



Transcript of “The Science of Smart with Dan Hurley”

Bulletproof Radio podcast #104



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Dave: Today's cool fact of the day is that the concave glass surface of a 37 story skyscraper in London has actually melted the side-mirrors of a Jaguar parked on the street below it just from creating a magnifying glass effect. Apparently, the way we teach Boy Scouts to fry an egg on the sidewalk works when you're building buildings. This only happens a few times each year and for some reason I guess it always does it to Jaguars because it's London and they're from London. Anyway, kind of cool that buildings are cooking cars.

Today's guest - and by the way, I should intro the show. This is Bulletproof Executive Radio; I'm Dave Asprey. The cool thing here is today's guest is Dan Hurley. Dan has the distinction of being called a slow learner in 3rd grade because he didn't know how to read. However, he is now someone who was taught by Spiderman comics how to read and was published in the National Examiner. Dan, I dug some real dirt up on you. Your first article was actually "I Was Attacked By Killer Bigfoot." Is this true?

Dan: That was my third article. My first article, well, for a national publication. It was back in 1980 and I was trying to figure out how to get started writing for national publications. I was living in St. Louis working as an editor; it was the old do what you can, with what you have, where you are. I heard some crazy local news reports and started pitching those stories to the supermarket newspapers.

Dave: So you could break into the business. You've come a long way.

Dan: That was my start.

Dave: If you look at the real reason you're on the show here, is obviously not bigfoot. It's because you wrote Smarter: The New Science of Building Brain Power.

Dan: Yes.

Dave: You've also been on Dr. Oz, and NPR, and CBS and you've increased your own fluid intelligence by 16 percent, and you've written for Neurology Today, so you're pretty much someone who's up to speed on how this stuff works.

Dan: I think so. I hope so.

Dave: Let's jump right into it for people who are ... lots of them are driving today. What is fluid intelligence? How do you measure it?

Dan: When people talk about smarts, often times it's about knowledge and information that we know, but the question is how do you get that knowledge and information? One way through hard work, but when everyone sits in class for the exact same amount of time and if they all study for the exact same amount of time, they don't all get the same grades. They don't all learn as well. That ability to learn, to understand things, to follow a conversation, to see into a matter, is fluid intelligence. This is the big thing that separates that crazy math genius from the guy who's smashing big rocks into little rocks.

Dave: That's the measure of fluid intelligence: how quickly you can absorb new information, or how quickly you can work with it?

Dan: Yeah.

Dave: Okay.

Dan: Yes, and see to the heart of it. It's tested by psychologists through various basic paper and pencil tests, but it's important to keep in mind that its usefulness is not some geeky-headed silly thing. It's the reason that, when you think of how did Jeff Bezos see what was coming with books online and building a business. How did he get that ability to penetrate all the facts that all of us see, and see the forest through the trees. That kind of ability is a really precious commodity in business and in all facets of life.

Dave: It's something that's incredible, especially because you were able to change your fluid intelligence. How'd you do that?

Dan: Until six years ago, psychologists who study intelligence all agreed that you cannot increase fluid intelligence. They had been trying for a hundred years; they had done study after study after study. We've all heard of preschool as a way to help people. Here in New York, Bill de Blasio, the new mayor, wants universal preschool. Preschool is great, it helps a lot of things, but one thing it does not seem to really help is it doesn't seem to raise your intelligence. It doesn't raise your IQ score by much. Even though you've got that whole extra year of learning and getting prepared, somehow that doesn't seem to translate. They've looked at all kinds of other things.

Six years ago the study came out in the Proceedings of the National Academy of Sciences where they did what's called a working memory practice. Working memory is something that is very closeness related to fluid intelligence; it's not quite the exact same thing. It's usually tested in these little two minute tasks that seem ... a psychologist, one guy calls them these dippy little tasks that seem really pointless but turn out to be really predictive of all sorts of other things.

Instead of just taking it as a test to see how good you are, they had people practice at this thing. After five weeks of a half hour a day of practicing, the people's fluid intelligence increased on average by 40 percent, which was a wild finding.

Dave: What kind of work was causing that?

