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**Welcome to MedTech Chat Podcast Series, where we discover the latest healthcare tools, device technology, as well as research approaches and studying them. We'll be talking to entrepreneurs, designers, engineers, researchers, investors, insight professionals, and other executives to better understand how MedTech is helping patients and those caring for them now and in the future. Today we're talking to Gavin Lew. He's a managing partner of Bold Insight, part of a global UX research consultancy in five countries. He has over 25 years of UX design and research experience. He's an adjunct at Northwestern's Feinberg School of Medicine and Communication, and at DePaul University.**

**So thanks for joining us today, Gavin. I know that we're going to be talking a lot about AI. Can you tell us more about sort of where should we be thinking about it? And I know you have a [inaudible 00:01:10] as well, so tell us all about that.**

Sure, Tom. Thank you for having me. The concept of artificial intelligence has always been in the back of my mind. I think you and I are in the same age bracket, where people were building AI to do chess, right, to play chess or Matthew Broderick in WarGames. And thinking about artificial intelligence has always been in the back of my mind. We like science-fiction, but as we started to look at it, one of the things that, from my perspective, in more of what is the user experience about it, I started realizing, what if we just assume artificial intelligence is going to work. Let's assume that the 70 plus years that has gone into these type of algorithms, whether it's a neural net, artificial intelligence, machine learning, machine translation. All of those variance, let's assume that they actually work. What makes artificial intelligence successful, and what makes it unsuccessful? And the more I thought about it, the more I realized it wasn't about the algorithms, it was actually about the experience itself. So as you mentioned, thank you for that, I'm writing a book. It's actually going to be published this year, which is 2020. I believe it's in December, but it could be even sooner. All the proofs are done. But essentially, the book is on artificial intelligence and user experience. So to give you a quick example of what I mean by let's assume the technology works is my college roommate at UCSD. Back in the late 80s and 90s, he ended up, after leaving Comp Sci, he graduated, he worked for a company that essentially build the first credit card detection system using artificial intelligence. And not more than a few years later, I find myself in Europe traveling. I had one credit card, and his neural net detected potential fraud. And he said, when I interviewed him, he goes, "Yes, let's just say the coefficient was .12. And that suggested past the threshold. And it suggested fraud." The experience of that action was turn off my credit card while I'm abroad back in 1991. But fast forward to today, and he said that it's, essentially, that same neural net, faster, more data sources, but it still outputs a coefficient of say 1.2 based on my transaction history. And he said it's the same thing, a little smarter, a little faster, a little bit more data. But the coefficient that was spit out of AI was the same thing rolling back the clock to 1991. But what is our experience? I get a text message that says, "Is this you? If yes, press one." The credit company is not turning off my credit card when I need it. So the experience is the same. Output of 1.2, that's the coefficient it spit out. The question that I have is, isn't the experience a lot different than when I was in 1991? Nowadays, if I get that same experience or that same fraud detection, it sends me a text, and I say, "Yes, that's me." And it doesn't embarrass me. It doesn't remove my credit card from existence. So I started thinking more about what are the outputs and what is the experience we're designing towards? Because a lot of our colleagues, when they're creating AI-enabled products, are hands-off.

**That's a great point because I've gone through the same thing that you're just describing, where I had early in the days in the 90s, without any credit, and saying, "Why doesn't this work?" And as you say, these days, you get the alert. You have the chance to make a correction. Particularly, I use ATMs a lot. So sometimes the first transaction or two they still go through, but you're getting the alerts, and if you don't eventually respond, then they cut you off. That's a good point that if you put the user experience in now, then we have a better experience with that AI.**

And the thought is, unfortunately, a lot of our colleagues who are designing AI-enabled products are hands-off because it seems so high-tech. AI, it's so far out there, let the brilliance happen. And what I'm suggesting is, products will succeed and fail not based on whether it has a good algorithm because let's assume it works. It's actually going to succeed or fail on a better design around it. What do you do around that experience that can make the interactions something that you, as a consumer of it, trust? How do we build that context, interaction, and trust into something that makes the product successful? Because let's not assume that the technology is not incredible. Let's anticipate it, and let's build products around it.

