Ask A Biologist Vol 077 (Guest David McConville)

Science Powered Games

What is a media artist doing developing games based on large science data sets? It turns out he is looking into how the planet ticks and also what **David McConville** calls global weirding. Listen as Dr. Biology learns how an artist makes his home in the world of science, biology, and and mountains of scientific data, which we call big data.

Transcript

[beeps – electronic lock and vault door opening]

Dr. Biology: This episode of "Ask a Biologist" is being pulled from our special collections that have been stored in our secret vault.

This is Ask a Biologist, a program about the living world, and I'm Dr. Biology.

Today, we're going to be talking about art, biology, big data, and games. As it turns out, these are just a few of the many areas and tools that our guest uses to explore and understand our planet.

He's also a good example that you do not have to be a biologist to have a career that focuses on the living world and how it works.

David McConville is a media artist that spends his time thinking and developing immersive worlds that you can explore. In other words, visual experiences that make you feel like you were there.

He's also an advocate of games for learning. Now, these are not your typical Warcraft-like games, although there are some like Spore and Fate of the World that are just as entertaining as they are good for learning about our planet and life on our planet.

One of David's newest collaborations is Worldviews Network. This project brings together artists, scientists and educators who are helping formal and informal learners understand global changes using scientific data.

In addition to this work, David is the president of the Buckminster Fuller Institute and co-founder of the design and engineering company called Elumenati.

Welcome to the show, David, and thanks for joining me.

David: Thanks.

Dr. Biology: Tell me about your ultimate game. You build these giant game engines based on billions of dollars' worth of data. Some of them you have built and some of them, I'm sure, are in the design mode. What is your ultimate game? How do you see it playing out?

David: First off, it's huge teams of people that are building these things! [laughs] I by no means want to take credit of all of this work. What I really focus on is how are we using these to their utmost capacity? How are we bringing them to the largest audiences? How are we using them effectively?

And my ultimate game is one that we're really working on now with a project called the Worldviews Network that is taking billions of dollars' worth of space science data and earth science data and figuring out how do you tell the story of human life in the context of everything we've been able to observe? How do we really get to understand and appreciate our home in the universe?

Because we're in this extraordinary place that is so amazing that we don't have to think about breathing. We don't have to think about where our water's coming from most of the time. We don't have to think about the billions of bacteria that are in the soils generating all of the food that we're just now really starting to understand the levels of complexity.

So my goal with using these tools is to help people really appreciate the beauty and the fortunate position we're in of being able to be the recipients of all of this to the point where we just take it for granted.

We just get up in the morning and we don't even have to think about it, but trust me. If you go to Mars, every single day your life is going to be filled with toil because you're trying to just meet the basic requirements of sustenance. And you have to import it all in there with you.

So what I like to do is to help people to resituate themselves to understand the context that we are in here that we've been taking for granted for a long time. I think honestly that we've been taking for granted to such a degree that we're abusing the privilege that we have of being on this planet.

The more we can use scientific data and visualizations and stories and conversations to really bring out the interactions of all of these systems and help people to appreciate that...not only appreciate it, but also understand what they can do about it. That's my goal.

Dr. Biology: So the games, when anybody thinks about games, it's going to be like World of Warcraft and I could name probably a lot of others, even though I'm not a big gamer.

David: Yeah.

Dr. Biology: Are you really talking about games?

David: To some degree. I mean, within the gaming engines, that's more of what we're using. They're like the underlying structures of the software that enables us to visualize scientific data. We use those so that we can interact with the data. We can interact with these visualizations. We can say, "Hey, let's go out and fly to the moon and understand the ways in which the moon and the earth are interacting. And look at the earth's magnetic field. And look at the sun. And fly way out to other galaxies." Whatever it is.

That that technically is not a game from the definition of how people generally consider that. It's almost like sitting around a campfire and being able to look up at the stars and tell stories. It's a tool that's being used to explain and to explore a lot of different ideas.