Dan: It's a working memory task called the n-back. If you go on a site called soakyourhead.com, it's there for free - you can do it. It's so hard it makes you want to throw your computer across the room; it's extremely demanding. You're seeing like a ... imagine a tic-tac-toe board, and different items, different ones of the squares are lighting up. This one lights up, that one lights up, this one lights up, that one lights up. You're being asked first to remember to

press a button every time the same one that lit up two times ago lights up again. That's two-back.

Then, if you master that - and that's pretty easy remembering which one was two times ago - then you get to three-back. You're constantly having to keep track of three ... it was here, it was there, it was there. Okay, now it was here, it was there, it was there. It just keeps shifting back and forth and you're like, "Ahhh! I can't follow it!" This ability to concentrate and zoom in turned out to be super-useful. There have been now dozens and dozens of studies that have found that doing these various working memory tasks seemed to increase ... either they increase just working memory, which is really, really useful. They've increased all kinds of skills from reading comprehension, math ability - everything, really. It's quite an extraordinary thing. The field of intelligence research has really caught fire ever since that study came out.

Dave: It's funny that you mentioned that. I've been doing dual n-back training with-

Dan: There you go.

Dave: -executive coaching clients for about three years. It's something I read about on the site a while back.

Dan: How far along are you?

Dave: I haven't done my own training in a while, because like you said, it's mentally painful.

Dan: I got up to five-back.

Dave: I got up to five-back also. I've seen studies that say it's stable even ten years later. You probably saw that study.

Dan: You know what's crazy, is when I go on, I haven't done it ... I did it very regularly for three and a half months.

Dave: That's a long time.

- Dan: I did it like 55 times over those three and a half months, so I was doing it close to five days a week. Now when I do it a year later, I'm right back up to five-back very quickly. It's strange; it's like riding a bike or something.
- Dave: Those are the words that I was thinking, was it is like riding a bike. I'll have to go back and see if I can still do five. I hit five a few times; I wouldn't say that I was that reliable on it. Four was doable.
- Dan: Four was doable. I would get up to five and fall back to four, I would get up to five and fall back to four.
- Dave: We were in the same zone
- Dan: Yes.
- Dave: Here's a question for you then. You talk about 16 percent improvement in fluid intelligence. Are you talking about IQ there or something else?
- Dan: IQ is different than fluid intelligence. Most IQ tests include all sorts of things that ... including a crystallized knowledge like ... I took an IQ test and it included all kinds of word knowledge. I'm a writer; I'm a professional writer, I've been a professional writer for 30 years. All I do is I sit around reading these damn books back here. I'm a reader; I'm crazy. Of course, yes, I see your books, too. Of course I know all those words. It would almost be like asking a car mechanic about where's the carburetor in a 1979 Buick and they know that instantly. What is this piece of equipment? They know what that is, where I wouldn't know what that is.
- To that degree, a regular IQ test is such a mix of things. It's such a mutt of this and the other, that most of these studies do not bother with an IQ test. First of all, they take a long time and they just include so much. Most fluid intelligence tests tend to be visual-spatial for some reason. I'm not sure exactly why they have zoomed in on that. A lot of them are these ... the Ravens Matrices

is considered the gold standard. That's the one where you have three rows of three. You see a little triangle, a bigger triangle, biggest triangle. Little circle, bigger circle, biggest circle. Little square, bigger square, oh, what's the last one? Oh, it should be a big square.

When you're at the third one they instantly become hard enough that a little child, a ten year old, would start getting really confused. By the sixth one, it's really pushing you. It's like, "Woah, what is that?" It begins to look like hieroglyphics. There's so much going on that you've ... and what it takes, is it takes careful attention. It takes a sort of systematic careful attention and you kind of have to go through. It requires this weird thing of insight. At some point your mind needs to just go, "Oh! That's it!" That is hard to do when it gets hard.

That kind of pattern detection, when you think about it, that's what a little baby does when it's learning language. That's what we all do when we're driving and there's snow coming down and it's foggy. We're trying to see the road and, "Oh yeah, I got to turn right here." It's pattern detection, which is really fundamental to intelligence and to making sense of the world.

