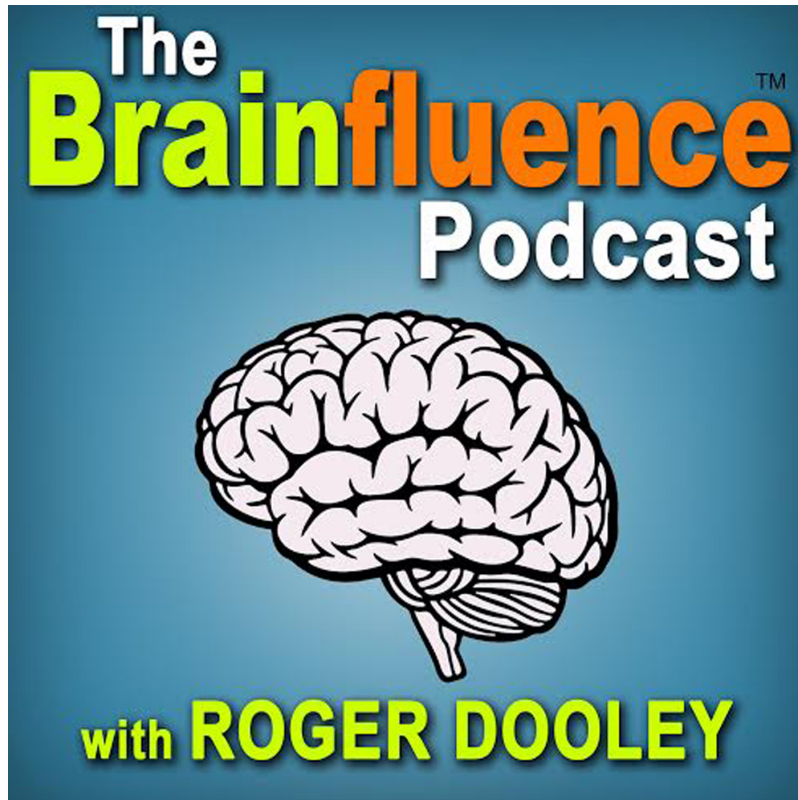


Brain Rules with John Medina



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**Roger Dooley**

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## **Brain Rules with John Medina**

Welcome to the Brainfluence Podcast with Roger Dooley, author, speaker and educator on neuromarketing and the psychology of persuasion. Every week, we talk with thought leaders that will help you improve your influence with factual evidence and concrete research. Introducing your host, Roger Dooley.

Roger Dooley: Welcome to The Brainfluence Podcast. I'm Roger Dooley. I've been a fan of this week's guest for ten years. I've mentioned his work in my blog in and at least one of his experiments made it into my book, Brainfluence. John Medina is a developmental molecular biologist who is a Professor of Bioengineering at the University of Washington School of Medicine, but you may know him as the author of the New York Times Bestseller, Brain Rules. He's also the author of Brain Rules for Baby and the brand new book, Brain Rules for Aging Well. Welcome to the show, John.

John Medina: A pleasure to talk with you, Roger.

Roger Dooley: Yeah, it's really good to have you on the show. When I was getting ready I found that you've actually been writing for quite a few years and I was intrigued by one of your older titles, The Genetic Inferno: Inside the Seven Deadly Sins. You used Dante's epic poem as a way of explaining how genetics drives human behaviors like eating too much chocolate. How did you convince Cambridge University Press of all people that combining Dante and molecular biology was a good idea?

John Medina: It's helpful that Cambridge University is actually a broad swath of colleges with different expertises and different strengths and so the people that populate Cambridge University Press also have that saying. It was natural to take an artistic-type metaphor, in this particular case, a book, Dante's Inferno and ask the question is there any

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molecular neuroscience underneath there that could explain the seven deadly sins.

As we started talking about it and I was a graphic artist and an animator before I was a scientist, so it was easy for me to go to the website on the Prado, the museum in Spain, and I found a wonderful painting that talks about Dante's Inferno. They actually got permission to use it in the book and I have each of the seven deadly sins based upon this one particular painting.

