Hope and Optimism, Improving Memory, Viewing America with Foreign Eyes
What Happens Next – 8.29.2021

My name is Larry Bernstein.

What Happens Next is a podcast where experts are given just SIX minutes to present. This is followed by a Q&A period for deeper engagement.

This week's topics include Hope and Optimism, Improving your Memory, and Viewing America Through Foreign Eyes.

Our first speaker will be Martin Seligman. Marty is the Zellerbach Family Professor of Psychology at the University of Pennsylvania and Director of the Positive Psychology Center. Marty has written an autobiographical book entitled The Hope Circuit: A Psychologist's Journey from Helplessness to Optimism. Marty is the former President of the American Psychological Association and is a giant in his field. Marty's work includes learned helplessness and for the past few decades, Marty has focused on positive psychology, optimism and happiness. Today, Marty is going to speak about the role of agency in innovation.

Our second speaker will be Michael Kahana who is also a Professor of Psychology at UPenn. I met Michael at a Penn Day event that I hosted and was incredibly impressed by Michael's intellectual curiosity and his passion for his research. In fact, I was so moved by Michael's presentation that I decided to invest in his new company Nia. The company uses brain implants to improve a patient's memory. The results have been incredible, and I want you to hear what progress his team is making in brain science.

Our final speaker is Jorge Castañeda. Jorge is the former Mexican foreign minister and presidential candidate. Jorge has written extensively on Latin American left-wing politics, and has also authored a biography of Che Guevara. Today, Jorge will discuss his new book America through Foreign Eyes. Topics will include the world's reaction to the debacle in Afghanistan, the likelihood of a democratic revolution in Venezuela and Cuba, Mexican and Central American migration to the US, and Hispanic partisanship.

There will be NO What Happens Next the following Sunday as we will be celebrating Labor Day.

Let's begin today's program with our first speaker Marty Seligman.

Martin Seligman:

Here's my grandiose hypothesis. It is that agency, the mental belief that I can influence the world, has changed the course of history. In particular, when individuals, cultures have a belief in agency, that's the immediate cause of progress and innovation. And in the absence of this mindset, the belief that "I'm helpless, I can't influence the world," humanity stagnates. Now,

the last 40 years of my work has been to show that in the laboratory and in present day real life, agency is causal, as there's 40 years of experiments which show that when a person has this mental state, "I can influence the world," she tries harder, she persists, she innovates. Conversely, when you undermine this mental belief in agency, she's helpless and none of this occurs. Now, what I'm going to do in the next three minutes is go through the sweep of human history now and ask, what do we know about the relationship of a belief in agency to human progress?

The first epoch for which we have writing is the Divine Age in which the gods command and we humans obey. Philosophically, during those times, we have limited agency and not even much self. Then, after the Bronze Age between 1100 BC and 600 BCE, the balance between the agency of the gods and the agency of humans' tilts toward humans. Greece develops much expanded agency by 400 BCE and material, technological, artistic, and political progress all follow from the presence of this agentic self. And this is true about the same time, not only of Greece, but of Judeo-Christian biblical civilization and of China. In each of these three, when there are periods that believe in agency, you get progress. When you get periods in which humans don't believe in agency, progress comes to a halt.

Now, going back to Western history, as Rome declines, the theology of Augustine takes over. Augustine says we don't have agency. Anything good that happens, any avoidance of bad is God's grace. And from Augustine's anti-agentic stance, 1000 years of stagnation occur, Middle Ages. Very little is invented. And then around 1450, when these beliefs have theologically cracked, an age of agency begins in the West, but not elsewhere as human beings reacquire substantial agency. Then, enormous progress from 1450 to about 1525 when the Reformation occurs, and contrary to what you were taught in school about the Reformation, the Reformation is predestination, the belief in the lack of human agency. Lutheran Calvin out Augustine and progress grinds to a halt. With the overthrow of Puritanism, Calvinism, in England in 1660, progress resumes.

You get Newtonian science, medicine, wealth, capitalism, political revolution, all which occur from a rebirth of agency. Agency then democratizes, particularly in America, during the Industrial Revolution, and around 1950 it becomes universal as technology explodes. The future, what's next? The world is now in labor. It's about to give birth to an age of agency populated by fully agentic individuals who peer far into the future in order to flourish. If the following potential barriers can be overcome, nuclear war, pandemic, climate catastrophe, racial warfare, financial collapse, if we can avoid these things, we are coming to an age of unprecedented progress. Mindful of the limits of human agency, this will be our first age of well-being.

Larry Bernstein:

You mentioned Calvinism. Let's start with that. Max Weber wrote the book *The Protestant Work Ethic* and the Calvinists really seemed to be at a forefront of progress and you spoke against Calvinism.

Martin Seligman:

That it really is a myth the notion that the Protestant ethic causes progress comes out of Calvinism. Basically, Calvin believed in the utter depravity of a human being. He's an Augustinian and he believes in total predestination. But what happens between Calvin 1550 and 1650 is a revolution in Protestantism, which does establish a Protestant ethic. It's called Arminianism, Larry, and that's heresy against Calvin that says, "We can participate in our own grace. We can do things to get into heaven. It's not predestined." And that becomes the Protestant ethic that becomes Methodism and becomes Protestantism in America, particularly after the fall of the Puritans around 1750 in America. So, the Protestant ethic that works is anti-Calvin.

Michael Kahana:

Marty, fascinating thesis. I wonder if you see in recent years a shift away from a belief in agency, as we've begun to associate medical brain maladies with all sorts of human actions and suggest that people do things because this part of their brain is too big or too small or too active or not active enough.

Martin Seligman:

The answer is, I don't know, but I'm going to find out. And let me tell you how I'm going to find out. I've decided that cherry picking through history is not a very good idea methodologically. So, basically, with machine learning, we've created a vocabulary of the lexicon of agency, the lexicon of efficacy, and so what we now do is we plow through things like the front page of the New York Times over time and we can ask, does agency increase and decrease quantitatively, and correlate that with human progress. This very important question that you're asking very much about the human future is, has there been a decline, particularly in the last 20 years, in the belief in agency? And we can correlate that with, we have quantitatively measured progress as well.

By the way, what we're trying to do with that, Mike, is, for any given time slice, like 1800 to 1900, we take all the major progress events in five different kinds of progress, we multiply them by how important they are, we sum them up, and we ask you in any given decade how much of that occurs. You can actually look at changes in progress as a function of changes in the lexicon of agency.

Larry Bernstein:

You mentioned that there's been 40 years of lab, I want to discuss a couple of those experiments that I read about in your most recent book The Hope Circuit that might be relevant and you could tell me how you're going to apply it. The first thing you mentioned is your use of the going through the articles in the New York Times and what it reminds me of was the experiments you did with regard to ascertaining whether or not an individual is an optimistic person or not. And because it was difficult for you to interview everyone, what you did with sports stars was you read articles and looked at their quotes in the newspaper and you were able to, using certain criteria, grade them with levels of optimism. Can you comment about that in the context of how you're going to use it for this?

Martin Seligman:

We started with the sports pages and we wanted to know if we could predict coming back from defeat based on the optimism of sports heroes. They don't take questionnaires, so what we did essentially was to take all the press briefings that we could find and form optimism and pessimism profiles for players and teams. I remember when we were doing this, the Celtics were a very optimistic basketball team. The Sixers were very pessimistic. We formed a profile. We then went to the next season and we looked at sports betting, which is great because you have a predicted outcome line and the prediction was that optimistic teams like the Celtics after they were defeated would do better than expected and pessimistic teams like the Sixers, when they're defeated, would do worse than expected. And we found in both Major League Baseball, Olympic swimming, in which we could actually do the tests, and basketball that optimistic athletes, when they're defeated, do better than they're supposed to. Pessimistic athletes do worse than their predicted to do.

Larry Bernstein:

One interesting other addition to that analysis, you mentioned in the book that when you looked at the optimism or pessimism of the coach, that also was a very important predictor and more important than any particular player. How do you think about the role of the coach and his relative optimism in helping improve a team?

Martin Seligman:

Well, I think this is about leadership, and after we spent hours and hours doing every individual player's optimism and pessimism and analyzed, after all that work, we found that if we just evaluated the coach, we would have gotten the same predictive power. And that suggests that the leadership about optimism in general is contagious and optimistic leaders engender trying harder and innovation. Pessimistic coaches and leaders engender helplessness.

Larry Bernstein:

I want to switch to one of your colleagues, Angela Duckworth's work on grit. Does this have any applicability here, either in its methods of how to determine grittiness, whether it's a good predictive of success away from either intelligence or optimism, or is there some linkage between agency and grit that's important?

Martin Seligman:

Yeah, very much so. Angela, I'm very proud to say, was my PhD student. So, naturally, there is a relationship of helplessness and optimism to grit. Where does grit come from? What are the variables underneath it? For me, one of them is optimism. Otimism is one of the ingredients that leads to grit, both of which produce perseverance, trying harder, overcoming obstacles. Grit has the unfortunate side effect of getting you not to quit even when it's not promising out there. Optimism requires flexibility, the ability to recognize that you're hitting your head against an unmovable wall. So that's where grit and optimism diverge. There's no such thing as flexible grit, as far as I know.