Dave: When you talk about increasing your fluid intelligence by 16 percent, you use the Ravens Matrices?

Dan: The Ravens.

Dave: Not an IQ test.

Dan: Yes.

Dave: Got it.

Dan: I took an IQ test; I went to MENSA, because MENSA gives out free IQ tests - anyone who wants to join. I took MENSA thinking "Gee, maybe at the end of this my IQ will rise enough and I'll be a member. I could join." What I was surprised to find was that I qualified just barely based on my first test.

- Dave: Wow.
- Dan: Yeah. Then three and a half months later when I took it again, I only went up a point.
- Dave: Wow. It's funny, when I did it-
- Dan: My fluid intelligence increased but ... it's interesting, when I was looking at the IQ test that MENSA gives, a lot of it was sort of math, the kind of math ... I could tell that if I re-studied, if I sat down for a high school equivalency, a GED program. Just a simple two-week, "Well, how do you do this and that and that," I know I would have gone up way more on that MENSA IQ test because there were just a bunch of goofy little math things that ... since high school I haven't done that.
- Dave: Right, that's one of the problems with IQ tests in general is that there's a testing effect. You did it once, now you know what's on the test so you would go back and if you were going to take it again you might brush up on your math skills.
- Dan: Certainly the fact that I went up 16 percent on the Ravens, you could say, "Well, Dan, maybe you would've gone up 16 percent if you just took it twice without having done anything." That's certainly true, but scientifically though, there have been nearly a hundred of these studies published ... My six year old is coming in. Honey, I'm doing a ... yes, there she is. Okay.
- Dave: That's okay, my six year old has done that before, too.
- Dan: Hello, see you later. See you later. Okay. Go downstairs with Annie!
- Dan's daughter: Where is he?
- Dan: He's in ... where are you, Dave?
- Dave: I'm in Canada. Victoria, British Columbia. Hi there.

- Dan: He's in Canada. Say hi.
- Dan's daughter: How far is it?
- Dan: That's many miles away. You need to go downstairs; I'm working.
- Dan's daughter: Bye, daddy!
- Dan: Bye!
- Dave: How cute.
- Dan: Oh lord! Actually, we're going to be enrolling her in a working memory training program through something called Cogmed.
- Dave: Ooh, that's exciting.
- Dan: Yeah, that's the biggest ... we've all heard of Lumosity, which is this 15 dollar a month thing for every man. They've got like 40 million people that have signed up for that.
- Dave: I was on a panel with their chief scientist at South By Southwest a couple years ago on brain hacking. Really good people. I've been to their labs and everybody liked it.
- Dan: I have been there, too. They are very good people, they're working very hard, they want it to work, they want it to help people. Cogmed has more published research behind it. It started off as a research program for people who have like ADHD or are recovering from the effects of chemotherapy or anything like that. It seems like Cogmed looks to be the most promising approach.
- Dave: I've often thought of doing dual n-back with my kids - they're four and six. I'm not quite sure it's time yet. I am certainly going to do neurofeedback with them once they're eight or so and they've developed a fully formed basic nervous system so they can just gain more ability to understand the limits and edges of what they're capable of at a young age, so they twirl around less.

- Dan: Right.
- Dave: Twirl around cognitively; they can twirl around all they want, physically.
- Dan: You can absolutely watch kids in this early age range as their working memory goes up. It's interesting, they are such remarkable learners at that edge and yet their ability to sit and look at a piece of paper and make sense of that pattern is very low. Because, they're just so everywhere that they can't attend in that manner. Even though, of course, we all know that they are able to learn new words and they make sense out of what adults are saying and learn social cues so amazingly fast. You're never smarter at that fundamental level than you are as your first year of life. You're starting from scratch and gaining a vast body of knowledge with nothing to base it on.
- Dave: The thing that kids that age seem to be able to do, obviously if there's a bit of moving stuff on a screen, they lock in on it. I have mine do inner-balance heart rate variability training; it teaches you to breathe in slowly and breathe out slowly while you're staring at a screen and changing your heart rate. They can rock it on the first level; they immediately turn it to green and they keep it there. It's really funny, because once they learn that, you say take a deep breath, and most kids just start panting when you tell them to take the ... but they actually do a deep breath like the way they learned with feedback. The loops are so fresh for their brains, I love watching kids learn it.
- Dan: That's cute.
- Dave: It's awesome. We were talking about IQ tests. I was concerned about the testing effect and I was trying to tell if my own dual n-back experiments had paid off. I did one form of IQ test; I don't recall which one right now - this was going back like four years, maybe three years. I did one, then I did another equivalent style of test where you could match them up on standardized tests to see where you were but you wouldn't get a testing effect. My second