I actually had a blast trying to do something that's been a priority for me for a long time, Roger, and that is being able to take this arcane molecular neuroscience that I do for a living and see if I can put some wheels and an engine and make it run around somewhere, someplace where people could understand it, someplace where people could be more practical. What could be more practical than the seven deadly sins ranging from lust to sloth to a whole range of issues. I actually had a lot of fun writing it.

Roger Dooley: Yeah, no doubt. It's just ... and that's one of the more unlikely

combinations that I've seen, but it's very creative and makes me want to check it out.

John Medina: Thank you very much. It's actually a little long in the tooth. I think it needs some updating, I haven't updated it in a while.

Roger Dooley: Right.

John Medina: Yeah, I think as a museum piece, Roger, have at it.

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Roger Dooley: Just because it's so unusual. Anyway, John, I read the original Brain Rules when it first came out and what was really appealing to me was the combination of a really sound base of science, but turning that then into simple, practical advice. It's what I try and do in my writing.

John Medina: Sure.

Roger Dooley: I don't succeed nearly as well as you do I think, but the anecdote that made it into my book was your brood experiment that is probably not your most scientific experiment ever.

John Medina: No, in fact, it's not an experiment.

Roger Dooley: Right, it's something, but I thought it made the point really well. Do you want to tell that story?

John Medina: Sure. In fact, we could have done it more formally than a randomized blinded trial and it probably would have got similar results. What I did is that I knew a lot about the fact that when we lecture in a class as we project information usually we use two senses, auditory information and visual information, and that's it. There are many other senses out there that you could capitalize on including one that actually is really tied to certain types of emotional memories and that is olfactory presentation.

What I did is ... I usually teach either second year medical students or now more bioengineering graduate students. My task in this class was to teach them a very particular enzyme polymerase II which is a big deal if you're interested in gene regulation. I decided every time that I mentioned the word RNA polymerase II or had a lecture where I was going to be devoting to that enzyme combination I just would spray the old Brut perfume in the

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room. It certainly was going to date me. It's a very heavy presence of a smell and it stayed there for a long period of time, so it was really useful.

Then I did this, at test time I either sprayed the room when they were going to have to know about RNA polymerase and we were actually going to have to regurgitate information about that enzyme complex ... I either sprayed the room with Brut or I did not depending upon the class and the year and what not. Every time I sprayed the room with Brut I got a big spike on their ability to answer correctly questions related to that enzyme complex. Every time I left the Brut alone and didn't at all they scored much more poorly. Now like I say I never quantified this. We didn't randomize it. It's not a real experiment, but it is a flashlight that could do a real experiment. Actually it's very similar to Alan Baddeley's work. Are you familiar with his skin diving experiment?

Roger Dooley: No, I'm not, John.

John Medina: He was the first to really put on the map something we call context-dependent learning where it is that he was able to show that if you can match the conditions at retrieval with the conditions of encoding i.e. if you are given a piece of information at a certain point and you have a room that's in there or a smell or whatever ... If you can match those conditions after you've taught it when it comes time to give the person a test, so that's the retrieval, if you make those two conditions congruent with each other you can get a 14, 20% increase in the test score.

Here's what he did. He took a bunch of people and put them in skin diving suits and they were maybe active divers and gave them a list of 14 words that they had to

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memorize, so half of the group memorized the list underwater. Took them about two meters under the water and they had to memorize the list there. The other group still in the skin diving suits actually memorized their list of 14 words, the same list, on land and then asked the question if I toggle the retrieval conditions can I get a change in the test score?

He was able to show something very similar to what we just said. If you memorize that list underwater and you retrieved a lot more if I put you back underwater and asked you to do the retrieval there, if you learned the list better on land your score was much better if I asked you to retrieve the information on land. Showing something over and over again, he actually got really creative with it. He got people drunk, no kidding, Roger.

Roger Dooley: Anything in the name of science.

John Medina: Yeah, it's lovely stuff. He actually also got them high and there's a bunch of interesting experiments in the context-dependent world, but he got them drunk and then had them memorize the list. By golly they got a much better score if at retrieval you got them drunk before you asked them to retrieve the information. From that comes then another idea, context-dependent learning, so you can see when I'm spraying the room with Brut that you probably are triggering parts of that.