Larry Bernstein:

What an interesting experiment, and you discussed this I think in your Learned Optimism book, you talk about grittiness. The experiments that they used, the marshmallows or the "Don't eat this cookie" experiments that you've done, how do you feel about our ability to evaluate a person's grit? And is it a defined born characteristic or do you think it can change? And I want to bring it back to agency for a second. Do you think that, are you born believing you have agency? Are you affected by your peers or the leadership in terms of your agency? And can you learn to be either a leader or that you have ability to change the world?

Martin Seligman:

For the grit question, ask Angela. But I can answer the agency question. First, efficacy, the belief that I can control the world, optimism, is about 50% heritable. We've done twin studies on it and identical twins are much more concordant for optimism than fraternal twins. One of the things we know about optimism, a major component of agency, is that it's highly heritable. The second thing we know is that the world changes it, you can learn it, and so I've devoted a large part of my career to teaching pessimistic people how to become optimistic. So even though it's heritable, like many heritable characteristics like alcoholism, for example, you can change it. The essence of changing pessimism into optimism is teaching people to argue against their most catastrophic faults, to argue realistically treating the thoughts that say "I'm a loser, I'm never going to succeed" as if they were shouted at you or someone whose mission in life was to make you miserable and to realistically argue against them. And that is the key to changing pessimism into optimism, to changing helplessness into efficacy.

Larry Bernstein:

I want to ask you about longitudinal studies. We have a mutual friend George Vaillant who worked on a longitudinal study called the Harvard Grant Study. These were lifelong interviews with the Harvard class of 1941 and 1942. And in your book, The Hope Circuit, you talk about the incredible power of longitudinal studies. Are you able to use longitudinal studies to evaluate agency better than some of these other tools you're talking about? How would you design a longitudinal study to find out the key aspects of your new hypothesis?

Martin Seligman:

A longitudinal study requires that you look the same person at different times. So, indeed, there are longitudinal studies of optimism and efficacy, and our best evidence comes from them. But this is a barrier in history, that is, while you can look at Israelites from 800 to 600 BCE, it's not the same people. You can't do longitudinal studies. So longitudinal studies are a great method for separating historical effects from individual change. Can't do that in history, except when you have the same person over time. One can, for example, look at Newton's sense of agency in his early writings and later writings, and indeed that's a conceivable thing to do with the new methodologies of agency. But, for the most part, historical analysis is limited by the inability to do true longitudinal studies.

Larry Bernstein:

I totally see your point. I want to just mention an interesting historical analysis that a MIT historian Frank Sulloway who wrote the book Born to Rebel: Birth Order, Family Dynamics and Creative Lives. And I don't know if you know his work, what he was very interested in was birth order and whether that affected whether you believed in new, innovative ideas.

Martin Seligman:

Yeah. I do know his work.

Larry Bernstein:

So just for my listeners' benefit, here's what Sulloway did. He would look at diaries of individuals and then look at their siblings and then see who believed in Newton's theory or Darwin's theory, or the earth is flat or in geological plates, for example, I think were the four major aspects. And what he found was firstborns didn't believe in innovations nearly as much as the second or later child in birth order. And he believes that the first born is more conservative, wants their parents' attention, and is less willing to be open-minded. Do you like Soloway's approach to analyzing historical fact? Is there anything from that, that you think you can use for your benefit?

Martin Seligman:

Yeah, I do. I think Soloway's ingenious and indeed it makes a lot of sense, particularly for Darwinian and Copernican revolutions. Unfortunately, for the great sweep of history, we're not going to know a lot about whether or not these people are first born or not, but it's a sensible thing to look at. Statistically, when people have taken Soloway's approach and looked at large samples of kids, it's a very small effect.

Martin Seligman:

But for the Darwinian effect, it's really stunning.

Larry Bernstein:

You mentioned Augustine's work and I imagine that in the West, very few people would have actually read Augustine at that time. How important are these philosophies in effecting millions of people, particularly many who are illiterate and had no access to the big ideas that existed at the time?

Martin Seligman:

Yeah, that's a very important question. And we look, for example, in 100 year periods across the Middle Ages at prayers, what people say before they go to sleep.

And what you essentially find out is after Augustine and up to the time of Aquinas the prayers are all about God helping me. They're not about individual agency. And then, as the Renaissance approaches, Augustine, Abelard, Aquinas, you start to get more and more agency in the prayers. But, basically, the theology of Augustine and other major theologians is

transmitted through prayers and stories, and we think in that way, seeps in to the beliefs of the people who can make a difference.

Michael Kahana:

Marty, Mike Kahana again jumping in just to ask you about going more ancient, if you look at prayers that ... For example, I happen to be familiar with the Jewish tradition. You'll see a lot of very strong emphasis on agency in a much earlier period in history if you look at even in what are called the chapters of our fathers. You'll see language about how the reward for a good deed is that it will lead you to do another good deed, and the punishment for a bad deed is it will condition you to do more bad deeds. I mean, that seems ... Isn't that all about agency there?

Martin Seligman:

I think you and I may disagree about the Old Testament, particularly the Torah. We've completed a complete analysis of agency words in the Old Testament and the New Testament, and what we find is indeed there are anecdotes. There are periods in which there looks like high agency, but quantitatively, the Torah is very God-agentic and not human-agentic.

Just a couple of examples, Mike, when Abraham is instructed by God to sacrifice Isaac, he doesn't question it. He obeys. He goes up to the mountain and is about to sacrifice Isaac, and God intervenes and tells him not to. Indeed, in these passages, there's no human agency, and then wonderful story, the burning bush. God tells Moses, "Go to Pharaoh, and tell him, 'Let My people go.'" You remember what Moses says? He says, "I can't do that. I'm a stutterer. I'm a stammerer." God says, "I will put the words in your mouth."

Now, those are just two anecdotes, and indeed there are anecdotes like, "Choose life" and the like, but quantitatively, the five books of Moses are God's agency and the Israelite obedience to God. One of my friends who said the only choice in the Old Testament is the choice to believe in God.

Larry Bernstein:

Just a follow-up on Michael's question here. You just mentioned that how you apply religion was critical in determining agency. So, what you said was, "I looked at the prayers." You said before bed. I want to follow that up with how we use the Old Testament in the Jewish tradition. So yes, it's text, and I'll just give you an example from my own experience. My son was bar mitzvahed a few years ago, and as part of the Reform Judaism tradition, what we do is that my son reads from the Torah, and then he has to give a little speech. We met with a group all preparing for their Bar Mitzvahs, and my son asked the Rabbi, "Can I use humor in my speech?" The rabbi said, "Absolutely. I mean, humor is core to the Jewish tradition. Absolutely. Jonathan, don't do anything that is disrespectful, but you can use humor."

Larry Bernstein:

Jonathan's Torah portion was from Leviticus about the kosher laws. The first thing he started his speech was, "What's your bacon policy?" I know mine. I eat it, and I love it. Now, the text is

the text. No bacon. No choice My son gives his interpretation of the text and what's unusual about the Jewish religion, is what is a 13-year-old doing on the bema to begin with, and why do we care what he has to say about his bacon policy? I wonder how to think about text and then how to think about its application in the religion.

Martin Seligman:

Yep. An important point, Larry. It's very clear that we re-interpret text according to the beliefs that have come to pervade the time we live in. In spite of Old Testament Judaism being about very much obedience to God and lack of agency, Judaism is a religion of enormous agency. The accomplishment of Jews across the world is amazing. Very interestingly, Calvinism and Lutheranism are still around, but they don't believe in predestination anymore. They don't believe in utter depravity anymore. In the same way that the Jewish tradition reinterprets the texts to be coherent with larger forces about the importance of human agency, human agency has become irresistible in this time.

Larry Bernstein:

We got a question from the audience. This one is from Irwin Warren. He says, "Pick a different story. How about Sodom and Gomorrah, where God provides agency in spades?"

Martin Seligman:

Yep. So indeed, Abraham argues with God about the number of righteous people that could be found in Sodom and Gomorrah. But notice that Abraham is dissenting, but it's still in the context of it is God's power to destroy Sodom and Gomorrah. So indeed, there are good instances, and that's one, in which the heroes speak back to God and wrestle with God. But quantitatively, if you take the whole sweep of agency words in the Torah, they're overpowered by God's agency as opposed to human agency. When you get to the Judges, when you get to the rest of the Old Testament, now you get human agency in force and obedience to God and God's agency quantitatively diminished and human agency, and here we're dealing with stories about 1000 BC as opposed to 1400 BC. You're getting progress, and you're getting human agency again.

Larry Bernstein:

Just as a follow-up on Sodom and Gomorrah, I mean, what I remember from the story more than anything else is how clever Abraham is in his negotiation tactics. Yeah, yeah, God's got all the power. Yeah, yeah, I know. But as a metaphor for life, and I take this as a story, is, "Oh my goodness. What a clever negotiator, how Abraham kind of broke this thing down and put God into a corner." I mean, God probably knew what Abraham was to say before he said it, but he fell into the trap all the same.