**It's interesting you say that because a lot of times when you're thinking about user experience, you talk about the device, you talk about the interface, you talk about the user, the environment. And so we think in those terms, but as you're saying, the technical people that are working on the technology are not thinking about the user. And it's a very strange concept, to me being a psychologist, but you would think just as we're training doctors to have good bedside manner, that we should be training the tech scientists to be thinking about the user.**

Or rather, instead of waiting for AI to produce miracles or insights we never thought we would have, let's have the design product teams, marketing teams, all of those groups together saying, "AI is investigating these areas. If it were to find these correlations and open up a whole new line of business, what products would we want to build around it?" Start that side of the ledger. Let's assume it's going to do well. If so, instead of playing the catch up that we wait for AI to have magic occur, why don't we start building products that anticipate the magical outcomes, so we can actually have a better experience. We can actually have people engage with that. You have this thing where we all know how quickly product design happens, and how short timelines are, and how short budgets are. What I'm suggesting is, let's get ahead of the curve. Let's assume it's going to happen, and let's start designing better now so that we can have that experience.

**Such a great point. One of the things that I always find challenging, and maybe you have a solution to this, is getting the user, which is typically a consumer, in the right frame of mind in future thinking, in here's what's really going to happen so that you can get from them what their needs are, what they think they're going to respond to.**

100%. So let me give you an example of-- I'll give you a story first. And the story first is, AI has been around since, publicly, 1958. In 1958, it was a public announcement of the Georgetown IBM experiment. And that was the first true AI machine learning system that was to translate Russian into English. So it goes back as far as '58. Now, the problem was, it originally was built around an organic chemistry vocabulary. So it translated organic chemistry really, really well. And they thought that they would be able to do that for language. The problem was it spurred millions of dollars, back in 1958, of research and development into AI machine learning and machine translation. The problem was 10 years later, when, and picture this, a group of US entities, the CIA, the Department of Defense, and the National Security Agency reviewed all of the investment that was put, and they found no new advancement has happened in the last 10 years, which caused an AI winter. And then it started to reemerge again a decade later as neural nets, which is part of robotics. So all the terms that you see out there, it's all because of past failures, and they've had to change the name. So let me give you an example of exactly what you talked about. Think of Siri. Think of that voice concept. Well, I worked at Ameritech, which was a baby bell doing voice systems. Voice recognition has been around for decades, but Siri did something a little different. It created this new concept of being able to engage with this assistant. You could talk to it. Now, it was fascinating, very cool. But here's where I ask 97% of people who own an iPhone have tried Siri, but only 30% still use it after six months, a year. In fact, if I were to play you the Siri sound right now, it might send a chill up your spine because you're like, how many people accidentally evoke Siri?

**You know me. It's happened to me many times.**

The question isn't Siri's failure because that's known. The question is, Samsung Bixby. Microsoft Cortana. How many people have heard of these things and never tried it because they said, "Oh, that's just like Siri." I'm going to argue that that's an AI winter. The poor experience overtime when Siri said, "Hey, I don't know how to do that," created an impression that impacted other products that were similar. And I will tell you that the Microsoft people would say, "Cortana is so different than Siri. I have a list of ways. We do this. We do this." No one ever tried because of that winter. And I'll tell you, Amazon Alexa, something that's physically different, it sits on your kitchen table, it got you to try a voice assistant again, but it was based on new learnings. It was based on a wider set of vocabulary. A wider set of tasks. So you talked about, well, it's about the environment, how the situations of use. All of those things had Alexa had a little bit of a got to watch. Let's build a situation of use for the kitchen. Then you talked about a screen. Let's build one for the bedroom. As they started seeing different situations of use, different environments, they adapted, but it took something physical to sit on a table to get people to try voice again. I mean, how many people have tried Cortana, Bixby, all those other voice systems? It took a physical product for people to try again.

**That's so funny.**

We experienced a winner.

**You're describing me exactly. So I had the same issue with the iPhone. Listen, I didn't try any of the other systems because I thought, "Oh, well, they're probably just as bad as that." And the reason I actually tried Alexa was because one of my wife's relatives, an older guy, his daughter had gotten him one, and we went to visit him. And he was playing music, or whatever, and I was like, "Oh." And at first, I was like, "Is that creepy? Do I want them listening to me?" We decided let's get it for her mother. And I was like, "Well, we should try it out first." And now, I love it. I play NPR, I ask about the weather, all sorts of things. But I still get the frustrations of it doesn't understand certain things, but I feel like now that I've had that experience, I'm like, "Yes, they'll probably improve this later." I'm sure there'll be a new update where she'll understand that I want her to look at my calendar or I want to know the weather someplace not where I'm local to, or whatever it might be.**