There's also something called state-dependent learning which is a lot like this

only now you're not trying to match the outer conditions. What you're trying to do is to create a psychological interior, a very particular feeling, before you give them the list of words. For example, if you make somebody fearful,

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if you show them a horror movie or scare them and then give them the list of words by golly they score much better at retrieval if you pre-scare them before you ask them to remember the list that they had gotten a day or two before. It's not just context in the external that is an important thing, it is also the context in the internal that can work really well.

My practical suggestion, if you have a high-risk test like you have a bunch of kids take an SAT by golly you should teach them in the very room where they're actually going to be taking that test because the brain's going to encode all of that. If you have the encoding and the retrieval experiences congruent with each other, both externally and internally, the kid's going to do a whole lot better.

Roger Dooley: Right and maybe spray some Brut, too, during both the training and testing.

John Medina: That's the reason why I did the Brut, I wanted to see if this could work with a bunch of sophisticated bioengineering graduate students and by golly, Roger, you just never outgrow it.

Roger Dooley: Right, there might be a whole market for scent generators in schools. They certainly use them in commercial environments to create desirable scents for different businesses. There might be something there.

John Medina: Sure, you could do it and you don't even have to use smell although the olfactory sense is hooked up to emotional memories. You don't have to use smell, you could make the room colder or you could make the room warmer or you could pump in Wagner's Ring Cycle or an old Tupac song while you were busy teaching. If you want to shoehorn the encoding to make sure the retrieval is

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good just simply matching the conditions. If you can get somebody drunk, Roger, and still get a better score it's ridiculous that we don't capitalize on Alan Baddeley's great context-dependent and state-dependent learning.

Roger Dooley: That's pretty remarkable stuff. Your discussion of that experiment reminded me of another one, just a crazy research thing where scientists wanted to evaluate the effect of alcohol or lack thereof on small group interactions and so they basically ...

John Medina: Oh, really?

Roger Dooley: Yeah, they basically ... I don't have the citation. I can find it. I'll put it in the shownotes. They basically had a big happy hour and they videotaped groups, they divided people into groups of three and they videotaped them. Each group was served a different mix of drinks. Some had basically two alcoholic drinks and so they weren't drunk, but they were perhaps ... They were feeling it a little bit perhaps. Some people got no alcohol and some people got the two drinks. They were all served something to drink, but some of it had alcohol, some didn't.

Then the scientists observed the interactions and what they found was that the groups that had been served alcohol to all three people had more social interaction, more smiling, more what they called golden moments which is when all three people smile at once. It was a pretty interesting experiment, but I'm visualizing them going to get approval for this experiment. Okay, you're going to have this ...

John Medina: Yeah, I really don't know how Alan Baddeley got it past the IRB or whatever the Brit equivalent of that is used in



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the UK. Yeah, it's an interesting set of experiments to try and why don't we all sign up for it right now. I know you're in Austin. Let's go do it with that Franklin Barbecue which I love.

Roger Dooley: Right, right.

John Medina: I love barbecuing.

Roger Dooley: Maybe we could jump the line in the name of science.

John Medina: That's right. We'll put it in the IRB and then we have to be first when it opens up, okay?

Roger Dooley: Okay. John, we know smell is really important. Our brain is actually wired differently for processing smell, but vision is potentially even more powerful than smell, right?

John Medina: Oh, yeah. Oh, yeah. In fact, it's so powerful, it's so dominant it's given its own name. We call it the PSE or pictorial superiority effect and you can measure it lots of different ways. In fact, it's so powerful, but there's only a tiny little portion of the brain that's related to olfactory processing. Almost half of the brain is devoted to visual perception.

The research has gone in the direction of asking the question if the neurons that are devoted to visual processing, there's so many of them, if it's so dominant in the brain does that also translate into a behavioral component? The answer is yes. If you get a visual percept you will remember it better and in more clear detail than almost any other way. If you can make the visual percept moving you will also then pay attention to it more often. There's a really good example of this published in the journal Neuron years ago, probably one

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of the most delightful experiments I think I've ever heard. Here's the gist. Have you heard of this with the people that are professional that are enologists, that are professional wine tasters?

