How to Think Like a Rocket Scientist – Ozan Varol with Dave Asprey – #738

Announcer:

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Dave Asprey:

You're listening to Bulletproof Radio with Dave Asprey. Today. We're going to talk with a real life, rocket scientist. And why would we talk with a rocket scientist? Well, because all rocket scientists are cool. At least if you are nerds, except that's not really what we're talking about here, because this guy was part of the operations team for the 2003 Mars Exploration Rover Project, where they found that pyramid and those aliens were going to ask him about that. Okay. Actually, we're not. Then he's like, rocket scientists, that's so boring and I'm not getting the chicks. Okay. He didn't [inaudible 00:00:39] either he pivoted to become a lawyer and then said, no, I'm going to become a law professor and author and a public speaker, but he never stopped being a rocket scientist. And he wrote a book called "Think Like a Rocket Scientist: Simple Strategies You Can use to Make Giant Leaps in Work and Life." And that's why he's coming onto the show today, because when you come from one set of thinking and you move into another thing, I don't know, like computer security hacking to coffee, you might do things that people wouldn't think about. And that the thinking skills you get from one thing lets you do magic in another.

So Ozan welcome to the show. It's Ozan Varol. Thank you.

Ozan Varol:

Thank you so much for having me on Dave. It's a pleasure to be here.

Dave:

You moved here from Turkey, by yourself at 17 and I'm like, I'll just go to Cornell and major in astrophysics. Are you from a family of incredibly smart space people what's up with that? You have a very random background and you've done so many different seemingly unrelated things. How did you get here?

Ozan Varol:

Yeah. I had very generous kind caring parents. They were both engineers. But honestly my interest in space began when I was probably four or five years old. We lived in a small apartment in Istanbul, and we would frequently get blackouts. So we lose electricity a couple times, a couple days a week and I would just get terrified. And so my dad came up with this game. He would pick up my soccer ball and then he'd light a candle. And then he'd rotate the soccer ball around the candle to show how the earth rotated around the sun. And those were my first astronomy lessons then I was hooked. And so I started [inaudible 00:02:24] what I could read, I started reading lots of science books, science fiction books. I would watch the original Cosmos series by Carl Sagan.

I didn't speak English at the time. So I had no idea what he was talking about but [inaudible 00:02:36] stood in front of the TV and watch the whole show from start to end. So he was a hero for me. And I had this big dream of becoming an astronaut one day and I remember, I think this was a middle school. I researched the biographies of all the civilian astronauts at NASA. I couldn't go the military route because I was not a US citizen. And I've found the common denominators between these astronauts, they at all a master's or PhD degree in some science or engineering. They all had pilots licenses, so it was sort of back casting from what I needed to be an astronaut. And one of those common denominators

was getting a science degree from a great university. And I ended up applying to a number of colleges, got into Cornell. And of course Carl Sagan, my hero had taught there. And so that was one of the big drivers for my decision to go to school there.

Dave:

I think you said the key there, it sounds your mom was an engineer as well. You said engineering parents. Okay. So you had two engineers. In fact, this is what happens when engineers reproduce. It's a terrible thing. No I'm kidding. You grow up seeing the world differently because your parents are explaining how and why things work because they can see that. Whereas a lot of times the mindset might be that works and it's beautiful, which is an artist parent. And this one isn't better than the other. They just have different cognitive styles.

Ozan Varol:

Totally. And you know, one of the other things they did in addition to explaining the, how and the why was to get out of my own way. I think a lot of well-meaning parents tend to do too much directing. And my parents were all about giving me autonomy within guardrails, of course, right? So they set up these guardrails, but they gave me room to breathe. And for me to pursue my curiosity, wherever it might lead, I mean, they didn't speak any English. They had never been to the United States. But when I had these crazy ideas of becoming an astronaut or a rocket scientist, one day, they never told me you can't do that. You come from a poor family in Turkey, there's no way that you can achieve what you're dreaming about. They always said, yeah follow your curiosity, follow where it might lead. If you work hard, if you make good decisions, the sky is the limit. And in this case it wasn't even the sky, Mars ended up being in the outer reach. But I think that was so important.

Dave:

There's a certain personality characteristic, like a look, people get in their eyes when they're truly a space people. And I'm talking about like Peter Diamandis, who's become a good friend. And the guy who created the X Prize that led to the creation of SpaceX and all, and Naveen Jain who's another one of those has a collection of media or fragments. And one of his companies is looking to exploring the moon and I've been to JPL. My uncles who's passed away was one of the very earliest investors in private space traveling in 20 years before it was really a good idea to invest in that. But so all of these people that have this twinkle in their eye, they're seeing the future or they see something really, really big, and it's an unusual personality characteristic, and you've got the same look and the same kind of just childlike excitement. What let you keep your childlike excitement?

Ozan Varol:

That's a great question. And I've lost it at times in my life. I think whenever I follow my natural curiosity, regardless of where it may be lead, that works out well for me. But when I start chasing outcomes, for example, right. When we were talking about bestseller list, right before we started recording here, when I think in terms of outcomes and outcomes, in terms of like quantities, number of books, sold number of followers on social media, number of subscribers to my email list that completely robs the joy away from the process, and whatever I can turn process into play, work becomes play, play is work. There's really no distinguishing between the two. And I'm just following my curiosity, regardless of where it might lead.