Yes. And it's fascinating because the blame that gets placed on Siri's or Alexa's inability to do something is fascinating because we, as humans, feel-- I used to do work on telephones because I worked in the baby bell. Someone did a study on our team, that statistically speaking, when you dial, back in the day, a 10 digit number, and we still have this problem today. Every key pressed, you have about a 98 to 99% accuracy. We call it the fat finger. I mean, how often have you accidentally dialed the wrong number, and you go, "Well, I fat fingered it." When you have seven to 10 numbers that you do with a potential 1 to 2% error, you will accidentally fat-finger. But when we do it, it's OK. But if you say something and the system doesn't recognize you, says, "I'm sorry. I can't do that." You are so less resistant to try it again, which is why the experience is so important because you will change and not try something because it didn't do it. And our kids, we watch them walk. We watch them before walking, they toddled. We watch them begin to run. You can see that physical transformation. In something that just sits on your phone or sits on the table, you don't see how smart it's getting. It's hard to break those habits that we attributed to the technology, not a fat finger. And that's a challenge. And that's why I'm emphasizing we need to spend a lot of time on the experience so that the technology can be the brightest possible. If you put all of your effort on the technology, the experience is where you will actually have the adoption issues, the retention. That's where you see churn happen, where people use it and stop. That's where we need to spend our time.

**It's interesting though, as you're saying that, I think, "OK. I fat-fingered it, but I'm only human. I make mistakes." But my AI isn't. You are computer. You are a machine. You shouldn't be making mistakes. So that's sort of in my head as why I'm like, "Oh, it's dumb. It doesn't work. I'm not going to try that again."**

It's fascinating how we basically [inaudible 00:16:20] or try to humanize our relationship with technology. And knowing all of that is the emphasis on why we need to spend more time on the interaction that people have with that thing, that technology, that AI-enabled product so that we trust it. Because if we trust it, we will experiment with it. Like you said, "Well, they might not know now, but I'll try later." That's because you have the trust in the system, but that only comes through good experiences.

**That's a great point. In this group that I'm working with, I probably mentioned before, the Digital Healthcare Collaborative, we have this scale that we use to determine sort of how comfortable people are in sharing their data with different types of people. And then we kind of segment them so we can say, "OK, these people are higher in comfort or lower in comfort." And I wonder if you've had any thinking around that if there's any research you know going on about that that helps aid those that are going to be not only designing the AI but then also whether it be in the marketing or some other way that will translate to who's actually going to use it?**

No. So let me take your comfort level one step further. In the book, I talk about something I call a weirdness scale. So imagine this, it's a little bit close to but beyond this notion of comfort because it's not about the comfort in the data because that is true, exactly what you described. But let's dream a little bit. Let's think about what AI could do with that knowledge. You're in your car. It could predict, based on your driving habits and behaviors, what you are doing at certain time of the day. You may visit certain restaurants, certain stores. You may be heading home. At what point does the prediction of artificial intelligence broach into a OK place, like, "Hey, I notice you're heading home. Would you like me to turn the heat up? It's really cold inside." Or does it get to the weirdness factor and cross that line and say, "No. You don't know where I'm going because this is not my house. This is somebody else's house that I've happened to have gone every Thursday." What point does the prediction cross over into this weirdness factor? And that's something that, as we think AI can be predictive, what is the experience? Let's take it to having teams spend a lot of thought on what is in the acceptable level and what crosses into that weirdness level? Eric Schmidt of Google once said, "We want to get right up to that point of strange and awkward and weird." I don't know where that point is, but it's really important for those designing these AI-enabled systems to consider where does that prediction go, and not just wait for it to happen. Let's start thinking about it now and anticipate it.

**Some of the thoughts I have on that is, one, I don't know how well it works, but asking people for permission because sometimes you just check the box just to get done what you have to get done. But really understanding this is what it's going to do, and here's the benefit to you. You're good with that? Maybe there could be levels of permission. I don't know.**

All the things you're thinking about are exactly smart people building a better design. Because AI is not going to ask you to ask that question, but if you were to give this question to the user, and then give that to the data set for the AI to think about, it's going to be even better. But that level of analysis has to be done independent of the tech. It's about how do we build this better interaction?