Roger Dooley: Right, right. Yes, yes, the famous wine experiment or one of the famous wine experiments, but go ahead and explain that, John.

John Medina: Oh, it's my favorite because what happened is ... If you're an enologist and you're a wine taster and you're from France, you have an old nose and you're really good at it and you can snuff it out ... In France they will teach you that there's a certain vocabulary for the white wines and a certain vocabulary for the red wines. It's the normal foo-foo, wonderful words that you come up with.

A group of experimenters asked the question given this pictorial superiority effect what if I got a food coloring generated ... made a food coloring that I could slip into a white wine turning it red yet not affect most of the other properties of the wine otherwise. Simply you're just going to add an inert chemical that will make a white wine look red. Could we fool these professional wine tasters, people that are at ground zero for this stuff, would the pictorial superiority effect, there it is, would the visual percept so override the other senses that these professional enologists when they saw, I'm going to use the word a fake red wine ... If they saw a fake red wine what vocabulary would they use? Would they taste it and go huh, this looks like a red, but it tastes like a white, therefore, I will use the white vocabulary, or would their brains be tricked into thinking they were actually tasting a red wine and so doing use the red wine vocabulary descriptors to describe the wine.

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The funny, interesting thing is the pictorial superiority effect works like a charm. Even though these professional ... They've been tasting this stuff for decades. If that eye is fooled into thinking it's a red wine it's not, it's just a white wine, you just altered the color. Altering the color was both necessary and sufficient to change the gustatorial and olfactory descriptors that were utilized with it.

What that tells me ... It was published and it was good ... Neuron's a fine research journal. What that tells me over and over again though is that the visual processing world is so dominant that at every point that you can if you're making a presentation or if you're thinking of a marketing strategy or if you just want to communicate information to somebody else use a picture as much as you possibly can and stay away from picture's worst enemy and that is text. Have minimal text, maximum picture and if you can make the picture move you get bonus points.

Roger Dooley: Yeah, it also underscores the importance of alcoholic beverages and the experimental process in science.

John Medina: It seems like there's a common theme for this interview, Roger.

Roger Dooley: Yeah, and actually wine in particular, wine is so subjective that I've written quite a bit about some of the other experiments that they've done with wine of different origins that was all the same, but depending on the supposed origin it caused significant behavior differences in the people drinking it or the ...

John Medina: Really?

Roger Dooley: Yeah.

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John Medina: Like how, like what?

Roger Dooley: This was done by Cornell researchers. They had a fixed menu French restaurant, fixed price, too, no doubt. Each table was served the exact same food, each patron was served the same food and everyone was given a free glass of wine and half the patrons were told or each ... It was done by table, that it was from Noah's Winery in California which, of course, California has great wines, one of the best wine regions in the world.

John Medina: It used to be before the fires.

Roger Dooley: Yeah, right. There are still a few grapes there I think. The other group was told it was from Noah's Winery in North Dakota which is not necessarily known for their fine wines, the same stuff. Of course, ironically it was all "two-buck Chuck" which is the favorite for psychology experiments because it's cheap, it's about three bucks a bottle, it's mass produced, so there's no variations between bottles.

John Medina: It's called two-buck Chuck, really?

Roger Dooley: Yes, only it's not two bucks anymore. It's a bit more expensive these days, but in its early days it was \$2 a bottle and it actually resembles wine. It's a wine-like substance, so it fools most people except in this case the enologists would probably detect that this was not the best stuff. Anyway, the people who had the wine from California ate more food and actually the way the scientists did it was they weighed what was left on people's plates. Some people think science is glamorous, but I feel sorry for the grad students that got that assignment. Scrape everything off and ...

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John Medina: They're graduate students, so they're going to be used to a certain level of what's the word, a differential experience.