score was 12 points higher than my first score, which was kind of cool. One of the people my company with ... had 18 points which is astounding. Again, how much of that was luck, how much of it was sleep, because your intra-day variability of IQ varies, too, right?

Dan: Again, the only way we know this ... none of us would take any pill sold whether a pharmaceutical or a dietary supplement based just on how does it make us feel? If you take a statin drug or an aspirin - an aspirin you kind of learn yeah, it makes it hurt less - but most pills, most things that we do, we don't know, and it's only based on a large study. That's where these hundred or so studies that have been published ... it's been building up so quickly, when I finished my research I had 75 randomized clinical trials that have been published in peer-reviewed literature, the vast majority showing significant benefits. In just like eight months there's been another 25 studies published; it's really gaining speed. The field is on fire.

Dave: It is on fire and part of what I am working on with the Bulletproof Executive is helping people see that there's a bunch of research that they're not going to hear about at the doctor's office about these sorts of things and that some things that we didn't think were possible using both the power of data analysis where we couldn't do data collection and analysis enough, and just the power of feedback tools like dual n-back where right away, did I get it right, did I not get it right? We can do things that you could never do fifty years ago. It was just unthinkable.

Dan: Absolutely. I think anyone who is interested in improving their abilities, you know, Lumosity is inexpensive. I know a lot of their games are working memory games. There's a vast literature showing that that is real, that's it's beneficial. For instance, if you have someone who's had a traumatic brain injury, if you have a child that you're learning maybe you're concerned that their ADHD, someone who's recovering from radiation chemotherapy from cancer, I think Cogmed is a very ... there is a lot of research supporting it. Some skeptics continue to doubt it but I think it's ... I

see studies going on in leading medical hospitals around the world. It's really considered a credible approach.

For my book, I looked at all kinds of methods. I looked at physical exercise, which is absolutely, probably the single best proved method. One thing that most of these methods that I looked into all have in common is that you've got to be progressively getting better. It's not enough to just ... I've been jogger like my whole life, I've been a reader my whole life, so me just reading and jogging is not going to move me up; where I joined a boot camp exercise program and really was out there three mornings a week killing myself just about and I think that contributed as much as the working memory games.

Dave: It increases your BDNF which is something necessary to increase brain function, right?

Dan: Absolutely. It seems that weight training, strength training, is something that really helps. What's great about all of these things, is they are progressive. As you get stronger, it gets harder, so you just keep going. It's that gaining process where the real benefits seems to come in. I think another thing is if people say, "Oh, well I do sudoku," or "Oh, do crosswords," or "I'm playing Tetris." Here in the New Jersey, New York, Connecticut area, if you get on a bus or a train you inevitably walk by someone who's playing Tetris on their phone. I just think if that person was just doing a working memory task, this would actually be literally making them smarter while they're having some fun.

Chess is another game where it gets harder as you get better. It requires a lot of brain power. You could get a teacher who helps you start learning new strategies and really pushes you to grow there. Learning a musical instrument ... I should have had my lute available here. I learned to play the Renaissance lute. There's a number of good studies showing that learning to play an instrument is really great. Not just picking up your guitar and playing the old Beatles songs or the Grateful Dead, but actually learning a new instrument. Again, it's the learning and growing

and getting better at something where the gain really seems to come in.

Dave: The idea of constantly pushing for hormesis, this idea of something was hard so you had to learn to do it better.

Dan: Yes.

Dave: It's interesting, because you're a pretty well traveled brain hacker. You've also tried the Racetam family of neotropics, right?