That's right where the magic happens. And I think it gets beaten out of people because if you watch children, they are naturally curious, they are naturally self-driven. And then we enter the

education system. And unfortunately, the way that most schools are designed, it's like they're designed to rob that curiosity away from children, because everything is forced. Here are the courses you have to take. Here are the problems you have to solve. You get up a math and science classes, you get a problem set. As in the problems are set, they are defined for you. And you're supposed to take the formula that you memorized in class and then a plugin the problem. And then that will magically spit out the right answer on an exam. And that's just, I don't know, that's not fun. It sucks and it's wildly disconnected from how the real world works, right?

Because in the real world, problems are not handed to you on a silver platter. You have to find the problem and then you have to reframe it. Define it. Figure out ways of looking at it from different angles so you can illuminate other answers that you may have initially missed, but you don't learn any of that in school. You just sit in your chair and then you listen to your teacher reveal Newton's laws as if they arrived by a grand divine visitation. You don't learn about the years of tweaking, struggling, failing, fixing you don't learn about Newton's experiments and alchemy, which spectacularly failed to convert lead into gold. You just see the final product, which I think again, it gives a false impression that life is a series of right answers. And those right answers are delivered by an authority figure behind the podium. And your job is to memorize those right answers and then spit them back out.

Dave:

So you escaped that because you had good parents and every time you focus on an outcome, instead of on process, you don't like it. But what fascinated me, what made me want to get you on the show is that you then took from engineering, what you've learned, and you went to law school, which is a different set of engineering principles, but it's language is engineering. Sure. And then you thought about how you thought and you decided to teach it in a book. So I want to move into that process that you do. And you talk about a launch process because, you framed it in space flight, which is always cool. So you say stage one in the book from these nine principles of rocket science thinking, you say stage one is launch, and what is launch when we're talking about how to think.

Ozan Varol:

Yeah. So it's got a number of different components. And one of the most important ones is first principles thinking, and in the book I use a story from SpaceX, which came up already to illustrate first principles thinking at work. So when Elon Musk first started thinking about sending rockets to Mars, he was shopping for rockets on the American market initially, and the rockets are not to be way too expensive. So then you went to Russia to shop for, I kid you not decommissions Intercontinental ballistic missiles without the, of course, the nuclear warheads on top that he could repurpose as rockets. And even those were way too expensive for him. And on a plane flight back from Russia, empty handed, he had an epiphany and he realized that his approach had been flawed all along and trying to buy rockets that other people had built.

He realized he was not reasoning from first principles. So first principles thinking is a way of distilling a complex system into its fundamental non-negotiable sub-components. So you're hacking through your assumptions as if you're hacking through a jungle with a machete until you're left with those non-negotiable raw materials, everything else is negotiable. So for, for Elon reasoning from first principles meant asking himself, well, what does it actually take to put a rocket into space? What are the nonnegotiable raw materials of a rocket? And it turns out that if you try to buy those raw materials on the open market, it's like 2% of the typical price of a rocket. So he said, all right, screw it. I'm going to build my next generation rockets from scratch. And that's what he ended up doing with SpaceX.

And of course we're recording this in mid-July. One of those rockets ended up putting two astronauts and to space making SpaceX, the first private company to be able to do so. And now of course, space flight is becoming a lot cheaper because SpaceX and also Jeff Bezos has company Blue Origin are questioning these fundamental assumptions that we take for granted in aerospace. And other one is we usability, for decades rockets were not reusable. So they would plunge into the ocean or burn up in the atmosphere after they're carried their cargo into orbit. And now imagine for a moment doing the same thing for commercial flights, you fly from Portland, where I am to Victoria B.C. where you are Dave, and then the passengers get off the plane and somebody steps up to the plane and just lights it on fire.

Sounds ridiculous. But that's basically what we did for rockets for decades. And now re-usability is becoming a thing because we're requesting that assumption. And there's now a landing pad next to the launch pad at Kennedy Space Center. And that's a new thing in rocket science. And a lot of those innovations that were brought by first principles thinking are just drastically cutting the cost of space flight. I think it takes the Falcon heavy 40 X less, so less expensive to carry a kilogram into orbit compared to the space shuttle, which is pretty incredible.

Dave:

Do you know what a nerdgasm is?

Ozan Varol:

I sure do. Yes.

Dave:

So You're describing these things, and if you're listening to this going back to what you did you just say, Dave, it's when you have this sense of awe, it makes your skin tingle you're like, I can't believe humans did that. And I was at the SpaceX plant with Peter Diamandis watching them 3D print, a titanium rocket nozzle. And it was one of the things like, I cannot believe that just happened. It's incredible. And the same thing, the first time you see a rocket land, this is what you read about in science fiction books for ever, but no one ever did it. And it just happened. And if you look at life sciences and the anti-aging world, it's like every two weeks something worthy of a nerdgasm happens if you're paying attention and you know, what a peak of human achievement it is. Right? So what I want to know is in all of your time on the Mars rover, and all this stuff you've done, what was your peak nerdgasm?