Roger Dooley: Yeah, so anyway, the California people ate more food and were more likely to book a return reservation. There's been other experiments even using fMRI where people are served once again two-buck Chuck, but some people thought it was a \$5 wine which would be pretty close to its flavor and some thought it was a \$50 wine. Not only did the \$50 wine people think that it tasted better which you'd expect, their brains actually lit up more when they were drinking the \$50 wines, so I use that to illustrate the importance of expectations. If you're going to deliver a service to somebody or sell a product to them their experience will be influenced by what they're expecting, so if you can lead them to expect something really good and you don't fail on that promise completely to the point where it's obvious they will actually have a better experience.

John Medina: Sure, I say in the book, Brain Rules, that you don't see what's out there. You see what your brain expects is out there, so many people are just not familiar with the power that top down processing plays over the general perception of our social experiences and our sensory experiences, virtually anything. When they begin to understand that your visual perception is a handshake agreement between what is out there and what your brain thinks should be out there then all of a sudden things like the famous gorilla experiment and all the other places where you can actually fool perception begins to make a little more sense.

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I've found ... You might have found this, too, Roger, that after you give a lecture like that and there are certain brain regions, my favorite region in the world is the association cortices and I start talking about how those actually work people begin after a while ... They stop putting so much reliance on their initial impressions of how the world works because they're beginning to see how deeply their prior experiences and their prejudices, this is the heartbeat of implicit bias certainly and all the other things that go into how we are continually reinjecting our experience into the very active perception itself it makes you trust things a little less.

Roger Dooley: Right, and I think it maybe goes a little ways toward maybe reducing the phenomenon that people totally get that other people can have these irrational biases, but they know that they themselves are immune, they operate logically. Enough training and you can convince people that, okay, maybe I'm not always 100% rational. John, one thing that probably most of our listeners have to do is give presentations of some kind. They may be teaching a class or a skill, they may be doing a small sales pitch to a smaller group or they could be doing a keynote speech. What are some of the things that they can do based on your research to be more impactful, have folks a) pay attention and b) remember more of what they say?

John Medina: Sure. You bet, we can talk about two ... I probably have two sets of things to say there. The first is this. This is the great work of ... teaching years ago, but it's still true today. A given speaker if they're going to give a lecture has 9 minutes and 59 seconds to make it interesting. If they don't do something at the 10-minute mark after they've started their lecture they can kiss the audience goodbye. In fact, you can begin to kiss the audience

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goodbye within 30 seconds of the speech if you aren't willing to regularly traffic in what in the business is called emotionally competent stimuli, ECS.

Here's the principle, so the first thing is that you've got about 10 minutes before

you have to do something for real. Here's what you have to do. You have to insert at the 9 minute and 59 second mark emotionally competent stimulus of some kind. The next question you can ask is what is an emotionally competent stimulus? This is the second component of the advice and that's this. The brain actually isn't interested in learning, it's interested in surviving. It's not interested in acquiring information, it's interested in projecting its owner's genes into the next generation.

When a piece of information comes into the brain and in Brain Rules I simplify it into saying that and it's actually true, it's accurate although the precision is going to be lost here for a little bit. The brain will interrogate a piece of information with six questions and in the following order. Number one, will it eat me? When the piece of information comes in the first question it asks is a survival question, will it eat me?

The second question, because the brain is an energy hog, it's only two percent of your body weight, but it's between 20 and 25% consumer of all the energy that you give your body, number two is can I eat it? Those are both survival questions related to getting to the next day. Question number three is the whole reason for the Darwinian selection in the first place is to have babies that will outlast you. The third question is can I have sex with it? The fourth question is will it have sex with me?

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Interestingly enough it's not sex per se that the brain is interested in, it's more reproductive opportunity, so that if you have a potential sexual signal the brain's going to lock down on it. If there's potential opportunity then the brain locks down even further, so come hither is better than a naked body and that kind of thing. Question number five, to me it's the most interesting because there's no ... priority for it. It just tells you a little bit about how it is that we learn things or how the brain has learned to prioritize its learning. Question number five is have I seen it before and question number six is have I never seen it before. It turns out we are absolutely terrific pattern matchers.