Martin Seligman:

Yeah. Good, Larry. Just to counterbalance that, next Passover, look at the service very carefully for the lack of human agency and the presence of only God's agency. A real counterbalancing here. The Sodom and Gomorrah story, Jacob wrestling with the angel, choose life are all good

counterexamples, and that's why I don't cherry pick here. That's why we take every word in the Torah, every phrase, and quantitatively ask, "What's the ratio of God's agency to human agency?" That's what changes.

Larry Bernstein:

Just a follow-up on Passover. What I find amazing about Passover is here is one of the major Jewish holidays, and there is no rabbi in the house. We have a prayer book, we have a group of people, usually family members, and we're going to talk this thing through. Let's try to learn what we can from this experience. For me, I think there is an enormous amount of agency in the tradition, the fact we could create our own text, the fact that we decide when we're going to eat. I mean, there's some rules and stuff, but on balance, it's a very pro-agency sort of experience, unlike many other religions. The following week, sometimes I go, and I go to church and I hear the Easter experience in a church. I'm always awestruck at the comparison between the Passover Seder and the Easter services in church, because it's really focused on the priest and following his specific direction. How do you think about agency versus non-agency in the religious experience?

Martin Seligman:

Oh, well, this is a lot of what I work on, the evolution of agency and the religious experience. So very important is the Catholic reaction to the Reformation. The Reformation is hugely anti-agentic. It's predestination, it is utter depravity, and war breaks out across all of Central Europe. There's a 30 years' war going on. The Council of Trent is the Catholic answer to the Reformation. It goes on for 25 years, and it decides on two things. One is the doctrine that priests will follow and still do about human agency. It's anti-predestination. It says you can do good works as a Catholic and get into heaven. Slaps Luther in the face about that. But the other thing the Council of Trent does, and I can just, like our faculty meetings, Mike, understand the compromise. It doubles down on the superstitions. It doubles down on saints, on hell, on the superstitions. The Inquisition indeed followed from the Council of Trent. So importantly, in Catholicism and then after Arminius follows in Protestantism, the priests are talking about you can do things to get into heaven. You have human agency.

Michael Kahana:

Okay. Well, I disagree with Marty on the point about the Hebrew Scriptures, and maybe it's not worth spending the time of this program to go through it. But since Marty, you gave the example of Moses and not being a man of words, I thought I would look it up, because I remember that story differently. Moses said to the Lord, "What if they do not believe me and do not listen to me, but say, 'The Lord did not appear to you?'" The Lord said to him, "What is in your hand?" He replied, "A rod." He said, "Cast it to the ground." He cast it to the ground, and it became a snake. Moses recoiled from it. Then the Lord said to Moses, "Put out your hand and grasp it by the tail." He put out his hand and seized it, and it became a rod in his hand that they made believe that the Lord, the God of their fathers, the God of Abraham, Isaac, and Jacob did appear to you.

So in this story, and we can go further, and it keeps on going, it's fascinating, because it's the story where God is telling Moses to use agency to do his thing, right? Moses is responding, "Perhaps," and this may be to your point, in a way that is more reflective of the ancient culture, which is to say, "But no, I don't have agency." But God is telling him, "No, you do have agency. Go do it. Take that staff. Throw it down. It'll become a snake. Grab it. Take your hand. Put it in your bosom. It will become leprous. Put it back, and it won't be leprous anymore."

Then finally, when Moses persists and says to God, "No, I can't. I can't. I can't," God says to him the final word, which is, "Show them. Look at the water that I will turn to blood. When you see the blood," and the way I learned the story is when Moses realized all of the death that was caused by casting the males into the sea, that then he was able to take agency upon himself. So anyway, I mean, we could spend forever going back and forth.

Martin Seligman:

We're going to have a great time. We're going to have a great time debating it. Notice what's absent in the burning bush story and your very good telling of it is choice. Moses doesn't choose to do these things. God commands him to do these things. So, for me, the question of decision and choice as opposed to obedience is crucial to agency.

Larry Bernstein:

I wonder if you can do natural experiments comparing different religions of individuals at specific periods of time. For example, could you compare Protestantism with Catholicism with Islam or Judaism at coterminous periods to evaluate creativity or innovation?

Martin Seligman:

The answer is not coterminous periods, but very importantly for Islam, for Catholicism, for Judaism, across time, I want to correlate changes in belief in agency with changes in progress. These are not coterminous in time. The history of China, Judaism and the Hellenic tradition are actually coterminous, but Islam is not. For me, it's within a culture that you want to look at changes in the philosophy religion of agency as a driver of stagnation or of innovation.

Larry Bernstein:

I worry about this experiment deciding causality. In other words, let's say you're in a period of enormous economic growth. Does that economic growth increase agency, or was it the agency that increased economic growth?

Martin Seligman:

Yeah, so that's an extremely important question, and as I said at the outset, I can only determine causality by experiments in the laboratory now. I'm very interested in the origins of the Industrial Revolution, Britain 1800. Indeed, in the lexicon, you get big increases in optimism and agency, but Britain has just become enormously wealthy between 1750 and 1800. The British tolerate eccentricity. There's more coal being burned in Britain. There's more energy. The upper classes have more time to tinker. We don't know which of these things is causal, but

very importantly, let's distinguish between remote causes, like becoming rich, and proximal causes, like the belief that I can change Michael's mind about the Old Testament. So that's an immediate cause of my having a dialogue with Michael. Agenticism is about proximal causes, and most of the confounds are about remote causes, which bring on the mental state of agency.

Larry Bernstein:

Marty, what are you optimistic about as it relates to your work on agency and innovation?

Martin Seligman:

Well, I think, as I said, the world is in labor. We're entering an age in which there's never been as much human agency, and I keep thinking about 1365, Giuliano of Norwich and the Black Plague, the worst Western plague we've ever had. What Giuliano writes is the following and expresses my sentiment now about our future. Giuliano says, "He said not, 'Thou shall not be travailed.' He said, 'Thou shall not be tempested.' He said, 'Thou shalt not be diseased.' He said, 'Thou shalt not be overcome, and all shall be well. All shall be well, and all manner of things shall be well.'"

Larry Bernstein:

That was beautiful, Marty. Thank you. We're going to go into our second speaker. You've already met him a little bit in the Q and A. It's Michael Kahana. Michael is a Professor at Penn in psychology and has been doing cutting-edge research with regard to memory. Go ahead, Michael.

Michael Kahana:

Thanks so much. Well, this was great to share the conversation with Marty. My comments will be all about agency and obedience, and I didn't think I was going to start out that way. It all goes back to my beloved grandmother, who helped to raise me as a young lad. With her, the lesson was agency. "You must do it." Whatever she wanted me to do, it was, "You must do it." So it was agency and obedience all at once.

I'm going to talk to you about exciting recent advances and how we can address the tremendous challenge that we all face of memory loss. We want to come up with therapies to treat individuals who have memory loss, and that's important, because we will all likely suffer from significant memory loss as we get older, and certainly individuals who have neurological injuries, neurological diseases, or brain injuries.

When I began studying human memory three decades ago, I was not thinking about brain signals recording from implanted electrodes or certainly not thinking about conducting, as I'll explain in a moment, closed loop electrical stimulation of the brain in patients with memory loss. Instead, I began my scientific journey working on mathematical models, and my goal was to understand how neural networks as implemented mathematically as described by these mathematical models could perform memory functions in much the way that we do.

But my grandmother kept coming into my room, and she'd see me working on my computer or doing my math. She would say, "But how is that going to help people?" I don't know if it was agency on my part or obedience that led me on the journey that I'll describe. Maybe it was a mixture of both, or maybe that's the fundamental challenge in life, is how you reconcile those two things.

Well, I guess they say that good things happen when you're prepared for them to happen, and in my case, I stumbled into studying the brain when I met a neurosurgeon at Boston Children's Hospital who invited me to speak about memory at the Harvard neurology neurosurgery grand rounds. After my lecture, Dr. Joe Madsen, a good colleague and friend, took me to the epilepsy monitoring unit, where I saw a teenage boy lying in bed and playing video games, another example of agency. In his case, he had wires coming out of his bandaged head that were connected to a reporting system that measured signals from deep inside of the brain.

When I saw this, I was mesmerized. I was doing mathematical modeling. I was doing experimental studies. But the idea of studying the brain was not part of my research program, and when I asked Joe Madsen and the other physicians there, "Who's analyzing these precious data? These are electrical signals that you could somehow correlate with actions in the game, what the subject, the child is doing." What I found out was that every day, they delete the data at the end of the day, because there's not enough room to store all the data. So that night, I drove to the Micro Center computer store in Cambridge. They had computer stores back then, and I started buying hard drives.