Ozan Varol:

I think watching, so we sent two rovers to Mars, speared an opportunity. It was supposed to be initially one, it ended up being two, which is a cool story that we can get into later. I talk about it in the book, but really watching. And these were built to last for 90 days, watching Opportunity rove the Red Planet for nearly 15 years into its 90-day mission. And I still am getting goosebumps as I'm saying that. And that was the epitome for me, is to see this thing that we helped build that. I worked on selecting the landing size for this thing. My senior thesis was programming some of the algorithms that were used to snap photos of the Martian's surface and seeing it just blossomed to become one of the most successful interplanetary missions of all time was definitely the epitome of my career.

And then what you described Dave, that the feeling of nerdgasm, and other way of putting it is awe, and awe is such a, I think, a unifying emotion, right? All human beings are drawn to awe. One of the reasons why I wanted to get into rocket science was watching footage of the Apollo astronauts walk on the lunar surface. And if you look back a child who was six years old, when the Wright brothers took

their first flight, which lasted like 10 seconds and moved about 100 feet, would have been 72 when flight became powerful enough to put a man on the moon and return him safely to the earth, let it sink in for a moment that's 66 years. And that from Wright brothers to Neil Armstrong, and that giant leap is when people were being interviewed after the moon landing around the world, they weren't saying America did it.

They were saying we did it. This was humanity's achievement, basically putting people on the moon. And one of the things that makes me sad is that, that feeling of awe has been missing from our lives for a long time now, I think after NASA put people on the moon, and then sends a couple of missions there, we just decided to send astronauts into low earth orbit to the International Space Station, which frankly, I mean, as amazing as the International Space Station is, it's just not that awe inspiring, it's just like watching, I don't know, Columbus sail to Ibiza. You're just going into low earth orbit. And so I think with what some of these private space companies are doing now, and I know so many people around the world tuned in to watch the SpaceX launch a couple of weeks ago. I think that emotion is hopefully going to be restored in the long-term, but I think it's such an important emotion and yeah, you can call it a nerdgasm or you can just call it awe. And when people experience awe, they become together.

Dave:

Awe can come from seeing a beautiful experience in nature and a sense of all kind of things. I feel like nerdgasm is we did it plus awe. And just like you're saying, and it's that sense of, okay, it does bring us together, but this is an achievement of humankind that does something different than watching the Milky way on a night. That's gorgeous. And it's also an awe. And I can think of a few of the peak experiences in my life. And many of them are, wow humans did this and they involve beauty and engineering and incredible complexity. And I think it requires a certain amount of understanding of what went into it. I was at Burning Man a couple of ago, and they had a drone show and there was something like 4,000 drones, perfectly orchestrated doing light shows in the sky.

And as a former network engineer who understands all the layers of complexity that went into that, the fact that you could even make three drones, do that, but much less in a windy dusty environment with all that stuff. If you just look at that and you go, Hey, they made something beautiful and awe-inspiring, but just the level of technology sophistication there, it's incredible. And I feel like, okay, you and I experienced these things from our perspective, but every endeavor of human achievement right now is experiencing a renaissance like that except for maybe politics.

I don't talk about politics on the show, because frankly I like to talk about stuff that works. But anyway, that I want everyone hearing the show just to think about it. What do you know in your life that's just so incredibly awesome compared to what it was 10 or 20, or to your case 66 years ago. And then you fast forward, I've said publicly, I'm going to live to at least 180. Right. And I think there's good math behind that. So what's going to happen in 66 more years if the Wright brothers were flying, 66 years ago, in your example, not from today, but from the person you're talking about all kinds of crazy stuff.

Now you talked about first principle thinking as a part of what leads you to those incredible future vistas. If you ever read "Anathem" by Neal Stephenson?

Ozan Varol:

I have not. No. I know who Neil Stevenson is obviously, and I've read some of his other books, but I have not read that one.

Dave:

You have to read this book flat out, you have to read this book. It is science fiction. But it's one about some alternate planet where there's a monastery based on math, but you said it first principles. And one of the favorite quotes in my family is, there's these three math super geek monk people. And if you guys listen to this, going to, what are you talking about? Just listen for a second. And what they're saying at one point in the book is, we're stranded halfway around the planet and all we have as, a piece of string and a pocket knife, and the wise old 100-year-old monk goes, that's no problem. We didn't have a Sexton, but we can derive one from first principles. So this is the ultimate mindset of engineering. And of course they do end up going into space and saving the world and all this stuff you're supposed to do in a good science fiction book. But the thinking that was captured in that book had a lot of commonality with what you teach in your book.

That one though is a story and what you're talking about in "How to Think Like a Rocket Scientist" here is distilling that for people aren't rocket scientists. And so we covered first principles, but what about uncertainty? And the Mars thing is a great example, but that's actually the first thing in your book, even ahead of first principles. Talk to me about how to deal with uncertainty, because, Hey, we are kind of in a pandemic, half of people now just don't have jobs and no one knows whether their company is going to be around tomorrow, whether the restaurant can stay open. So uncertainty give it to me straight.