At the 9 minute and 59 second mark if we were to combine both of these ideas, at the 9 minute and 59 second mark you have to create an anecdote, a story, something that will be answering one of those six questions, will it eat me, can I eat it, can I have sex with it, will it have sex with me, have I seen it before, have I never seen it before particularly regarding any of those spikes. For example, my research specialty is the genetics of psychiatric disorders and part of my job will be to talk about neurotransmitter release and concentrations in the parasynaptic space and all kinds of detailed, detailed, detailed stuff.

I never start a lecture when I'm going to have to talk about neurotransmitter release and just how the brain processes information with that stuff, Roger. I always start it with a story. I've sat on a number of treatment committees in my career asking questions when there are interesting psychiatric disorders around. One of them might be a hallucination. There's one story in particular. I remember a woman who was caught in a very florid



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hallucination, but she would wake up in the morning and think a train was coming at her and she spent the rest of the day trying to get over it.

I'd start with that story and then I can buy 9 minutes and 59 seconds of lecture before I have to stop the details of that and then give another emotionally competent stimulus. Now I've won a couple of national teaching awards and several regional ones based on that model, but it's not because it's me in particular, it's simply because we take into account the survival priority of the brain and land on what is the largest principle of all and I talk about it in Brain Rules. The brain processes meaning before it processes detail. It's not interested in the number of vertical lines in the saber-toothed cat's mouth before it's interested in whether that mouth is going to clamp down on your thigh or not.

Understanding that meaning before detail should guide everything any business professional does, any professor does, anybody that has to transfer information from one brain to the next given that the whole brain's *raison d'être* is to survive, so those are the two components. You have 9 minutes and 59 seconds to give the second component which is an emotionally competent stimulus and if you don't you're going to lose your audience.

Roger Dooley: Right, other than stories, stories are no doubt a good one. Are there some other stimuli that could be stuck in various places?

John Medina: You can. If you can make an object move at the 9 minute and 59 second mark, so if you have a PowerPoint presentation, but you've chosen to animate it that often can serve as a gray hook. I would argue that other stimuli that you could bring into the equation. You hit on

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something very powerful that is not in my view not well subscribed in the research literature, but I believe in it with all my heart and that is the power of a good story, the power of narrative.

I actually think it's because there's so little data on this and I'm going to say it as a hypothesis. I hypothesize that you're stimulating the episodic memory neurons within the brain which aren't always stimulated in a lecture, but when you can stimulate them in ... If the brain is detecting that there's a narrative it just comes right to the front, so I never start out by saying, you know, there are hallucinations where you can feel like a railroad train is coming at you. I say I was on a treatment committee and this was presented to us and that turns what is essentially a scientific observation into a narrative.

Roger Dooley: Right, stories are big in marketing these days. Just in the last few months I've had a couple of authors, Esther Choy and Paul Smith, both have books about effective use of stories for communication. My half-baked explanation for why stories are so effective actually relates to your survival theory that we evolved to pay attention to stories that other people told us because in our earlier days what that person came back with say after being out hunting or exploring a cave was really important for you to know because it might mean that you could then go directly to food or avoid an encounter with a saber-toothed tiger or something.

John Medina: It also ... to the idea of pattern matching. If you're telling a narrative it's either a story about someone or maybe it's an autobiographical story about you. If someone else is telling it you can immediately relate to it and that question number five and six, oh, this is a person walking through

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time, where something happened, I can relate to that. My feeling is that pattern matching stuff begins to come to the front and I think narrative plus episodic memory. We have to say this as a hypothesis because there's zero data on this. Narrative is a big mystery in my world. Nonetheless like I say I believe it with all my heart that you're probably stimulating multiple gadgets all at the same time internally simply by saying once upon a time I was.

Roger Dooley: Yeah, I want to get to the aging book, but one last question while we're talking about presentations. PowerPoint is almost universally used and there's certainly some people who say ditch the slide deck, just talk and tell stories, of course, because that's a common wisdom among all presenters. There's stories that get the audience's attention, but your research shows that adding a visual component definitely does improve recall. What should PowerPoint slides look like if you are maybe communicating a business idea or something? Obviously, things like lots of dense text or confusing spreadsheets and what not, those are no good, but what would an ideal slide format look like that would combine both the visual stimulus that would underscore what you're saying and how people remember it?