My research on the neural basis of human memory grew into a large multicenter collaborative effort that over 25 years led to the discovery of various patterns of neural activity that mark moments of successful learning, successful memory, recall, and recognition. These studies were principally conducted in patients who had drug-resistant epilepsy, who were fitted with hundreds of electrodes implanted throughout the brain. Why? In order to map seizures, figure out where the seizures come from so that their seizures could be treated neurosurgically.

I was fortunate that my group, along with maybe a half a dozen other groups around the world, created the field of human cognitive electrophysiology by really systematically studying these patients as they performed a variety of cognitive tasks, memory games, perceptual, other tasks as well.

Now, every once in a while, the doctors would do something called stimulation mapping. Because they want to avoid cutting out a part of the brain that's important, let's say, for speech. You don't want the person to have a deficit. So, they would electrically stimulate that part of the brain, and they would ask me, "Could you do the same kind of stimulation for memory?" I said, "Well, we could cook something up." The IRB approved it. We did it. Maybe it could help this patient so they wouldn't have a memory deficit.

Well, I noticed a few things about brain stimulation. First, often it didn't do anything, and often it would impair memory. But a couple of patients showed very clear definitive evidence for improved memory when we stimulate it. Weird. Why does that happen? The question was, could we somehow scale that up and turn it into an actual therapy?

Well, fast-forward years later. The type of brain stimulation that was done in the clinic was done in a very haphazard manner. Every patient was done differently. In 2015, the Defense

Department through DARPA, the Defense Advanced Research Projects Agency, funded a proposal that I had submitted for very large grant, much larger than typical research grants, about $25 million, that allowed us to conduct brain stimulation experiments at 10 medical centers in collaboration with engineers, scientists, and two medical device companies at the time. And what we were pursuing was an idea that I had, and the idea is very simple. It's premised on the notion of good days and bad days, good moments and bad moments. So sometimes memory works well, sometimes it doesn't work well. We all have good days and bad days. And if you ask anybody who treats patients who have memory loss, they particularly have good and bad days. And I was able to quantify the good days versus bad days and show that the difference between a good day and a bad day is almost a factor of two in memory performance.

You could take somebody and double their function in the memory test by making all their bad days good days, if somehow you could magically do it. Now, how would you do that? Well, maybe you can't do it. Well, around the same time, around seven, eight years ago, there was machine learning. Marty was talking about using machine learning for decoding ancient texts. We're using machine learning to decode the brain. And the idea here is simply to take all the data that we get from hundreds of implanted electrodes in a patient, and try and build a predictive model of when you have your good moments and bad moments with respect to memory. Now, if you can get that model to work, and we did and published many papers, showing that it works, if you can get that model to work, then maybe, just maybe, you could use that model to have the brain tell itself when it needs to be stimulated and how it needs to be stimulated and where it needs to be stimulated.

And we were able to do this. We published three articles in peer reviewed scientific journals demonstrating that by stimulating the brain at the moments when it is predicted to have a lapse of memory, and when you stimulate using parameters that modulates the machine learning classifier in a positive direction, you can produce an 18 to 19.5% percent boost in memory function. Now, we did this in the clinic with a big machine sitting beside the patient's head. And the next step is to say, well, okay. If Moses has to pick up the staff, what are we going to pick up? What can we do to address the fact that memory loss afflicts one in 12 Americans, and there's no effective treatment currently available? And the answer is to build a device that can be implanted in the brain that is small enough that you can slip it under the temporalis muscle on the side of the head, powered from a hearing aid, that would control a stimulator that would know when, where, and how to stimulate the brain using these machine learning decoders.

With support from the Federal government, the University of Pennsylvania, and some private investors, we spun out a company, Nia Therapeutics, that I co-founded. And Nia will complete the functional prototype device this January. And at that point, we will be about a year and a half away from running a, FDA approved clinical trial. And our first target population will be people who have significant memory impairment due to traumatic brain injury, because there's no therapy at all for traumatic brain injury. And from there, the therapy could be extended to a variety of other indications.

And just to paint a vision for the future as I see it, many of us have issues that need to be treated in various ways, whether it's a hip replacement or a cardiac pacemaker. These are relatively safe interventions that can cause a dramatic improvement in quality of life. Brain

surgery has become very, very safe. Speaking with a colleague brain surgeon who did over 320 surgeries in the last several years, he had 321 out of 325, I have the number now, no complications whatsoever, and four patients with minor complications that resolved with no lasting impairment. So very, very safe, about 1% chance of a complication, and the complications are usually easily treatable when you're in the clinic. My vision is that someday we will all be able to have a treatment for memory loss, using devices like hearing aids or cochlear implants, that would restore memory functions to some degree. And we'll find out soon when we run this clinical trial just how good we can make it work.

Larry Bernstein:

Fantastic, Michael. I want to start with trying to understand how it works. First of all, the most basic questions. What is a memory? How does the brain access that memory? Why would adding an energy pulse allow for better access to that memory? And then finally, I think that once we are able to grab that memory, how do we then use that memory in thought and speech and action?

Michael Kahana:

Well, now I have to remember five things. I'm writing an article on the big questions in memory that we don't have the answer to. And the first question that I'm trying to come up with... Well, I'm articulating how hard it is to answer the question of what is a memory? What actually is a memory? Well, I'll give you my tentative answer to what is a memory. A memory is an association between the content of an experience and the situational context, including when, where, and in what cognitive state that experience occurred. It's a linking between the actual event, let's say you asked me a question and I see your face on the Zoom and then linking it into its temporal, spatial, situational, emotional context that forms a tapestry into which all memories become woven.

Now, how do we access the memory? Well, we need a way of reinstating of essentially doing a mental jump back in time. The author, HG Wells, in The Time Machine, when the time traveler is questioned by the psychologist says, "Time travel is impossible," he retorts and says, "No, in fact, we do it all the time." Whenever you have a powerful memory of a past event, you are jumping back in time, you're doing mental time travel. Now, most memories don't have that kind of powerful mental time travel, but that is the element, is that you're able to somehow navigate through the space of context that linked to the memories.

Michael Kahana:

Now, that process, both the process of weaving the memory with the context and the process of navigating the memory space depend on a circuit, on a network, like in a city that is connected by roads and other modes of transportation, subways. There's a network of communication that supports those functions. And what's fascinating is that that network of communication varies in how well it works at moment to moment. There are traffic jams. Sometimes it just gets stuck and it doesn't work. And sometimes it works fine. And even in a patient who's impaired where it never works fine, sometimes it works poorly and other times it

just simply doesn't work at all. And the idea is to be able to rapidly decode the state of the network, the electrical state, and intervene in some way to alter that state.

The magic of this approach is that rather than being the external agent that is imposing the will like the will of a divine power on the actor, to call back to Marty's presentation, instead what we're going to do is we're going to say that the brain possesses the capacity to produce good function, but right now it's not. And we're going to just give it a little nudge, a little nudge to try and get it to do what it sometimes is able to do well. I don't know if I answered all five questions. I think I only answered three.

Larry Bernstein:

It's totally fine. What I found amazing in one of your previous presentations on this topic was I asked you, how quick do we know if you're in a bad state? Sometimes I might be the bad state a whole morning. And you said, "Well, I can pretty much determine that in milliseconds," type of situations. So, this morning, which is, for me, only a few hours because I get up late, and then there is milliseconds, which I can't even distinguish in time space. And what I think is interesting is how is it that we drift in and out of good and bad memory states in milliseconds? And then how is it that an energy pulse can do some sort of a reboot, like a computer reboot? My computer takes a long time to reboot. How long does it take my brain to reboot to go from this bad state to a good state?

Michael Kahana:

Those are really great questions, and we've actually just published a paper looking at the timescale of these good and bad states. You can decode the states very rapidly. Imagine a system that can decode the weather rapidly. You have an algorithm, you're detecting the pressure, the temperature, the humidity, the air flow. You've got all these things going into a computer. You might be able to, like a thermostat, you're able to read out a rapid index of air quality or likelihood of precipitation. In our case, it would be likelihood of forgetting. That doesn't mean that that your mental state is going to change very quickly.

And you can think of it as a diffusion process. You could think of it as like stock prices. They can go up and down at different timescales. There are going to be fluctuations that are very fast and fluctuations that are medium term and fluctuations that are much slower. You can actually think of it as almost like a diffusion process. It's not as simple as a fusion process because it's bound to a range. Is it an Ornstein–Uhlenbeck? Is it something more complicated? But you can think of it as something akin to a diffusion process, something that's fluctuating, and that has fluctuations that many timescales from very slow to much faster.

Larry Bernstein:

At the beginning of your talk, you remembered your grandmother coming into your bedroom and asking you to do something good in the world. I imagine the way that memory works is you don't remember exactly what she said, but you got the gist of it. The memory is the gist, do good. She may not even have said that, but that's the key essence of it. And there's other stuff. You remember her tone. You may remember her love. You may remember the smell, all these

things. And there's these axions in the brain. I actually don't know how the brain works at all, but there must be these axions, love, smell, sound, the gist, all connected.