Ozan Varol:

Yes. So uncertainty, we humans are afraid of uncertainty for at least partially for evolutionary reasons, because thousands of years ago, if you are not afraid of the unknown, you probably became lunch for a saber tooth tiger. And so the people who are not afraid of the unknown didn't pass on their genes to us. And I think then that genetic conditioning gets reinforced by our schooling where we're handed, right answers. There's certainty prescription, as we talked about before. And so we then enter the workforce ill-equipped basically to deal with uncertainty. And one of the things that happens in conditions of uncertainty is, and this is the opposite of what rocket scientists do. We try to control things that cannot be controlled, and then we don't control things that can be controlled.

And rocket scientists are very good at ignoring what cannot be controlled and focusing themselves on the variables that are actually within their control. So let me give you an example where I did not apply this principle in my life. We were talking about book marketing before we started recording here. So my book came out on April 14th and that was the height of the pandemic. I had this book tour planned and it was canceled. And I spent two days just being miserable basically, wishing for reality to be different than what it was hoping that the universe had dealt me a better hand, which is just a profoundly useless thing to do. It's like tugging at a flower to make it grow faster. It's not going to happen, a much better approach would be to say, okay, well I can't change the hand that I was dealt, but how do I play the cards that I have been dealt?

So what is my mine to shape here? So if you're listening to this and the pandemic has disrupted the way that you conduct your business, ask yourself, how do I solve the problems that the world needs solving right now, as opposed to the problems that I want it to solve, as opposed to the problems that I expected to solve, how can I use my skills, resources, product services in a way that I haven't used them before to address the problems that now exist in the world? So for me, so the book tour was canceled, I ended up pivoting to doing lots of virtual events, partnering with other authors, with big audiences who were in a similar position as I was, and the virtual "Book tour" I did ended up being far more successful than the physical one.

And by the way, I should also preface this by saying I was not reasoning from first principles and deciding to do a book tour, a book tour I was doing it as a copy and paste. I was like, all right, well, I wrote a book and the other authors I admire, they also went on book tours. I was not asking myself, what purpose does a book tour serve? Is it the most efficient, and once you identify the strategy, is it the most efficient way of actually getting there? I know I was just simply copying and pasting tactics from other people's playbooks. And so the pandemic basically forced me out of the status quo and forced me to go back to first principles and define my objective. And then that also allowed me to find other a lot more creative ways, a lot less time consuming ways too, of getting the word out about my book, as opposed to a bookstore, which would have required me to get on a flight to New York city, and go into a Barnes & Noble and sign books for 50 people and come right back around, which is just not an effective use of my time.

Dave:

It's funny though, you talk in your book about how people doing things the way it's always been done is one of the things that's the opposite of this. Here you are. Okay. I'm a rocket scientist, I'm a law professor. I am an author and you studied this. To write a book, it takes a huge amount of just structuring of information. So really become sort of one with what you write about. Obviously I do, I'm assuming you do, just because the amount of rigor it takes to take out all the words that don't need to be there. So after all that, you still did it. Why did you have blindness there that allowed you to just do what's always been done?

Ozan Varol:

That's a great question. I think there's a number of reasons for it. One is I was completely in hustle mode, leading up to the launch of the book, and I wasn't building in time to pause, reflect and deliberate. And I think one of the things that totally undermines first principles thinking is not building in that time into your day. It's really hard to innovate when you're clearing out your email inbox, which is what I was doing. And so I think that was one of the reasons for it. And I was also of course, new to this. And so I was just sort of looking at what other people had done. But I think embedded in your question is another thing, another principle, another idea that's come up for me when I was writing the book, and let me illustrate this with, I think this is a scene in one of the Star Wars movies. I don't remember which one it is.

But Luke Skywalker walks into a cave to fight Darth Vader. And then they're fighting each other. They're having this lightsaber fight, Darth Vader's mask drops, and Luke sees himself behind the mask. And some of what I talk about in the book felt a little bit like that. Like I was fighting this sort of monster, but the monster at times lives within me. And so it was very much a form of self-therapy. Some of the principles I've been really successful at applying at certain periods of my life and other periods, not so much. And so writing itself, I think transformed me into a different person in many different ways, but it did feel like in many cases fighting some of the demons that I've grappled with throughout my whole life.

Dave:

That monster's called the ego.

Ozan Varol:

Yeah.

Dave:

I have a whole neuroscience company that's focused on using tech to help people see what it's doing so that you can become more aware of your blind spots. It's a major thing in my life that's been helpful, but hey, I still have blind spots too. Sometimes I hire the wrong people. I follow the wrong strategy and I don't listen to the people I hire, or listen to the wrong ones and we all do our best, but it's that sense of discernment that can make you a fantastic engineer, a fantastic rocket scientist. There's also a sense of discomfort when you go into a new space, you've never launched a book before, so you don't necessarily know what to do, so then "I'll follow a template." Right. Which is dangerous, except it's safe at the same time.

Ozan Varol:

Exactly.