John Medina: Right, I think the best advice would be to mix it up. If all you told were stories you could actually bore your audience or, more importantly, they begin to check out from your lecture because you no longer are taking them seriously. If they've come to learn something and all you're doing is telling stories you're essentially doing standup.

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Roger Dooley: Yeah, I have an actual example of that, John. I was lucky enough, lucky or unlucky enough to attend about a two-hour keynote which is really long to begin with for a keynote from a person who had at the time I think the most viewed TED Talk ever. I don't know where it is now. It was basically a sequence of stories and I experienced exactly what you're talking about where the first few stories were pretty good and interesting, but after a while I did check out and it was pretty clear the audience was checking out, too.

John Medina: Yeah. Oh, yeah.

Roger Dooley: People pulling out their phones surreptitiously and so I have at least anecdotal evidence that that's the case.

John Medina: You can show it. The brain really loves variety. The brain was not built to sit still for 30 minutes, okay. If you're out in the Serengeti and you're sitting still for 30 minutes you're going to be somebody's lunch. We're not strong enough to be able to sit there and dominate our evolutionary history simply by our physical presence, so it makes perfect sense to me that after, I don't know, 5 minutes of some boredom or 30 minutes of habituating to a string of pearl of stories that people would get checked out.

I recommend that you do a mix up. In that 9 minute and 59 second mark that's where you can put your story, but if you have to communicate information you could use a slide. I'm not at all against using PowerPoint slides. I am against using them in a particular way. One is that they can't substitute for your lecture notes, some people read their slides, but you need to keep an amount of letters, the text ... If you can make it a picture the brain loves it much better and acquires the information faster.

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The reason why text is so hostile is because we now know from eye tracking work that the brain doesn't look at a word as a holistic word like the word the and then just sees the contours around it. It looks at each individual letter as a specific picture and that's something you can show that it will inspect a letter, it'll inspect a letter, inspect a letter.

In fact, what it will do ... If you're doing the eye tracking work you will notice an extraordinary thing. The eye will actually jump from one word to another, rest for about 250 milliseconds, look at 13 letters back from where it's resting and 13 letters forward where it's reading and then try and get the whole thing together. Then it makes another jump. Those are called fixating. That's what it's called, it's called a fixation. When it's jumping it's called a fixation and the reason why is that there's so much information in a string of text that the brain actually chokes on it.

This is Debra Moore's great work. I think ... left her a while back to show you have to limit the amount of text to about 100 letters, maybe 140 if you want to tweet it, but it's mostly 100 letters. If you have any more than 100 letters on your slide and you don't have a picture and the picture's not moving then you're going to bore your audience. If you are willing to invest in how to make objects move in something as simple as PowerPoint and this is actually pretty easy to do and you keep the amount of text to about 100 to 150 letters you can have a very effective learning environment. In fact, I would argue it's more effective than if you just told stories and it's least effective if you don't add stories. The real counsel is to mix it up, keep it to about 100 letters and have a picture

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on your slide and make sure that picture moves. Then you can keep your audience.

Roger Dooley: Great advice. I can see people starting to revise their decks now. I do want to get to your aging book and I realize it's a 280 or so page book, but we can't quite summarize it here. What would you say, a few of the most important takeaways because I don't have demographics on our audience, but one thing I'm pretty sure about is that 100% of them are getting older and depending on their current age are probably somewhat concerned to somewhat more concerned about staying sharp as long as possible. What are a couple of the most important interventions that people can use to, hopefully, stay sharp into their senior years?

John Medina: Yeah, we can talk about the age demographics for a second because it's actually fairly broad. We didn't live much past the age of 30 in our evolutionary history. It was up on the side of the crater if you were 35 you were an old man or old woman. Your cognitive peak is 23.86 years. Now that's a generalized score and there's some unevenness with it. On average your brain is pumping out at its best ability at 24 and after age 30 it's genetic freefall, so this is available to anybody over the age of 30 there, Roger. You don't have to know too much about your demographics, you just have to know that they're out of college, I guess.