And then when it hits, all of these memories are released at once. What I don't understand is when memory is impinged or impugned in some way, is it the axion network that's compromised? And then how does it lift out all those different axions to all those different places in the brain? Because I imagine that smell might be one part and sight in another, and the gist is in a different place as well, because I imagine that you're doing with the electric pulse is very location particular with regards to the electrical shock. You're shocking maybe into the smell area, you get the smell, but what has that got to do with the gist?

Michael Kahana:

It turns out that there are a couple of important elements here. I didn't really explain what are these signatures of good and bad memory in the brain? There are two principal signatures of good and bad memory and I finally gave them a name, TAG and TILT. TAG is increased data oscillations, which are slow frequency oscillations, diminished alpha oscillations, and increased gamma oscillations. I call it +T -A +G, TAG. And TILT is a general tilt in the power spectrum of the Fourier analysis of the brain signal. Now, I'm not going to go into Fourier analysis for all your listeners, but the idea is that there's this time series of brain activity that has two characteristic patterns that occur in multiple memory centers of the brain at moments of memory success versus memory failure. You can decode those in those centers.

Now, the precise regions where you see how much of the TAG and how much of the TILT will be different for every single person. And so that's where the machine learning algorithms are learning a patient specific formula for how one person's brain can be restored. However, on average, there are these general patterns. Now, to come back to the question about my memory of my grandmother, I think that when you have... There's a movie called Inside Out. I don't know, has anybody seen Inside Out? It's a Disney movie. Marty's raising his hand. I'm glad that I'm not the only person above the age of 50, Marty and I, and I think we're all in the over 50 club, who's watched Inside Out. It's a Disney movie. And there's this idea of these poor memories, really core memories, the core memories are maybe related to, I don't know, whether you're optimistic about something. But my grandmother is certainly a core memory for me.

And I think that the idea there is not that I'm remembering a specific episode. It's that many things over my life remind me of those events and they get reinterpreted and modified repeatedly, so that by now, the memory is more of a caricature that has been shaped by my life than any original episode. In this particular case, she was Hungarian and I can hear exactly the words that she said in Hungarian, because those don't have a lot of interference and she was the only person who ever in my life spoke to me in Hungarian. I hear only a few things in Hungarian. So that gives me a precise version of that memory. But all the rest of it is just a feeling, as you said. It's recursive. It just repeats and builds and it gains compound interest over time, so to speak, in how it influences who we are.

But in terms of the question of, how does a pulse affect the network? Well, if you have an electrical network that has different modes of oscillations, of connections, of correlations, and

it knows mode... Let's just make it very simple. Let's assume that we're just a good mode and a bad mode. Then all you need to do is figure out how to press a switch that will flip it from the bad mode back to the good mode. It's more complicated than that because the brain is going to tell you how to do that. But that's the idea, that you're trying to get it to switch modes. Just like if you see in those pictures where it's a vase if you look at it one way and it's a face if you look at it the other way, and how sometimes your brain just switches between the two images. So here, the idea is that there's a little pulse, an electrical pulse that will allow you to jump between the good and the bad state.

Martin Seligman:

Mike, this is great science that you're doing. I'm so proud of you.

Michael Kahana:

That means a lot coming from you.

Martin Seligman:

Can we get electrical control to increase the probability of good memories?

Michael Kahana:

That's hard. That's hard, because what I've done focuses on the system's ability to retrieve memories. So that means that if you're better at retrieving memories, you're going to retrieve all kinds of memories. So now you're talking about something that would bias the system toward good or away from negative memories. It would be a different kind of technology. So yes, I think you could. It would be a different approach. What you would do is instead of looking for the pattern associated with memory success versus memory failure, you'd look for the pattern of good memory versus bad, or maybe two patterns, good, bad pattern and the success failure pattern. And now you're trying to jointly modulate that. You want to drive the system toward good memory when the memory is positive, drive the system toward bad memory when the memory is negative. And that is theoretically possible.

I think that your question opens a much broader set of ideas, which is once you can decode all kinds of cognitive states and you can manipulate the brain to make it do more of what it would normally do, but biased either one way or the other, then you could imagine an assistive device, kind of like a better version of my eyeglasses that help me see, this device would help me use my brain more effectively, but in many ways, it could address anxiety or depression. You would just need a good machine learning model for anxiety, for depression, for positive affect, or for OCD behaviors or for anything else. And memory is, in a way, easier. Because with memory, there's very clear-cut moments of success and failure, and I can trigger them very easily, whereas with those emotional states, it's maybe a little bit less straightforward how you measure it at a moment-to-moment basis.

Martin Seligman:

Particularly important for me, since optimism and good memories are tied to agency. If there's a way of producing more good memories, very important for increasing agentic behavior. One more question, Mike. I think of memory as being in service of the future, that is, I think, the past and how we represent the past has evolved to be in service of an adoptive future. And indeed, I think we distort memory or select from memory for that purpose. Is there a neuroscience-electrical tank on the relationship of a memory, stimulating memory, and preparing for the future?

Michael Kahana:

Well, Marty, I'm glad you brought that up, because the future is what memory is really for. We can play this trick of going to visit the past, but the reason it's so valuable for me to my grandmother's memories is that it directs me to a more functional, adaptive, and productive future. And for some people, they have bad memories that direct them to future behavior that is less functional, less adaptive, et cetera. So, yes, I completely resonate with that idea. And I agree that when we imagine the future, we're doing it using the Lego blocks of our memory system. We are imagining the future with the past. As you were talking, I could imagine that the therapy that I'm developing, it could be standalone, but it could be combined with other therapies. Imagine a positive therapy intervention, coupled with a memory therapy where you turn on good memory at the moments when you applied positive psychology interventions. Then that would serve the role, not of specifically improving memory per se, but improving positive memories, creating strong, positive memories that can direct future behavior.

And if you have somebody who had early life negative memories, which then they reminisced and reincarnated and consolidated over a long period of time, those will color and flavor all neutral experiences with a tone of negativity. You could imagine a positive psychology intervention that would work better if it were combined, especially if a person, because we know depressed individuals have impaired memory, so it's hard for them to learn. And there may be reasons for that that we can't get into right now. But if you could improve their memory during an intervention, that could really be very helpful, I think.

Larry Bernstein:

Michael, when I first met you, I think it was five years ago or so, I asked you what a memory was, and you said something like 164K. And I said, "What are you talking about?" And you said, "It's the amount of memory. You've seen an amount of memory on your computer when you get an email, how many bytes it is." And I said, "Well, what is 164K?" And you said, "It's a bad Polaroid. That's about what a memory is." And then I said to you, "How do you know that?" And you said, "Well, in one of my epilepsy patients, we put an electrode in someone's head and we put some power on it and out came a memory."

Larry Bernstein:

And it was, "Oh my God, I'm in seventh grade history. I haven't thought about that girl, it must be 50 years. Do it again. Oh, there she is. I love it." How do you think about that memory in seventh grade history with the embellished characteristic of your grandmothers telling you to

do good, which was a false memory, it was a caricature of the memory? How do you think of the specificity of a moment verses of this other of the gist?

Michael Kahana:

Well, I love that you have such a great memory of the presentation I gave at the Penn Book Club. I don't know if that number is exactly the number, but I did have a number that I had calculated based on the number of neurons that are recurrent in one of the main memory centers of the brain. That number was really just saying theoretically this number of neurons in an average brain could store this number of bytes of information. And you could store many of these things. You could store potentially millions of these memories of that size, that Polaroid size. That's where that calculation came from.

You're absolutely right that I described a study that I didn't personally conduct, a former student of mine, Josh Jacobs is a professor at Columbia Bioengineering did this study where he was able to stimulate the brain and reliably evoke in a patient memories of that patient's junior high school experience, and consistently did it over and over and over again with this stimulation, which was a more compelling version of what was more anecdotally described by neurosurgeons in early years. Those are two related findings.

I think that this is a really fascinating question about why some memories can be evoked so precisely and other memories are more schematized or more generic. Obviously, I've seen Marty many times, I've seen you a number of times, Larry, and so it would make sense for my brain to create a composite and not try to hold onto every precise detail. But on the other hand, you can imagine an experience, a salient experience that does not have other competing similar memories.

We can all come up with examples. I do have some very specific memories that I can access from my childhood, but not so many. Most of them are more gist based, and only a few of them are very precise memories. And even the precise ones I don't even know how accurate they really are. But I think it's all about the issue of using those memories over time is that it will make it harder to remember the original memory.

Now, you're raising the possibility of would it be conceivable that we could somehow stimulate the brain so that all of our memories could be called back precisely? That's an open question. I don't know the answer to that question. I somehow think it's unlikely, but it's probably the case that we could evoke many more memories than those that we can call up with our own volition.

Larry Bernstein:

What am I going to remember from your talk? In real time, I'm engaged with you 100%. I'm giving you my all, Michael. And I'm listening and I'm trying to take it in. I got the visual of you, I got the background because this is a Zoom call for me, and yet, in a few hours I'm going to send this file to Rev.com and I'm going to get a transcript. And when I read the transcript, I'm going to be awestruck, and I always am, how much I missed. I'm telling you, I'm giving it to you, 100% but I'm going to miss tons of it. I'm going to go, "Oh my God, how did I miss that? What a fool. I really should focus more."