Dan: The only drug that I took aside from coffee, which, you know, drink more get smarter. Coffee actually has a ridiculous number of benefits. Nicotine - and this will sound very bad to most ... there, he's running away.

Dave: I'll just grab mine while you grab yours.

Dan: Oh no!

Dave: No, I love it, Dan. Tell us.

Dan: I don't smoke. I'm not a tobacco user; it's definitely not helpful, tobacco, but nicotine alone as a patch or if you want to use the gum ... What do you got there? What is this?

Dave: I have the two milligram lozenges that don't have bad sweeteners in them.

Dan: Wow, 2 milligram.

Dave: Yeah, it absorbs more through the gum.

Dan: How quickly does that come on?

Dave: It comes on really fast. I actually break them in half. I use one milligram where you'd put chewing tobacco in the mouth.

Dan: Interesting.

- Dave: I really feel it. I've used the patches, too; they're really good for weight loss, too.
- Dan: The patch, what I've found was like I was afraid that I would feel nauseated, like light-headed and all that. I just took the seven milligram patch. I felt absolutely nothing; I couldn't tell that I had it on.
- Dave: It's subtle.
- Dan: It was beyond subtle. It was not like coffee; it was like nothing. Yet, at the end of the day when I was getting undressed and I went, "Oh, I wore my patch today." Then I thought, "Oh wow, I had a really productive day." I think it's something that someone should talk to their doctor about but it is available over the counter and there is a great deal of research ... I have an article in the March issue of Discover magazine. There's another one if you look up my name and nicotine, you'll see it online.
- Dave: It's Dan Hardy nicotine if you're listening to this.
- Dan: Hurley, H-u-r-l-e-y, Dan Hurley.
- Dave: Did I say it wrong? Hurley.
- Dan: Harley, Hurley. I don't know.
- Dave: Sorry, I pronounced it wrong but I know it Hurley, like the surfboard company, right? There you go.
- Dan: The Michael J. Fox Foundation is supporting a study of nicotine for people with Parkinson's because-
- Dave: Wow.
- Dan: Yeah, this is how they first started noticing nicotine, because in the 60s when they were doing all those studies to show how bad it was, they were basically looking, okay, you're a smoker, you're a non-smoker. They did these massive studies with literally

hundreds of thousands of people. Britain did them, the US did them, and they would go through giant data sets; yeah, it makes your breathing worse, it gives you lung cancer, it gives you this cancer, the other cancer, it does everything bad for you, it causes heart attacks.

Then they went, "Woah, wait a minute. You have half the risk of developing Parkinson's?" It kind of freaked them out and they thought it was a mistake. Then they did more studies and they've now absolutely concluded that it has some sort of preventive effect on Parkinson's and even when people who have Parkinson's take nicotine, these pilot studies have shown a benefit for their movement disorders. There's nicotinic receptors in your brain.

Dave: This is awesome. I love it that you're actually using the patch for that. When I've used many smart drugs, the non-stimulating ones, you can feel coffee, you can feel Provigil, but the ones that are more like the anaracetams or the piracetam family, you don't really feel it when you take them but then when you stop taking them, you're like "Wait a minute, I just had to reach for a word and I haven't reached for a word in a week."

Dan: That's funny.

Dave: When you enhance your performance it feels so natural, like that's how you should have been, that you notice the lack of enhancement more so than the enhancement because it's like it's a glove, it just fits. Have you felt this in your own experiments or is it just me?

Dan: I definitely felt with the nicotine patch ... it really took a while because I was doing so many things at once, it was a little hard to figure out which one is really helping me? For instance, when I would do the exercise, I'd be kind of exhausted afterward.

Dan's daughter: Look what I made at school.

Dan: Okay, look what she made at school!