There are games that are specifically geared towards helping people to understand complex notions, like the best examples generally come from Will Wright, who developed the game SimEarth and the game Spore. It's one in which...I'm sure some of the people listening to this program are familiar with it, because you get to play with life forms in a Petri dish, and it gradually evolves into interplanetary relationships, right? Intergalactic, even.

So that has very much a game structure built into it, so that someone can go on and play and get to higher and higher levels. And explore all their different ideas around how their own invented forms of life might actually unfold over the course of an evolutionary process.

There's a whole continuum in between. It's not cut and dry. It's not a black and white, whether it's a game or whether it's not a game. Especially now that so many of the games are actually available on iPhones and we have these augmented reality games, where the virtual is bleeding over into the real.

There's not nearly as much of a distinction as there was when you and I were young. The Ataris were first coming out...like you knew when you were playing Pong... [laughs]

But now, gaming as a model of learning is becoming very, very powerful. I think what we're doing is actually rediscovering something that our ancestors have known for a really long time. Games have actually been integral to the ways in which animals learn. Humans across the world have used games to teach about really important concepts.

Dr. Biology: So is there a game out there, especially one online, that you would recommend someone go try out and get a feel for? They're learning games and most of the time, those really look like learning games.

David: Yeah, yeah.

Dr. Biology: But then there are other games that I've heard kids even say, "It's OK to trick us."

David: Yeah.

Dr. Biology: In other words, "This is fun. I really enjoy it." And even if they know they're being tricked, it's OK. You have any of those?

David: Actually, I usually recommend Spore, because I think that it's really one of the more interesting examples of literally starting with a Petri dish. I mean, like it's got these kind of scientific metaphors going on there that provide for some very powerful tools.

There's another game called Fate of the World that is being launched actually in a couple of weeks that lets you run scenarios around global changes. You can basically select here, I'm going to provide all the water and wind energy and solar energy over here or I'm going to go nuke all of this stuff. It lets you run through scenarios so that you can kind of play with the idea of what are the future options for humanity?

I tend to be inspired by an idea that this polymath in the 20th century named Buckminster Fuller came up with. He was kind of like a Leonardo DaVinci of the 20th century. He had an idea called the World Game. The notion of the World Game was that you would have...he created these giant

maps. Each person would represent so many people on the planet. Then they would have to start negotiating based on the resources that were available.

And the World Game for me has been a very powerful inspiration, because as our technologies has improved, it's becoming more and more possible for us to actually run these kind of scenarios and to play with the idea of the fact that we really are all kind of crew members aboard this spaceship that we call "Earth," right?

If you think of yourself being on a big ship, and you've got so many resources. You have to depend on the resources that are there. You also have to depend on each other. You have to collaborate and cooperate with others in order to understand how do we structure the life aboard the ship so that it can work for everybody?

Because eventually what you understand if you look at the game from that level is that we are all deeply, deeply interconnected. It's not a "I win, you lose" thing, because when you start getting that attitude, which is honestly, I think, one of the false impressions of evolution is that it's all been survival of the fittest.

What's come out from so much of biology is the critical importance of cooperation. With World Game, what you really start to see when you look at it from that level is that cooperation is everything. It's so critical for us to be able to win this game together.

Dr. Biology: Well, it's also adaptation, of course. You know, if you have changes, especially severe changes, whether it be weather or any other condition, it's not necessarily the fittest that's in the condition that's going to do well.

David: Right.

Dr. Biology: One good example everybody talks about, of course, is the extinction of the dinosaurs, but all the little mammals that were around at that time, they were fine. They could actually deal with that catastrophic change.

World Game. You know, it's interesting. You remind me. When I was in high school, we played that. It was interesting, because it wasn't a matter of who wins over someone else. It's who could keep the game going the longest.

David: Right. [laughs]

Dr. Biology: Right. And so that really is what we're talking about here.