Larry Bernstein:

And then my mother's going to say to me, "Larry, how did Michael perform today?" I say, "Well, he did great. Here's what he said." And I will distill your half hour presentation into something like a 60 or 90 second gist of what you said. And then if you ask me a year from now what I remember from this incident, it will basically come down to the 60 or 90 seconds that I distill for my mother. Why is it that I miss so much? Why is it that looking over the written words is almost like a completely new experience for which I can now remember? And why is it that the story I tell is the one that will have the greatest recall?

Michael Kahana:

Let me start out by trying to answer the last of those questions. What I say will be much more easily remembered if it resonates with something that you previously thought. Your internal thoughts become part of the memory. There is no memory of me by myself. That does not exist. Your memory of me is filtered through your internal thoughts, and now your internal thoughts, in between my words when I'm hemming and hawing and trying to remember what was your other question, going to reconstruct your own version of what I was saying, and you're now going to think about your thoughts and your questions. That's a big part of the memory.

It's not correct to say that there's the original memory, which was perfect, then somehow you recode it your way and then you remember the recoded version. What I'm saying is that the recoding is happening as part of the original memory, and it's the decoded version that you will be able to more easily access later.

Larry Bernstein:

Marty, in your book you talk about that as you've gotten older, one of your best functions is to help your colleagues and your students do their best work. As you see Michael's dream of what he wants to accomplish, what are your thoughts on what he's trying to do? How can he improve upon it? As the elder statesman, what do you make of all this?

Martin Seligman:

Well, I'm very enthused about Mike's work. And for me, what Mike said about the therapeutic aspects for depressed people, but also, I'm very interested in normal people increasing their productivity, increasing their success. Since I know that success and agency depend on memories and thoughts, what Mike was saying about coupling of the right electrical stimulation to the right psychological interventions to produce more positivity, more success in life seemed like a possibility for a future. I hope Mike will be taking some post-docs to go in that direction.

Larry Bernstein:

Marty, as a follow-up to what you just said, my grandfather was a psychoanalyst. He studied at the University of Vienna in Freud's department. He was very disappointed when he came to the United States that Freud had gone out of fashion in the sense that drugs and other pharmaceutical solutions to depression had taken over. What's interesting here is that Michael

is offering another path; not talking to somebody, not taking a drug but to use electrical impulses to improve cognitive ability. How do you think about those three avenues of pursuits?

Martin Seligman:

As a psychotherapist, I'm sad to say that I think psychotherapy in its usual form, psychoanalytic supportive, even cognitive behavioral has arrived at a 60% barrier. Basically, I've written five editions of abnormal psychology once every five years, and I had to revise it every five years, but there were essentially no changes in the effectiveness of therapy or the effectiveness of pharmacology over the last 25 years. I think we need something new here. Basically, the talk therapies in all their forms and the drug therapies have approached at about 60% effectiveness against a placebo.

Mike, I think, is telling us there's a different way of doing things. The psilocybin people are telling us there's a different way of doing things. The genetic people are telling us there's a different way of doing things. And I think it's time we took those methods and ideas seriously.

Larry Bernstein:

Michael, going to a more recent presentation that you gave on this topic, I asked you what improvements you can make in a patient, and you said, "12 years." And I said, "What does that mean?" And you said, "I can turn a 70-year-old into a 58-year-old memory person." To my audience, earlier you mentioned 15%, 20% - I forgot the number you said now - improvement. How should we think about what we can accomplish here in terms of an improved memory state?

Michael Kahana:

I've actually thought a lot about this because this is one of the hardest things to convey to people. What does it mean? What are you doing? In normal aging, memory declines, say, between 50 and 70, and we can basically remediate about a little more than half of that decline, from 50 to 70, meaning... That doesn't mean that we've tested that on 70-year-olds and made them look like 58-year-olds. It's just trying to quantify the benefit that we've seen in our hospital studies at the bedside of these patients.

I think a much better way of thinking about the benefit is as follows: In patients who have memory loss due to brain injury, 1/3rd of those patients, based on our data in traumatic brain injury patients in the hospital who got brain stimulation, 1/3rd of that deficit should be fully remediated, and that means they should be back to normal, 1/3rd should show 50% return to normal and 1/3rd would show no benefit. On average, we're remediating about half of the devastating loss of memory caused by a moderate to severe traumatic brain injury.

That's, I think, probably from a physician's point of view, the best way to think about it is you have a patient who's lost a certain amount of function that caused major disability in that patient, and now, on average, you can restore about half of that function, but in reality, what you're doing is you're restoring different degrees for different people, with some people benefiting enormously and others maybe not benefiting so much at all.

One of the goals of an early clinical study with a device that's implanted is to see whether we can create a kind of a virtuous cycle with the technology where the technology can learn to get better. And I believe it can. The technology can learn over time to get better. We can't do that in the epilepsy situation or in a hospital situation where we have a short-term implant, but in a device trial, you could do that. The system will learn to get better as you amass greater and greater amounts of data.

Larry Bernstein:

I want to allow my listeners at home to understand what you just said, so I'm going to give a more layman analysis. What Mike was going to do is he's going to put these wires all over inside your brain, and he's going to be gathering information, and that's going to go into that hearing aid-like contraption in the back of your ear. It's going to gather all this information, all these impulses, good state, bad state, whatever; just data. And then Mike is going to download it at the end of the day when you go to bed, you're going to download all the information from your brain from that day, and then that information is going to be used to say, "Oh, we can do better than yesterday's software. We're going to have a T plus one software. The next morning, we install the new software, and let's do it again and see if I can do a better job. And you can experiment with one software versus another in terms of improving your memory state or not, you can do some experiments, and each day you can get better and better and better and better at that.

Michael Kahana:

Right. That's pretty good at explaining that. I should've explained that better, but the... Absolutely. The algorithms can learn; they can learn to decode better and they can learn which stimulation parameters work better. And the key is that without a device in a trial, there's no way to learn that. There's no dollar amount of National Institutes of Health, of National Science Foundation grant funding that, unless you can build a device and get it FDA approved put in humans in a trial, there's no way that we could actually determine how much better it can get over time. But I believe that the data we have already indicates that it could get much better.

This raises a fascinating question, which is am I going to be... What is research in cognitive neuroscience going to look like in 10 years? Because right now, we have to jump through all these hoops to try to figure out how to ethically obtain neural data, but in 10 years, probably thousands of us, 10s of thousands, maybe hundreds of thousands will have devices recording our brains. And that will be an incredible source of data. I can't even imagine. All the work I've done the last 25 years, once these devices are actually used to help people, they will become an incredible source of data that will teach us so much that we don't know about the human brain and maybe help us figure out how to cure other disorders.

Larry Bernstein:

I want to try one last question on you. It's a play that I saw. This is a play that I saw at the Writers Theater here in Glencoe Illinois. It was a new play, and it was about a woman with dementia. They had a robot which was a younger version of her dead husband. And the woman was lonely, she was a little bit demented, and what the robot would do is it would tell her

stories that the husband had told her previously that she loved. Is that what we're talking about? Reinstalling those memories? Or the use of pleasant memories?

Michael Kahana:

It's a very powerful idea that somehow, yes, in a sense that play is capturing an idea, and that idea is that although we think we've forgotten so many of the things that we once knew, it's actually still in there, it's just hard to get it, it's hard to access it. And I think that that is the big theme of this type of research, which is... I'm not trying to create a superman, superwoman, superhero, I'm just trying to let the brain be the best it can be given its capability.

I was talking to a friend of mine who had a spouse who suffered for many years with dementia, and this friend told me his spouse was able to do this incredible thing. How did that happen? If the physical substrate of the brain was simply unable to do it, if it was just broken, how come that day it did it? What was it that happened that day? And can we somehow make that day happen over and over and over again? That's the idea. Now, whether it's about telling the stories, but it's reinstating the context. Coming back to what you asked what is a memory? A memory is linking this information to some kind of a tapestry. And in that play, what you're hearing is how this woman's husband, when he was alive, created a tapestry, and if you could somehow recapture the tapestry, all of a sudden it would create these little sparks that would evoke memories that were otherwise inaccessible. And yeah, I think that that's... It's a very powerful idea.

Since you brought up that play and I was telling everybody about my grandmother, I'll just say one more story about my grandmother. When my grandmother had a series of massive strokes and she was in a nursing home, and the nurse's aids could not communicate with her because she was no longer able to speak English. She could still speak Hungarian. I don't speak Hungarian, but we would try to communicate with one another, and I understood a little bit of Hungarian. One of the things that was fascinating to me was her higher intellectual functions were preserved much, much longer, or long after she had lost some more basic abilities that almost they make it hard to see what she could do, what she did know, what she did understand. Of course, at a certain point in any disease process, it may be that at a certain point nothing you can do. But that's a very long road into the future. There's a long, long period of many years when people probably retain far greater functions than we can observe or that they can show us that they have, and so maybe we can help those abilities come to the fore.