**Very true. The other thing that comes to mind is you have the early adopters. So I have a friend who always has the latest tech, and he changes phones and watches. And he's always on the latest thing. And by the time I get to it, he's off onto something else. So you're thinking about those as your first group, but then you can't forget about then the next group that's like, "Well, now that my friend has tried it out, and he said it's good, now I'll move in and give it a shot." So I don't know if you have any thoughts about sort of those kind of user groups.**

I do. And it's exactly as you described. You've seen those types of curves. The real question I have is, well, where do we make the most money? Where do we get the most adoption? Where do we get the most sales? It's in that second wave, and eventually, the third wave. But how do we build that experience well enough so that the opportunity to build and then enhance and improve in that next wave, that next iteration, hits that sweet spot where we actually deliver value. Deliver an experience that is worth the squeeze and the effort that people put into it. So you're absolutely right. There is always a curve of early adopters to the fast followers to the more mainstream. I see those as rounds of iteration. Opportunities to advance, learn and make better. Well, how quickly can we make that early adopter experience really good? How can we iterate and test the design so that what we've learned in the early adopters isn't something that we would have learned later? We're pushing the envelope even more. That's why it's so important to spend that extra time. And one thing that we haven't even talked about is an area of research where it's about the data. I talked a lot to people, and they go, "I have more data than I can analyze." We are in a world of data. One of our challenges is, do we just throw that data to AI people for data sciences and then send that off to the AI people and not think about it? Are we doing a disservice to AI if the data we're giving them could be so much better? We just give it to them.

**I remember hearing you talk about this on another talk that you had at one of these events about how we can just add on columns or bits of information that could then be used because it's like garbage in, garbage out. If you don't give it the right information, then what do you expect?**

Exactly. I mean, the AI only knows what it knows. You and I are in the medical space a lot. We worry about adverse events. We worry about the experiences and therapeutic value. Right? Well, AI could learn what drug was administered. But we know that drug has indications for use. How does AI know that? So when you're talking about adding columns, I call it adding context. So let's say they're using this type of drug X, well, we also know that that drug effects these five indications can be applicable. We also know that the delivery mechanism is a pill or intravenous or prefilled injection or auto-injection. All of those things, it's data. And when you aggregate that across all of the data that we have, those seven, eight columns we've added, could really make AI have better context into what we're dealing with. It's not just somebody took this drug and look at all what happened. This drug also has all of this other context around it. That's what I think is lacking in how we can accelerate AI from a perspective of what do we as humans know that AI should also know, rather than just giving data sets.

**Yes. I think that's very important. That's a great point. Now that you've brought us into the medical sphere, is there anything else that we should be thinking about that distinguishes AI in medical versus sort of just in the consumer space?**

Well, if we think about AI, a lot of effort has been initially, if you consider AI Watson, IBM Watson, etc. One of the big challenges early on is IBM Watson wanted to, in some ways, play doctor. It wanted to mimic and replicate what a doctor would prescribe, would diagnose. That's a little bit problematic because A, I think doctors have a little bit of a different insight. It's threatening in many ways. But the reality also is, I think they did a disservice to AI in trying to mimic a doctor when the reality is, there are things AI could have done to help enhance what doctors know, rather than replace, which is also why IBM today, Watson switches it. They've inversed it from AI artificial intelligence to augmented intelligence. We're augmenting the knowledge that we know. So that's one of the challenges, is you look at this, and say-- in one of the talks we had about artificial intelligence and doctors is, when you try to replicate a doctor, it may be true that in some conditions we can replicate the same treatment and diagnosis for oncology at an 80% level of doctors in the US, but when it shows a 50% correlation like it did with South Korean gastro oncology, it didn't replicate or mimic what doctors were thinking South Korea in terms of diagnosis. And they said, "Oh, well it was great over here at 90% accurate. And over here, it's only 50. Failure." I'm like, that's not a failure. That's AI raising its hand saying, "Guys, why does our methods using a US model not have the same predictive value in South Korea in gastro oncology? What's going on that's different?" Raise your hand. Get people thinking. Maybe something better is going on. Maybe we can improve outcomes by learning why this difference exists. That's the fascinating part.