Roger Dooley: Right, don't tell my publisher that.

John Medina: Oh, for sure. The literature's actually pretty clear. You can keep a brain healthy and active and working and that's what the book is all about. There's a bunch of rules with it, but you can divide all the rules into one of two categories. The first category is this. As you get older you need to do

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a cognitive prefrontal assault on your learning world. In fact, if it's not too much of a stretch to say that you need to go back to college. No retirement is ... You shouldn't retire anyway. If you hate your job and you want to get out of it you should turn it into a learning experience, but a particular type of learning experience. If you were a biochemistry major you need to go back and get a degree in poetry. You need to go to something you're not familiar with, something you're uncomfortable with, but something that is still intriguing to you and that you'd still like to utilize.

You could show that so many different ways. If you are aggressively involved in squeezing as much information out of your environment your brain can stay healthy and productive for a long period of time. Those people that read more than 3.5 hours per week they are 23% less likely to die by a certain age in what we call all-cause mortality, so just picking up a book and reading it for more than 3.5 hours a week will do something.

Stuff that's been shown in the research literature is musical exposure. If you don't play the piano, congratulations at retirement you're going to learn to play the piano. The experiment was done ... He did it for four months. He learned theory, he learned sight reading and it improved executive function, people were less depressed. There's all kinds of cool things that are there.

Another one is you need to go out with your friends and start regularly taking them out for coffee or to the theme of this interview take them out for a glass of wine. If you constantly are socializing, the highest socializing group, the rate of cognitive decline is 70% less, no kidding, than in the low socializing group. Memory decline is half that of

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non-socializers, so being aggressive in both your relational spheres as well as your intellectual spheres. That's about half the data and about half the brain rules.

There's another half that to me is the most interesting, Roger, because it's counterintuitive. There is a strong literature and it's growing by the year that you need to spend a lot of time also revisiting the things that happen to you in a pleasant, gauzy, nostalgic way particularly if you can revisit the events and sensory experiences that occurred when you were between the ages of 15 and 29, no kidding. If you start on the road to nostalgia with nostalgic experiences and the thing that leads the way for this is Ellen Langer's great counterclockwise experiment whereby she took a bunch of seniors and she did it in the mid-eighties, but threw them into a monastery that quoted 1959 and watched their brains just become alive.

You can show that reminiscing experiences change behavior in the sense that you become less afraid of dying. You have greater tolerance for people that don't look like you. You have a stronger sense of being able to value your relationships and friendships. In the case of Ellen Langer she was able to show that their vision improved and their finger length actually grew. The reason why is as they got more into the nostalgia anything, maybe they picked up the guitar they hadn't had in a while. They were actually stretching out their fingers and was getting ... In one fashion she had dances at the end of the day, one guy actually threw away his cane and the whole thing was written up in the New York Times by Bruce Grierson about two or three years ago, so the literature's becoming really clear. Not only do you need to go in the forward direction to be aggressive in your learning and you biochemists out there get your degree in



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poetry, you also need to create a room where you regularly visit everything that happened to you between the ages of 15 and 29 and you dose it like a pill, no kidding. There, that's the book in a nutshell.

Roger Dooley: Great, okay. That's a great place to ramp. Let me just remind everybody that we're speaking with John Medina, a molecular biologist, a Bioengineering Professor and author of Brain Rules and Brain Rules for Aging Well among other titles. John, how can people find you and your work online?

John Medina: You can find it through JohnMedina.com for sure. Also, BrainRules.net and the books are available in Barnes & Noble and Amazon and all the places you might normally get a book.

Roger Dooley: Great. We will put those links and links to any other resources we talked about on the shownotes page at RogerDooley.com/podcast and there'll be a handy PDF text version of our conversation there, too. John, it was a pleasure having you on the show.

John Medina: Roger, a pleasure to me, too. It was great to talk to you, too.

Announcer: Thank you for joining me for this episode of The Brainfluence Podcast. To continue the discussion and to find your own path to brainy success please visit us at RogerDooley.com.

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