Larry Bernstein:

What note of optimism do you want to end on, Michael?

Michael Kahana:

During this difficult time, we've all been through so much the last year and a half, and this show has been a bright point in my weekly schedule. Every Sunday afternoon I'll usually go for a jog and listen to the program, and it's been a pleasure. I guess all I want to say to everybody on the call is try to make some good memories because those good memories will recursively reactivate and will flavor and imbue all the neutral memories that surround them with the positivity of the good memories, and that in turn will evoke more and more positivity. Flavor

your cognitive context with positive memories. And whenever you can, relish those positive memories because you never know when they'll pop back up to help you when you need a little lift.

Larry Bernstein:

That's beautiful. Thank you so much, Michael.

Michael Kahana:

Thanks so much.

Larry Bernstein:

Our next guest is Jorge Castañeda. Jorge is a Global Professor in NYU's political science department, and he is the former foreign minister for the country of Mexico. Jorge was a candidate for president of Mexico in 2006. He is the author of several books and his most recent is entitled America Through Foreign Eyes. Jorge, please begin.

Jorge Castañeda:

The recent events in Afghanistan and the way the American withdrawal from that country has been handled by the Biden Administration have led many people all over the world, and in the United States, to question whether this marks the end of American hegemony or the United States as a superpower. These are issues that I addressed directly in my book, America Through Foreign Eyes.

I particularly address the issue of as an American characteristic, a lack of a sense of history, going back to Dickens and Tocqueville and as recently as people like V. S. Naipaul, foreigners looking at the United States have been forced to deal with this issue of why history is not as important in the United States as perhaps elsewhere, and why that matters because it might be that Americans don't care about history because they don't look backwards, they look forward. And what's wrong with that?

Why does it matter? Well, one of the reasons it matters is that if you don't pay a lot of attention to history, you can get into trouble, for example, on foreign policy issues.

It's not that there are not a whole bunch of American historians who would not have been able to tell the Bush Administration, because this began with Bush 43, really, he is the one most responsible for the whole debacle, that the US would never be able to fix Afghanistan the way he wanted, that it would not be able to build the nation where there is none, that it would not be able to build Western style institutions where there are none and that this was a lousy idea, an idea that the Brits first tried to do back in the 19th century and Kipling wrote a sort of scoff of all of this and this book called The Man Who Would Be King in a theoretical kingdom, which in fact was Afghanistan. And this of course happened to the Soviet Union between 1979 and 1989.

It's not that historians in America didn't know this. It's that the policymaking people didn't listen to them. They thought they knew better, the ones who made the decision, not

necessarily to invade Afghanistan in 2001, but to change the mission or the purpose of the invasion.

And I end up being highly sympathetic to almost everything that is proper to American civilization, including the limits to American hard power. But increasingly, I make the point in the book and many others have made it that the United States really should depend more on its soft power than on its hard power. American civilization is extraordinarily powerful, potent. It is not anywhere near to being eclipsed by the Chinese or by anybody else.

Larry Bernstein:

Afghanistan, which is obviously in the news right now, but really not a strategic interest of the United States after the passing of Osama Bin Laden. What I thought you were going to say but didn't say was that in order for the US to be successful in its foreign policy, it would need the support of its allies. And with Afghanistan, when the United States began its war in Iraq, it passed Afghanistan to its NATO allies. But then they cut and ran and then left the United States managing it afterwards. And then it appeared that Biden grew tired and just decided it was the end of the run. What is the role of the allies in these foreign policy situations? And second, how do you persuade the allies to stick around? And then third when should we go home?

Jorge Castañeda:

Well, in terms of allies, you can brow beat people into supporting you, but if their heart's not in it, they will forsake you when they can. Bush kind of bullied Tony Blair into supporting the invasion of Afghanistan and Iraq. But of course, once Blair was out of office, that was the end of that. If you can't convince people of what you're doing, no matter how much that you brow beat them, your allies will not go along with you indefinitely.

And we're seeing this today. The allies want the Americans to remain in so they can evacuate everybody because they can't do it themselves. They can't ensure the security of the airport in Kabul on their own. They need the United States to do that. That's what the indispensable power means today. But they don't want American priorities to be the only factor in determining when the United States leaves. The airport, on August 31st, they want the Americans to take into account the fact that they need to bring a lot of people out and they need the Americans for security and military coverage.

The United States has to think in terms of soft power as the way to convince people, other countries, other governments, other institutions in the world, whether they are the United Nations or the international monetary fund or whatever, instead of just using clout, which might get you a couple of years or two or three years of support, but at the end of the day, it doesn't work. What works are American ideas, American culture, American civilization, as I say, American financing for civil society. I saw a calculation the other day that of the so-called trillion dollars that President Biden always mentions regarding money plowed into Afghanistan over these 20 years, something like 850 billion were devoted to military activities. That's not soft power. That's hard power.

Larry Bernstein:

I want to talk about the Venezuelan regime. It's been non-democratic. The economy is in chaos. There are millions of refugees in Colombia, some in Panama. A group has moved to Miami. What should the US do about it? They worked with the Organization of American States. They met with the Brazilians and the Colombians and the Mexicans, and there was very little support in Mexico for either a hard power regime change in Venezuela. How do you think about how the US should react when there are problems like Venezuela in the region? Should Mexico have veto powers on that sort of decision-making? How would you recommend the United States organize a fighting force if it felt it was necessary in a place like Venezuela?

Jorge Castañeda:

Well, I start by saying, I can't conceive of any situation in which it would be desirable for the United States to intervene militarily in Venezuela or to encourage others to intervene militarily. First of all, it probably wouldn't work. Secondly, it would cost an enormous amount of money and lives. And thirdly, it's hard to say what real objectives would be attained. I mean, how important is Venezuela strategically to the United States?

There was a point when it was a major oil supplier of the United States, but what with shale oil and gas and renewables over the last 20 or so years, the United States probably no longer imports not even a million barrels a day from Venezuela, which can be replaced perfectly elsewhere.

I don't think the United States should give any ally, any friend, any neighbor veto power over what it does. But it should listen, and listening is not a strong suit for many Americans in foreign policy domain. I remember when there was an attempted coup against Hugo Chavez in April of 2002. And Condoleezza Rice was at the National Security Council and Colin Powell was at the State Department and we had developed a very good relationship. I was foreign minister at the time and one of the things we always talked about was Venezuela and I always said to both of them, "Look, let's talk before you do anything. You'll end up doing whatever you want anyway, but let's talk a few minutes before you make any, rush to any decisions."

Well, they never talked with us about the coup and Condoleezza Rice came out, like the New York Times supporting the coup right away and congratulating the perpetrators of the coup. Only for the coup to come tumbling down within 48 hours and Chavez was back in office. And it would have been relatively easy for people like myself and others in Latin America to have told the Americans, "Look, this coup doesn't sound right. We know coups. We do them for breakfast in Latin America, and this one doesn't look right. Let's wait a couple of days before committing too strongly."

You don't know give veto powers to anybody, but you want to listen, particularly in the case of, a case like Venezuela, which is remarkably intractable. In one way or another, a terrible government. Chavez and Maduro have been in office now for 22 years. They really have destroyed the country in every way that you described it. And they're still in power and there's nobody has been able to find a way to get rid of them democratically or through non-military means and nobody wants to resort to military means to get rid of them.

It is a tremendously intractable problem for the United States, for Mexico, for the Europeans. The Norwegians are now hosting talks between the opposition and the Maduro regime again. I don't think these will go anywhere like the ones before that took place in Santo Domingo and in Barbados. I don't think these will work any better because the Maduro regime is still able to hang on.

Larry Bernstein:

Let me move on onto Cuba. The Obama administration reached out to the Cubans to encourage a transfer to democratic power, opened up some of the trade and visitations. I went, for example, when I visited the country as part of a religious organization. What are your thoughts on what's going on in Cuba now? Do you see that reforming and becoming more democratic or do you think the Castro regime will last indefinitely?

Jorge Castañeda:

Well, it's certainly not becoming more democratic. We saw how the regime responded and how the current president, Miguel Díaz-Canel, who's still being overshadowed by Raúl Castro, how they responded to the protests on July 11th with widespread repression. Beating people up, trying them without lawyers, without family members in touch with them, and often in summary judgment. So it's certainly not being more democratic. If anything, it's closing up more than before.

The question here is what American policy and Latin American policy should be to this situation in Cuba? We know that the embargo hasn't worked in terms of regime change. We know that Latin American and trying to be nice to the Cubans and friendly with the Cubans, a bit like Mexico is now, doesn't work either in terms of changing Cuba. And we know also that Cuba continues to play a very important role in several Latin American countries, particularly in Venezuela, that we were just talking about.

My sense is that the Biden administration thought, for domestic political reasons, that Cuba was not an urgent priority. That it could leave it on a back-burner for a while before it got around to either returning to Obama's normalization of relations and rolling back all of Trump's decrees or regulations, making life more miserable for the Cubans, and that that didn't turn out to be entirely accurate as a policy. That because of the protests, because of COVID, because of the effects that the Trump sanctions have had in Cuba, because of increasing mismanagement of the economy by the Cubans, because of the diminishing of support from Venezuela, with Venezuelan oil and money for Cuba.