Dave:

Right. It's safe because, well, that's a trail I can see. And then you look at it and you step back out. Yeah. But that trail goes on that windy way. And there's another path it's just right there. I could just walk up that one, but no, one's done it before. Right. So then are there, what do they say at the end of the map? There's dragons there. And so since we don't know, we are like, I'm not going to be done to find the dragon. We'll let that other guy, who's not going to end up contributing to the gene pool. He's going to go. Right. How do you decide? Because you did this, you did this twice or three times, maybe like, okay, I'm going to leave Turkey. I'm going to go to Cornell and become a rocket scientist. Okay. Leaving Turkey's one become a rocket scientist is two, and then all become a law school professor. That's three. Okay. So you went to the places where all say there might've been dragons because you've certainly never done, other people have been law professors, but for you, those are really big changes. So you had the courage and you had the ability there, but then a blind spot appears and there has to be a cause for it. And as you finished your book, did you have any enlightenment about where your blind spots come from?

Ozan Varol:

Great question. So sometimes they come because I am too close to the problem to think differently. And this happens quite a bit. You're so immersed in the weeds of what you're talking about or what you're thinking about. And it's hard for you to step back and see other paths to use the analogy that you just mentioned. And so one of the things that I find really important and, with all of these like different career trajectories, different pivots that I've made to, I think one of the things that's helped me excel is bringing in insights from different fields into whatever it is I'm working on. You moved from computer security Dave to coffee. I did all of these crazy pivots and I think those actually help illuminates some of the blind spots because you're bringing in insights from one field, one time seemingly drastically different field to another one.

And as an actor outsider, it becomes much easier for you to see the blind spots that that field is operating under. And this is why so many, I think gatecrashers are outsiders to the field that they ended up disrupting, right? So Elon Musk, whose name came up already, he came from Silicon Valley. He learned rocket science by reading textbooks before he started SpaceX, Jeff Bezos came to start Amazon from, I think he was in the finance world, Reed Hastings, the co-founder of Netflix. He was a software developer before he started Netflix, Sara Blakely, the founder of Spanx. She was selling fax machines door to door before she became the world's youngest self-made female billionaire. And a lot of these...

when the established industries, so take blockbuster, for example, right. Too close to the problem to think differently.

They're looking at the rear view mirror and doing what they did yesterday. They're assuming that video rental requires a brick and mortar store. They're assuming that video rental requires late fees. So you've got this model that's been stuck in place. And then you've got Reed Hastings which is an interesting story by the way of cross-pollination. He had incurred a bunch of late fees for renting and then misplacing Apollo 13, which is one of my favorite movies all the time. And so he's like pissed off for having racked up 40 bucks in late fees. It finally finds the movie, goes to the blockbuster, drops it off, pays his late fee. And then he goes to the gym to work out. And as he's working out, he realizes that at his gym, he could work out as much or as little as he wants for 30 or $40 a month, no late fees.

And he thinks to themselves, well, what if we applied that idea to video rentals, and that seed eventually blossoms to become Netflix. So often what's coming common place in one field in this case, the fitness industry, the subscription model is completely revolutionary in another. And a lot of the gatecrashers a lot of the people are really adept at first principles thinking are able to move into a completely new industry and see all of the blind spots that the established players are operating under. And that's one thing that I've tried to do. And again, not successfully, always because book marketing was new for me, and yet I was still operating under this blind spot, but that's one of the things that I've tried to do. And whatever success I've had is definitely attributable to this is being able to bring insights from rocket science to seemingly completely unrelated fields like law and business. And that's because a lot of new ideas happen to be combinations of existing ones. And the best way to do that is to create a life where cross-pollination becomes possible.

Dave:

What I'm hearing out of that is if you piss off the wrong customer, they might put you out of business.

Ozan Varol:

Exactly.

Dave:

I kind of feel sad that my kids will never have the experience of going to a blockbuster and picking out a movie like Netflix is way better just to say it, but there was a ritual to that. And I got to say Reed Hastings kind of killed that. Thanks Reed. You also talk about in your book about moonshot thinking, which is another thing Naveen Jain's been on the show and talking about that, Tony Robbins talks about these big changes, Peter Diamandis, and this is very common amongst people who are like, just think way bigger than anyone else? Talk to me about your interpretation of moonshot thinking.

Ozan Varol:

Yeah. So moonshot thinking and going back to the first literal a moonshot we took, I think this sets the stage for what moonshot thinking means to me is the moment when John F. Kennedy steps up to the podium at Rice University Stadium in September, 1962 and pledges to put a man on the moon before the decade is out. And at the time that promise was quite literally a moonshot. A lot of people in the audience thought that Kennedy was crazy. Officials at NASA thought that he was out of his mind because so many of the prerequisites for a moon landing just hadn't been done yet. No American astronaut had worked outside of a spacecraft, two spacecraft had never docked together in space when Kennedy made that pledge, NASA didn't know if the lunar surface was solid enough to support a Lander. They didn't know if the communication system would work on the moon.