- Dave: Awesome.
- Dan: Because it's Valentine's Day tomorrow.
- Dan's daughter: Uh huh huh.
- Dan: Okay, dear.
- Dave: How cute.
- Dan: Love you! Okay, we'll see you later. We'll see you later.
- Dave: It's evening time for you out in New Jersey so I get it. You'll be off the podcast before bedtime, so that's good.
- Dan: It was hard to tell what was what but definitely ... the first time I noticed it was when I had had a really productive writing day and I got home and then when I got undressed, I went "Oh, I put on the patch today," because I didn't always remember to put it on and it really was striking how my writing just flowed that day. I hadn't even remembered that I was wearing it, so I don't think it was a placebo. I think it absolutely had an effect.
- Dave: There's a reason that so many of the world's famous artists and writers are smoking and drinking black coffee for hours on end when they're doing their writing. Those are two of the world's oldest smart drugs.
- Dan: Absolutely, positively, and everything else that's out there ... the US military would love to find things that could really help pilots, soldiers, because their routinely in these situations where they cannot go to sleep and they've got to perform at the highest possible level, or they get killed. There's the ultimate motivation, and really nicotine and coffee, it is very hard to find anything that produces a better effect without making you slightly paranoid or delusional.
- Dave: It's bad when you have bombs.

- Dan: A lot of these other drugs have weird effects - they really do. For instance, you could give someone speed and they would stay up and be like, "Yeah, I'll do it! Sure!" but back in Vietnam they found absolutely that when you gave those drugs to soldiers they end up turning around and shooting their fellow soldier who's coming back from the latrine, so it's really not a helpful thing.
- Dave: It's something a lot of people don't know, but in World War II, the US and allies actually set up coffee roasters near the front lines so they could roast coffee beans. It was part of the military's strategic supply and even like the Civil War and the War For Independence in the US, coffee was a major strategic component that they tracked like bullets.
- Dan: Oh yes.
- Dave: That's shocking and cool at the same time.
- Dan: It's crazy. What they definitely did not have was another thing that I did is trans-cranial direct current stimulation, which is ...
- Dave: Are you trained in mind reading, because you were talking about military and you talked about TDCS. I love this; you're so on the ball. Okay, tell us.
- Dan: The TDCS, I had an article a couple months ago
- Dan's daughter: You want a cookie?
- Dan: Thank you.
- Dan's daughter: I tried it; it's good.
- Dan: Thank you. Okay. All right, excuse me.
- Dan's daughter: Bye.
- Dan: Yes.

Dave: Kids are great.

Dan: Kids!

Dave: Yep. TDCS.

Dan: TDCS is the best thing that the military has ever found for improving the ability of soldiers to maintain focus for a long time and to persevere at a difficult, boring task. People, for instance, the controllers in airports who have to ... the air control tower people, they're looking at a computer monitor and people's lives are stake, but you do that for eight hours and you get pretty burned out. We all know that. We all know that when it's one thing to be working on a report for an hour; it's another thing to have that report and it's three in the morning and you're not done yet and you've got to hand it in in the morning, and being able to do that accurately with the same level of attention. TDCS, transcranial direct current stimulation, looks like a major breakthrough. Unfortunately, it's only available in research studies. People have been doing it by themselves, and ...

Dave: Like me.

Dan: You've been doing it by yourself?

Dave: For a little bit more than three years now using the iontophoresis machines, but they have the new videogaming focus device which is finally consumer grade. I can't make mine work but I got one. I use the old medical grade stuff. You've tried it yourself.

Dan: I did it at Harvard's neurostimulation laboratory. I just am too much of a scaredy cat to do it on myself because it's your brain and it's electricity. I don't want to see ... it's like "It's alive!!," and bolts of lightning come out. I know it's extremely low dose. There's hundreds of studies now that make it look super-effective for all kinds of things including depression, and for stroke survivors, and improving math ability, language ability, seemingly everything. It's really striking.

Dave: I'm trying it out. I'm learning to be good at archery so I go once or twice a week to shoot arrows and I put the electrodes on my head, trying to hide them under a hat, and I'm actually doing stimulation while I'm developing the muscle memory to learn how to target the arrows. The problem is how do you split test that? I have no idea how I can prove that it helped or didn't help. You would need a study for that.

Dan: Basically, you have to have faith in these studies that say that it does work. I would wonder, though, if you're doing it to yourself because the placement of it here vs. here vs. here, where on the brain should it be, is so varied for different conditions and things you're trying to target, that I wouldn't know how to do that.