**It might come back to the input, right? So they're using US doctor input to try to predict Korean output. I mean, again, it's what are you feeding the artificial intelligence?**

So that's where we get into the scary world of potential bias. Let's be really clear and be honest. If I'm on the project management team, and someone gives my team a data set. We trained on that data set. It comes up with incredible predictive value. We build an AI-enabled product around that predictive value. We build a suite of products. Are we ever going to go back and retrain that data set? Heaven forbid it creates a new model that doesn't quite have the same predictive value. We shoot ourselves in the foot. So the challenge here is, in that training set, did we introduce bias that we were retained and perpetuate? Think back in the 50s. I was watching a lot of shows around the Johnson & Johnson studies and those kind of interesting things that were going on-- the Masters and Johnson studies, I mean. A lot of things going on was because women were not part of medical studies back in the 40s and 50s. And now, we have started to realize that men and women have different biologies. And there are different therapies that might be better. If we only give AI the corpus of knowledge that it can consume and read very quickly, but it includes all of that data, does that introduce a bias that AI might not recognize? If we create synthetic cases, where literally we're building the rows of data because we don't have this new information, not enough data's been published. But we create the rows, are we inadvertently including our own inherent biases that those cases are not typical of the whole population at large? Are we creating our own world? And that's something that kind of scares me a little bit. There's no current standard on ethics in AI. They're starting to develop it. The IEEE is starting to develop it. MIT is working to try to develop a set of ethics, but right now, it's a data set that we give to data science to then put into AI training algorithms. Have we really thought through how bias our data set might be? And that's an open area because I don't-- I know, practically speaking, if my job were dependent on it, and I built a whole product suite around a model, would I retrain that model? That's kind of scary to me.

**This is really important stuff. I'm glad that you brought this up. I'm wondering if you could let us know the best place for people to find this book as it comes out. I'll certainly put a link on the site, as well. And also how they could best get in touch with you if they want to learn more.**

Well, certainly. I'm always open to interesting discussions, things I can learn more. So I'll give you the information. My name is Gavin Lew. And you can certainly contact me at Bold Insight, boldinsight.com. You can find me there. The book is coming out. It's published by a company called Asser Press, which is a publishing division of Springer Nature. So it's publishing. Here's a little story around this. The impetus for the book, the thesis of the book, was based on some talks I had given. And you've heard one of them. And I once gave this talk to my son. Computer science. He's a junior in a computer science program. And when I asked him about it because he didn't give me any feedback, a few weeks later I asked him, so tell me about it? And he said, "Dad. What you're saying is rather rudimentary to a computer science person." And I was devastated. And then, those who know a man named Don Norman, he's one in many ways a guru of user experience. He was a head of user experience at Apple, for example. He built a program for health at Northwestern. He went back to UCSD. He built the first cognitive science program in the world. And then, he went back to UCSD and build a design lab. He said, "Well, tell me." I gave him my talk. And at the end of the talk, he said-- he encouraged me to write the book because he said, "What rudimentary means is applicable to lots of people." So I tried to write this book not to help computer scientists write better algorithms, it's for marketers. It's for product developers. It's for those people interested in how AI could be more successful. It's written to that language. It's very conversational. I have these questions back and forth with my co-author. But it's on Amazon. There's a presale right now, but eventually, you'll start to see it in book stores. The reality is it's about a conversation that we have on how to make products better.

**That's great. Thank you. I'm definitely going to check it out. And I'll encourage everyone else to check it out as well. And post the link. In closing, I don't know if you've thought about this yet or not, but I'm curious if there is a cartoon character, fictional character, superhero that you kind of vibe with or see as something that you can associate with?**

That's an interesting question. What's my spirit animal, right?

**Exactly.**

I would honestly say it's kind of a cross between an owl and kind of a sea otter. It's all on personality. You think of an owl kind of as someone that just sits back and absorbs and pauses and is always just there kind of in the background watching. And then you've got this notion of the playful side and curiosity of a sea otter. One time when I was in college, I took some diving lessons, and I literally had my diving partner kind of point at me, saying, "Look what's going on." And I looked to my left, nothing. I looked to my right, nothing. And literally, there was a sea otter that was on my left and right. And every time the person pointed, it dotted to the other side because it knew I was going to look. So it's that curiosity that I have. That notion of how do we listen and think pensively about things in the background? It's somewhere in the combination of those two. And I hope in the book that I wrote, Artificial Intelligence and User Experience, some of both of those elements come through.

**Thank you. Appreciate it. And we'll look for that book. Thank you very much.**

Thank you, sir.

**Have a great day.**

Thank you for taking the time.

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