Kennedy said in his speech, some of the metals required to build the rockets hadn't even been invented yet. So we sort of jumped into the cosmic void and hope that we grow wings on the way up, and grow those wings we did, less than seven years after Kennedy pledge Armstrong ended up taking his giant leap for mankind. And that to me, exemplifies moonshot thinking, of course that was humanity's first actual moonshot, but we've been taking metaphorical moonshots long before Neil and buzz walked on the moon. The builders of pyramids, the discovers of the fire, the makers of cars, they were all taking moonshots. It was a moonshot for slaves to reach for freedom, for women to take the ballot. We are a species of moonshots, although we've largely forgotten it. We've been seduced into believing that small dreams are wiser than moonshots.

That coasting is better than soaring, that flying lower is somehow safer than flying higher. But as any pilot will tell you, and one of the things I did going back to my own moonshot of becoming an astronaut was to get a pilot's license in college, as any pilot will tell you, altitude happens to be your friend. If your engine quits, when you're flying high, you have possibilities for gliding your plane to safety. But if your engine quits at low altitudes to possibilities and flights, just like the possibilities in life tend to be more limited. And research shows that businesses that take moonshots tend to perform better for a number of reasons.

Maybe they attract investors because people believe in these big ideas and they're also become, they also become talent magnets. Yeah. One of the reasons why Jeff Bezos and Elon Musk were able to cherry pick the best rocket scientists from aerospace companies was to make them a simple promise is to tell them, instead of sitting in endless meetings, instead of trying to find your way through the red tape, the bureaucracy you get to do what you were trained to do, which is to build rockets.

And those rockets are one day going to take people to Mars. And that's a really compelling promise. Now of course, when we think of moonshot thinking, I think it's not just about like thinking big and then sprinkling some pixie dust and like hoping that your dreams magically take flight, you have to marry idealism with pragmatism. So it's important to set high goals, but then also use back casting to sketch out a roadmap to actually get to that goal. And I mentioned how I apply this in my own life in middle school in Turkey, my moonshot was to become an astronaut one day and I just worked backward from that desired outcome of like, okay, what do I need to actually get there? I need a pilot's license. I need a PhD preferably from one of the top universities in the United States. So that means I have to get into college in the US well, what does that require?

My parents knew nothing about that. I had to just discover things on my own. I thought to myself, well, what other skills could be useful for an astronaut? And I thought, well, you know, computer programming could be great. So I taught myself how to code and basic and C++ and Java. And so I think that combination of aiming really high and then sketching out a way of actually getting there that makes moonshot thinking possible.

Dave:

You talk a lot about creativity in the book which is cool, because rockets Just like, we don't know what's going to be there or no one's ever done this before. So you are the people who choose the path that might have dragons on it. And you say in the book, there's one single word that boosts creativity. What is the one single word?

Ozan Varol:

Could, that one single word as simple as it is, replacing should with could, replacing is with could research shows boost creativity. So in one study, if I'm remembering this correctly, participants were told, one set of participants were called object A is a chew toy for a dog. And the other set was told

object A could be a chew toy for a dog. The second set of participants did much better at generating new uses for the toy compared to the other ones. And there's a bunch of studies that bear that out as well. I mean, it's just one simple switch in your vocabulary. And other one that I like is replacing, we can't with, we can if, so going from can't to can if such a powerful we'll switch, and if you're listening to this, I'm sure you've been in so many meetings where idea generation doesn't happen because people are raising their hands and coming out with reasons as to why we can't do this, or we can't do that. Our budget doesn't allow it. Our skillset doesn't allow it. The management would never approve people are busy shutting ideas down as opposed to building them up. So maybe conduct a brainstorming session, try this and tell people you can't say we can't. You're only allowed to say we can if and watch magic happen.

Dave:

It's funny you say that I was on because in Games Changers, one of the books that I wrote. In fact, the one that didn't hit the New York times list, but did hit the USA Today and Wall Street Journal and all that kind of stuff. I took answers and data from almost 500 episodes of the show. So I've interviewed rocket scientists and Nobel prize winners and all kinds of just amazing game changing people. And I said, statistically speaking, if we boil it all down and do the math, what do they agree on? It makes people perform better. So instead of following one group, just like let's average out 500 groups and find some truths in there. And it turns of one of those laws is about, the power of language and it's a common trait for people. And so at my companies, and in my house, we just don't use the word can't, but there's all kinds of stuff you can do if you live in a world of unlimited possibility.

And it feels like in rocket science, you kind of do have some of that, which is a beautiful thing. And I would thank you for offering that bit of knowledge to people listening. So if you find yourself listening to this, the voice in your head says, can't, it's always lying. It, what it says is don't know how. You also in what you were just sharing there, you talked about how to spot the truth, right? And knowing whether something is true or not is a part of what you call the power of flip-flopping in your book. What is the power of flip-flopping and how do rocket scientists identify truth?

Ozan Varol:

Great. And the way that rocket scientists identify truth definitely runs contrary to the way that most people operate. Because most of us, and this is so true in politics, and we're not going to dive into politics, but I'm just going to mention it. People are rewarded for being consistent, right? They declare something and then the more consistent they are with it, then the way they're perceived as being the type of like ideological, never going to change my mind, people suitable for office, politicians would make for terrible rocket scientists because rocket science their job is to prove themselves wrong. And the way that that works is you basically, and by the way, opinions are really dangerous because usually when you declare an opinion, you tend to fall in love with it. And so scientists in general, they come up with what are called the working hypothesis.