Dave: There's definitely a black art to it and I'm sort of looking left dorsolateral prefrontal cortex because that's basically on the forehead above your left eyebrow [incher-do 39:50] because that's where the most studies have been but I've also tried it over the language processing center over here and I still think that when people say French or Swedish to me, it sounds like someone chewing gum. I don't parse the words right and it's a brain stem issue for me and it drives me nuts. I'm trying to hack that one but that's been a difficult one for me because the sounds don't enter my brain the way they enter my ear. I don't know if the electricity's going to fix that but I'm willing to try it.

All right, let's switch gears for a minute here because you're known for another book: Diabetes Rising.

Dan: Yes.

Dave: You've got type 1 diabetes.

Dan: Yes, I do.

Dave: How did this happen and why did you write a book about it?

Dan: Type 1 diabetes, how does it happen? Researchers don't know how it happens; there is a definite genetic component and most

people would assume that it's mostly genetic. In fact, it's mostly not genetic because it runs very weakly in families, where type 2 diabetes, the kind that people get when they're overweight and as they get older, runs very heavily in families. Actually, type 1 is far less genetic than type 2.

My book basically explored why type 1, which most people don't know ... type 1 is growing just as fast as type 2 is, so there are children now getting it at six months of age, at one and two, where typically the age used to like around eleven, twelve. I got it at age 18. Usually it's some point during adolescence or just before, as sort of the stress of growing puts more stress on your pancreas and then finally you kick over and you're diabetic. There's a bunch of things that seem to cause type 1 diabetes. Lack of exposure to sunshine ...

Dave: The vitamin [inaudible 42:08] connection.

Dan: Presumably vitamin D, but definitely the farther north you live, the more likely you are to develop it. The risk in high sunshine places, you just basically go up Europe, up the United States and the risk goes up up up up up.

Dave: It goes up more for people with dark skin, right?

Dan: Yes, it does.

Dave: Which could be vitamin D related because they make less vitamin D from sun.

Dan: It's absolutely ... we presume it's vitamin D. I now take vitamin D and it's sensible to assume that but it could be something else about the sunshine. It remains a little mysterious. There's all sorts of other things going on. The same increased height and weight that is leading people to develop type 2 also seems to be playing a role with type 1. The exposure to environmental contaminants definitely seems to be playing some kind of role.

Dave: In the weird biohacker world that I'm in I've looked at type 1 diabetes and autoimmunity, and since people with type 1 diabetes often get more Hashimoto's and the other autoimmune diseases, I'm looking at environmental factors that trigger autoimmune attacks on different parts of the body. I've even zoomed in on some common ones just because I have enough autoimmune conditions against my nervous system, and against my brain, and things like that that they're all manageable and hackable, but I suspect that's part of it. How far into your book - I haven't read your diabetes book yet but I'm now interested - how far into the autoimmune side you got-

Dan: The autoimmune is definitely a part of it. There's this thing called the hygiene hypothesis, that the environment we live in now is so clean and free of exposure to the pathogens that we all grew up with, so a hundred years ago almost everybody, or 150 years ago certainly, basically everyone had intestinal worms. We were exposed to all sorts of things that unfortunately killed a lot of people. You, generally speaking, would say, isn't it great that we've made our world nice and healthy and clean?

Sure, that sounds great, except the catch is that our immune system was designed to fight all those things. Without all those things, it seems like our immune system - the theory is and there's a lot of research into this - that your immune system goes a little crazy, goes a little hyper because it doesn't have anything to attack, so it starts attacking the body. One of the things it appears to possibly attack is the pancreas, resulting in type 1.

During my research, there's a great deal of type I diabetes up in the Boston suburbs and I went to this one town where there's a really remarkable increase and it happens to actually be located very near to Thoreau's Walden Pond. Sitting there at Walden Pond - I went by and visited - and I went "Wow, so all of these things that are increasing diabetes basically did not exist when Thoreau was around."

Another one of them is just being outside more. He was outside so much that even though there's less sun exposure up in the Boston area compared to Miami, you're outside so much that you're getting enough vitamin D. There weren't environmental contaminants. He certainly was exposed to the usual pathogens; in fact, the poor guy died of tuberculosis. People were far thinner back then, so all of these things that are going on in our modern world right there on Walden Pond, you could see that people did not have to deal with that.