For all of these reasons, things in Cuba kind of got out of control, got out of hand. And that often means, more Cuban migration to the United States, either by boat through the Florida Straits or through Mexico, trying to reach Brownsville in Texas and then seek asylum. Which, although the dry feet, wet feet policy was abolished by Obama, Cubans are still allowed to enter the United States. Or rather once they enter the United States one way or another, they can seek asylum and not be deported back to Cuba. And the numbers have been rising very strikingly over the past few months since late 2020, and certainly over the past few months.

I think the Biden administration should have addressed this issue right away, because it should have known that things were going poorly in Cuba. And they should not have left purely domestic considerations, Florida Senate elections in 2022, to be the exclusive driver of US policy towards Cuba, which is a little bit what they did.

Larry Bernstein:

Let's try another topic. And that's immigration from Mexico to the United States. It's been a very hot political issue, obviously in both the 2016 and 2020 campaigns. What do you think is the best way to reduce the chaos at the border? How do we persuade people not to enter the United States illegally?

Jorge Castañeda:

Well, the best way by far is to persuade them to enter legally. And that is perfectly doable given the size of the US economy, of the US population, and the demand for low skill, low wage labor in the United States, particularly now with the economic boom that is going on, and the enormous infrastructure projects that exist. Who's going to build Biden's highways? The Mexicans and Salvadorians and Guatemalans. It's not going to be Americans because they don't want to work in 100 degree heat for $10, $12 an hour. It's going to be the Mexicans mainly and other Central Americans are going to do that. So the best solution is to significantly increase the number of temporary work visas, H2As and H2Bs, mainly because those are the agricultural and service issues and construction workers, which have caps, but they can be waived by the executive.

And so, that's the first thing that is absolutely indispensable is to legally allow these people to enter because they will do jobs that Americans do not want to do, and they want to come to the United States and the numbers are relatively small. It looks terrible on television when you see 3,000 children in a tent camp in Texas. 3,000 children in the United States, a country of 330 million people. I think that the first thing is to understand that if you want people to not enter illegally, then you have to make it feasible for them to enter legally.

The second issue, which is very important is to legalize the 12 million people who are in the United States, half of which are Mexican, that do not have papers. Some of them have been in the United States for 25 years and they still don't have papers.

Building walls or deporting people, or throwing them out is not going to work if only because either you will have a lot of resistance in the US to doing nasty things. There are a lot of good people in the United States who don't like to see children being sent back to Honduras.

I think this is the way the US should view the immigration situation. I think it's the way the Biden people are viewing it, but I don't know how much political capital they want to spend on this in order to get it done compared with other priorities that they have. It's not clear to me that this is where they want to spend their political capital.

Larry Bernstein:

Switching topics to my hometown, the city of Chicago. Chicago is currently pretty evenly split population-wise between whites, African-Americans, and Hispanics, but the African-American

population is in decline. It's falling by about 10,000 people a year and has been doing so for about 20 years. The Hispanic population has been increasing quite dramatically. I imagine in 20 years-time, Chicago will be a majority Hispanic city.

What does it mean for Chicago to be a majority Hispanic city in terms of how it's run? We have a black mayor, we've got a black head of the police. But when it becomes majority Hispanic, which I expect it to be in 20 years, African-American political power will have to decline relative to Hispanic power. I fully expect if it's a majority Hispanic city, we'll have a Hispanic mayor with Hispanic police chief, Hispanic head of education. And we have finite resources. And so resources, where they may go to the African-American community now they'll go to the Hispanic communities in the future. Do you expect there to be tension between those two communities once some of our US major cities become majority Hispanic?

Jorge Castañeda:

Well, I think there will be tensions. It's already a similar situation in Los Angeles now has clearly a larger Hispanic population than African-American population.

Although there's a logic to using the term people of color with regard to Latinos, African-Americans, Asian Americans, and others, et cetera, Native Americans, you can't really put everybody together.

The last census shows the Asian American population, but also the Hispanic or Latino population is making serious progress in terms of reducing the income gap, the education gap, the wealth gap, the opportunity gap with white Americans.

Whereas, the gaps with the African-American community remain pretty much the same as they were back in the 1960s. So there's a root cause to what you referred to as tensions, because it's not just that the Hispanic community will be larger in Chicago than the African-American community soon. At some point, we'll see when, but it's that it will probably also be more prosperous and with smaller gaps between it and the white community in Chicago.

Larry Bernstein:

In the 2020 presidential elections, the number of Hispanics switching parties to the Republicans was meaningful and played an important part in the race. There was a surprise on both sides of the aisle as to changing Hispanic voter preference. What do you make of that change? What's driving that? Should we expect it to continue and why are some Hispanics choosing the Republican Party?

Jorge Castañeda:

One of the important sectors of the Hispanic population that leaned towards Trump in 2020 was the Cuban, and to a lesser extent, Venezuelan population in South Florida, which has always been Republican. They became more Republican this time than they had been in previous years. Hillary Clinton already lost Florida to Trump after Obama had won it twice but the fact is that Cubans voted more and more for Trump than they did. Some Venezuelans who voted for Trump and against Biden because they bought onto the "Biden, the socialist" type of

fake news, and because they were very happy with Trump's anti-Castro/anti-Maduro policies, and that made a difference.

Another area where apparently there was a bit of a shift was in the Southern Rio Grande valley areas of McAllen, Harlingen, reaching perhaps even to Brownsville, they're clearly Mexican-American who have been American citizens for five, six, seven generations or even more, apparently voted for Trump in larger numbers than they had in 2016 and 2012.

Apparently, there was a very active role played by the Border Patrol union, in those areas where they're very important. The Border Patrol officers in those areas of the country are all practically Mexican-American, and very conservative, and very pro-Trump, and very anti-immigration.

If you look at the overall situation, exclude the Cubans, and I mention this in my book, America Through Foreign Eyes, and the way the US electorate has changed, you have to exclude the Cubans, not because there's anything wrong with them, I have a great deal of sympathy there for that community because it fled a dictatorship under very adverse circumstances, but they are a very small minority of the overall Latino population. If you look at the big picture population, the Mexicans, Guatemalans, Salvadorians, Hondurans, Ecuadorians, Puerto Ricans on the mainland, you'll see that still close to 70% of the non-Cuban/non-Venezuelan Hispanic voters, voted for Biden. And they turned out in record numbers.

Larry Bernstein:

I end each session on a note of optimism. Jorge, what are you optimistic about?

Jorge Castañeda:

Well I'm very optimistic about America's capacity to reinvent itself. I think we are facing up to the huge challenges in terms of social inequality, racial inequality, poverty, violence. I think that we are really at a turning point in terms of American society facing these challenges and actually doing something about them.

I'm very optimistic about the Biden Administration's domestic intentions. Not so much its foreign policy part; I think the foreign policy team is much less competent than the domestic policy people. But I think Biden's two or three huge programs on infrastructure, on social issues, on helping families, et cetera, are really the pillars of building an American welfare state, which really never existed.

I thought that the demonstrations after the George Floyd assassination last year were exemplary. Regardless of isolated incidents here or there, I think the way the Biden people have tried to come up with all of these different policies and plans to rebuild that welfare state. And I think this is part of the United States of America's classic capacity for reinventing itself, and I'm very, very optimistic about it, regardless of the pitfalls, or the bumps in the road, which Biden, and his people, and the United States will obviously meet over the next few years.

Larry Bernstein:
That ends today’s session. I want to make a plug for next episode.

There will be NO episode next Sunday as we will be celebrating Labor Day weekend.

Our first speaker on September 12th will be Barry Posen who is the Ford International Professor of Political Science at MIT. Barry has written a recent book entitled Restraint: A New Foundation for US Grand Strategy. Barry rejects America's post-Soviet collapse foreign policy approach of liberal hegemony, which he feels is counterproductive and wasteful. Barry wants to move away from keeping troops all over the world and instead focus on protecting the global commons.

Our second speaker is Kenneth Pyle who is the leading academic on US-Japanese relations. Ken has a new book entitled Japan in the American Century, and my hope is to learn more about how the US and Japanese will work together to contain Chinese military ambitions.

Our final speaker will be Gary Lewandowski. Gary is the author of a new book entitled Stronger than you Think: the 10 Blind Spots that Undermine Your Relationship…and How to See Past Them. Gary will focus on how to evaluate your personal relationship, and when it is time to cut loose. Gary will help reveal your relationship's hidden strengths and how to build a more fulfilling bond.

If you are interested in listening to a replay of today's What Happens Next program or any of our previous episodes or wish to read a transcript, you can find them on our website Whathappensnextin6minutes.com. Replays are also available on Apple Podcasts, Podbean and Spotify.

I would like to thank today's speakers for their insights. I would also like to thank our listeners for their time and for engaging with these complex issues. Please stay tuned next Sunday to find out What Happens Next.