And the keyword there is working, working means it can be changed. It can be tweaked, it can be abandoned altogether. And ideally you generate multiple. So you don't fall in love with any one of these hypotheses. It doesn't always work that way, but that's at least how it's supposed to work. And once you come up with working hypothesis, you beat the crap out of them. You try to prove them wrong. Setting aside math in science, nothing is ever proven rights. It's simply proven not wrong. That's the way that science works. And you know, look scientific change all the time. We had Aristotle whose ideas were falsified by Galileo and then Newton came along, falsify some of Galileo's ideas. Einstein came along falsify, some of Newton's. And then Einstein's theory of relativity broke down at the

quantum level. That's the way that science operates. And it runs very much counter to the way that most humans are wired to operate.

Dave:

It's funny because when you're talking about language, what you'll hear is usually someone who's trained in any of those models of the universe, whether from Galileo on forward, when the new model comes up, they'll always say that didn't happen because it can't when you present them with new evidence, they literally say the evidence is false because it cannot exist. Because I believe in this model, that's, anti-science, that's dogma and it falls into so many areas where it's harder to deal with. And rockets means just having an unfair advantage. And the reason you have an unfair advantage is that if you're wrong, it blows up right in front of you. Okay? That is very strong and tangible evidence. Now, if you're a politician, it takes a generation or two. If you to blow up a country, nice work guys. And If you're looking at your health, it takes a lifetime or at least 10 years to blow up your health. And sometimes you can recover from that.

So it feels like short term consequences. We can engineer for those pretty effectively long-term consequences, like destroying much of the soil in the country to put in corn covered in poison. So you can make ethanol, which is using more petroleum to make it. Then you get out of the system might be a stupid idea, but it takes you 40 years to feel the pain of it. How do you recommend that people look at long-term problems like a rocket scientist instead of short term. Okay. It took me 10 years to build the rocket and it either goes, boom, or it doesn't slow consequences how do you deal with those?

Ozan Varol:

First comes with getting out of the... we're all chasing short term outcomes. Like politicians are chasing short term electoral outcomes. Companies are chasing short term quarterly stock values because they know that's what the executive compensation is tied to. Changing some of those structures to recalibrate for the long term would be I think, an incredible improvement again, going back to Wright brothers to Neil Armstrong, that's 66 years. That's one human life span. And if you can do that, it's amazing what you're able to accomplish. I think that's step number one is just realizing that if you are able to look toward the long term, and stop chasing short term outcomes, the results tend to be much better at a both personal institutional level. And second, I think it's important to get into the mindset of actually trying to prove yourself wrong, actively speaking.

So instead of jumping on Google, dreaming up a search query, and then clicking on the first link that confirms your preconception of what you thought to be true. Actually read some of the other ones. So actively look for disconfirming evidence. One of the things that I do is to ask myself, and you can try this in your own life, take one of your deeply held beliefs ask yourself what fact would change my opinion about this. And if the answer is no fact would change my opinion on this, you're in trouble because by definition someone was unwilling to change their minds. Even with an underlying change in the underlying facts, material facts is as a fundamentalist.

Dave:

I Confess to having been a Google fundamentalist. I used to believe that if something existed in digital format, that I was going to find it on Google. And a couple of years ago, they changed the algorithms. And now most of the information about how biology works is I'll call it suppressed, filtered out. It's probably on there somewhere on page 20, but I can't find it anymore. And all I see is in reader's digest level of garbage after ads. So even though it sort of broke my perspective on how to find stuff, but I switched to a different search engine because it stopped working, but I probably should have done it a

couple of years before I did. And I found that my productivity went through the roof, right. And I used something called [inaudible 00:47:41] I've no financial say in any of that stuff, I just got tired of it. But my belief there was really fundamentalist that, I'll just Google it and I'll find it. And when that changed, man, I did not catch it. And I'm finding that more and more. You have to be a little bit more careful about finding truth, because if you're relying on someone who's trying to manipulate your truth to get you to buy something or to get you to vote for something or whatever it's becoming increasingly difficult to do that.

Ozan Varol:

I think it's also partially because we're all operating under the shiny new object syndrome too. We're all reading the latest book on the best seller list. And then when you're doing what other people are doing, if you're using the same search engines that other people are using, if you're reading the same books that other people are reading, if you're reading the same articles that other people are reading, following the same new sources, you just end up thinking like everybody else. And so one of my favorite activities is to go to an indie bookstore and just look at the old releases and just browse the shelves for books that have been published 30, 40 years ago, but that have stood the test of time. And people aren't reading them, not because they're bad, but because they just happened to have been published a long time ago. And yet some of the best ideas are located in those that are hidden in everybody else's wine spots. And as long as you're intentional about it, as long as you're not sort of operating on autopilot and going to the same sources each time, the same search engine it's amazing what you're able to dig up.