Dave: I'm intrigued. I think I'm going to have to read your diabetes book, too. It's fascinating to see what's triggering all of this. The hygiene hypothesis is one where I looked at my own gut issues; I actually took pig whipworm eggs in order to give myself a parasite.

Dan: That is something, I considered doing that. I was ready to order them. There's all these studies, actually. It's really funny that you say that because there's studies, they've been doing it in animals and they are just starting it in humans. There are things with the immune system and that kind of taking intestinal parasites, drink that down, that seem crazy to us but then you have to remember that 150 years ago, everyone knew that blood letting was a great way to treat a disease and would have thought that surgery was like murder. When people started doing surgery, they were thought to be just this side of witches and warlocks. There's just so much that ... in fact, they've been able to cure a version of Crohn's Disease in some people by having them take a pill that has the poop of another person who is healthy, which is very freaky.

Dave: Fecal transplants are sort of gross.

Dan: Oh my god. It's incredible, but ...

Dave: I would do it but I don't know who's poop I want. That seems like an open question.

Dan: Yeah, I don't know either. I don't want to find out.

- Dave: Yeah, same problem here. It's been fascinating, Dan, to be able to talk about such a wide range of topics. You are, as far as I can tell, an old school biohacker. You've looked at all these different aspects of the human body and what it can do and why it does what it does. I really appreciate your work; it's really cool.
- Dan: Great, well I hope people ... the book is Smarter: The New Science of Building Brain Power. It's out there on Amazon and in your local book store. Go support your local bookstore.
- Dave: We'll include a link to it so people can find the name and all that and I agree, support your local bookstore. There is a question that everyone answers on the podcast at the end.
- Dan: What?
- Dave: Your top three recommendations for people who want to perform better throughout everything in life. It doesn't have to be from any of your books, but the wisdom you've accumulated in all of your studies and all of our learnings, top three most important things for someone who just wants to perform as well as they can.
- Dan: The main thing that I found out from doing all of these things, is you have to spend time doing things you suck at.
- Dave: Yes!
- Dan: By that, what I mean is, when I learned to play the lute, when I joined ... I'm a pretty decent guitar player. I used to be in a band and such but learning to play the lute was ... it's a little humiliating because you really immediately don't know what you're doing. Joining this boot camp exercise class, I have never been a jock - this was like military style exercise and everybody in this group is a fanatic. I'm there like mister goofball trying to keep up and totally unable to keep up. When I'm doing these working memory things, I tried mindfulness meditation, which is another thing.
- All of these things, you are submitting yourself to doing something that you're not good at. Most adults like to do things that they're

great at and we take a lot of pride in achieving mastery over something. I think the fun part here, and it doesn't have to be humiliating - it can be fun. I've personally found it really inspiring and I felt more alive because I was doing all these things that I thought I couldn't do and that didn't seem like my kind of thing. It's really enlivening to open yourself up to that new kind of experience and dive into something that is challenging and makes you feel like a beginner again.

Dave: Wow, so that's one. We've got two more. Or was that two?

Dan: I think that's where all of these things that I did. I would encourage people to try a challenging physical thing, a physical exercise thing that they've never done before to increase their fitness level. I would encourage people to try some of these working memory games whether they go to soakyourhead.com, Lumosity, Cogmed, you could read other ones that I describe in the book, and learning a musical instrument is really fun and cool and even if you think that you're terrible ... I think it should be not just picking up your old instrument and doing it again, but actually taking a listen like you did back when you were nine years old and the teacher is there.

Doing these things, none of them are directly related to your work but they all will pay off and they're going to bring a level of enthusiasm back to you. These are the things that when we were young, everything we did was new and exciting and like we had never done it before. I think everybody needs some of that in their life no matter how old they are.

Dave: That is fantastic. Thank you for that kind of advice.

Dan: Absolutely.

Dave: It's one of the reasons people listen to the podcast. You've been an amazing interview; totally appreciate your time. Have an awesome evening with your little girl.



Dan: Okay, now I'll go eat the piece of cookie that she made-

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