Dave:

Tell me about failing fast.

Ozan Varol:

Failing fast, failing often, failing forward. It's all the rage these days in Silicon Valley, celebrating failure has become this mantra. Silicon Valley companies are now holding funerals for failed startups, complete with like bagpipes, DJ spinning records.

Dave:

That's dark. I will admit by the way, for a long time, when I was in Silicon Valley, I would only wear t-shirts and schwag from companies that had either gone bankrupt or been acquired. Because every company would just throw clothing on you like, I don't need all this crap. And so would like sit in a closet until it had some sort of ceremonial significance.

Ozan Varol:

I love that. So you were conducting your own funeral for these companies. So yeah, that's become a thing at the institutional level. There are now conferences dedicated to celebrating failure and I don't buy it. I don't buy it for two reasons. One, regardless of what Silicon Valley tells you, failure sucks. Whoever says they celebrate failure and they don't mind failing is lying because there's a value judgment attached to failure. Right? Success is good and failure is bad. At the same time though, fear of failure can be paralyzing, right? I think behind every business unlaunched, every book unwritten, every song unsung is the looming fear of failure. So rocket scientists take a more balanced approach. They don't celebrate failure, but they also don't let it get in the way. And the mantra in rocket science isn't fail fast. It's to learn fast.

The goal is to, because one of the other underlying assumptions here of the fail fast mantra is that you're actually learning as you're failing fast. And that assumption turns out to be incorrect in many cases, because when we fail, what happens is we often attribute it to external factors. So we say, well, we failed because we were ahead of the market. We failed because of our competitors. We failed because of the regulations, but personal culpability doesn't make the list. We don't do that soul searching that says, you know what? We failed because we made a mistake. That was a bad decision. And if you don't do that kind of soul searching, then you are moving from one failure to the next, without improving and research bears this out. There's a study that I cite in the book of 65 cardiac surgeons and they tracked them over the course of 10 years.

The ones who botched a particular procedure ended up performing worse later procedures. Not only did they not learn from their mistakes, but they actually ended up reinforcing bad habits. There's another study from the business world, comparing the success rates of failed entrepreneurs versus first-time entrepreneurs. Now you might think that we'll fail entrepreneurs. They've launched the business before they failed at it. So they, they should be more successful. The success rates are virtually identical between failed entrepreneurs and first-time entrepreneurs, because we were not good at learning from failure. And so rocket science is take a learn fast approach, not fail fast approach to failure. The goal is to learn from each mistake, from each bad decision and improve with each iteration. And going back to what we were talking about with long-term thinking too, that's embedded into the learn fast philosophy. All breakthroughs are evolutionary, not revolutionary.

If you're trying to implement moonshot thinking, if you're trying to achieve something transformative, you're not going to succeed on your first try. Now Einstein's for several proofs for E equals MC square failed, Thomas Edison famously said, I haven't failed. I've just found 10,000 ways that won't work. SpaceX says first three launches were spectacular failures. The company was on the verge of bankruptcy, at the end of 2008, but the opening doesn't have to be grand as long as the finale is. And the best way to make the finale grand is to actually learn from each failure and improve.

Dave:

So it's about avoiding fear of failure, which allows learning.

Ozan Varol:

Yep. Exactly.

Dave:

All right. We don't have time to cover your entire book besides... by the way, is there an audible version of it?

Ozan Varol:

There is.

Dave:

There you go. So, and that's definitely more than an hour. So this episode, I still want to know, though, if someone's listening to this, maybe they're going to listen to your book or buy a book. Maybe they're not, but if you can offer the top three ways, people can think like a rocket scientist today. So everyone who hears this, walks away with some nuggets.

Ozan Varol:

Okay. So nugget, No. 1, you already talked about just to recap, first-principles, thinking question assumptions in your life, in areas where innovation matters. Don't take things for granted. That's number one. No. 2 is learn from your successes and from your failures. We're bad at learning from failures. As we discussed, we're also bad at learning from successes because we assume that when we succeed, everything went according to plan, but it's possible to succeed despite making a bad decision, despite making a mistake. So ask yourself the same questions after failure and success. What went wrong with this and what went right with this? And then No. 3 would be prove yourself wrong.

So flip-flopping try to seek out contradictory evidence that challenges what you believe as opposed to evidence that confirms it.

Dave:

Beautiful. Ozan Varol. Thank you for writing a book about this. Thanks for building stuff that helped us explore Mars. That's super solid. And I appreciate you being on the show.

Ozan Varol:

Thank you so much, Dave. This was a lot of fun. Thanks for having me on.

Dave:

If you guys thought this was thought provoking, you want to know more about what's going on in your own mind and how you can transform your processes to think differently then you should check out either his webpage at Ozon Varol. O Z A N V A R O l.com. Of course, on daveasprey.com. You'll have all the links and all that sort of stuff. Or you can just go to wherever you like to buy books. And you can say, Hey, I'd like to pick up a copy of the book called “Think Like a Rocket Scientist.” Have a beautiful day. And as always, if you buy a book and you like it and you don't leave a review for it, it's because you're a bad person. There we go.