David: Absolutely.

Dr. Biology: How do we keep the game going the longest?

David: Yeah.

Dr. Biology: Talking about the game, keeping the game going the longest, there are couple words, couple ideas that people hear regularly. "Climate change," "global warming." And unfortunately, they're being used so often and there are things that seem contrary. It's easy to say with more

recently we had incredible cold weather in parts of the country that people might think of it in a very snapshot time that. What is this they are talking about things are changing? Whether it's a good way to call it or not, the climatologist might not be thrilled with me, they call it wacky weather rather than saying global warming.

David: Global weirding.

Dr. Biology: Global weirding, exactly! Let's talk a little bit about; because you focus on that not necessarily from a biological stand point, but again you talk about this is our spaceship and their environmental conditions that work great for our spaceship. What's going on that we need to be looking into that all these billions of dollars of data you've been seeing?

David: Well, I'm with you, I think that the ideas of climate change and global warming have become so politicized and they are so poorly understood from a general perspective of the difference between climate and a weather, that it is very easy for people to just kind of have these reactions like, if it is snowing then what do you mean it's getting warmer? I think that thing to understand about the systems that we depend on.

The water systems, the systems of soil of other life forms of the climate. Is that they've achieved a level of stability, especially over the past 10,000 years of really the span of human civilization and what's happened is that in the past 100 years in particular that our discovery in use of fossil fuel has started to destabilize some of that stability.

Because it has been a system that has achieved this what ecologist call "Dynamic non-equilibrium." It's one of those fancy terms, but it allows the Earth to regulate itself because of the life forms in the oceans, and the atmosphere. It's all of these complex stuffs that interacts together.

But what's going on is that we as humans are burning all these fossil fuels. We are not only burning fossil fuel or putting them in to plastic bottles and we are throwing those bottles away .They are ending up in the ocean and the plastic is polluting the oceans. We are doing all of these this, that because of the incredible energy that is being released from these fuels.

And the degree to which they really have improved the life style of many people on the planet they've even improved the ease of travel, our capacity for making products, but it's a double edge sword in that we have taken all of that as granted to a large degree.

And what's happened is that it's enabled more and more of us to be born, and it's enabled more and more countries to take part in this industrial economy that it's started to really press on the stability of these systems. What we are starting to see now are the impacts of that.

Now whether that's in the form of trash, then you know in third world countries with all the e-waste, electronic waste or whether that's in the plastics in the ocean or whether that's in these long-term trends of climate that it's not what we would expect from the past and there is debate of how much it is the sun? How much of it is these different factors? And of course the answer is, it's everything. It's not any one thing, but the fact of the matter is that it's relatively obvious to anyone that goes outside as, ask the astronauts on the space station.

If you ever look at the images of the Earth at night it's unbelievable, how much power we are burning to light up our streets. You can see it from outer space.

Dr. Biology: Right, the change in balance is equilibrium. All our bodies are based on an equilibrium too. Without equilibrium we don't survive and at a global scale it's the same thing. So it's that balance. And so I get the idea, makes sense too much of one thing is throwing things out of balance. What's the answer? How do we work out our way out of this? The scientists have found the reasons, the many reasons. What are we going to do to get that balance back? What are the best tools?

David: Sure.

Dr. Biology: Let me add one more thing, as a student what would they be focusing on for now and into the future? What are the good skill sets? Because that's really what we need, just good skill sets.

David: Yeah, well I think that science is one part of it, science is important because it helps you empirically observe and understand the nature of these interacting systems.

But I also think that understanding design is absolutely critical, because its designers that make these microphones that we are talking into that probably make the computer that you are listening to the song, and make the headphones you are wearing and if you look at design from a middle level, if you step back and you consider.

What are these products that we are creating? What are these things that we are doing? And where do they end up? Right? And I think the most valuable still set that we can have right now generally is what's called ecological literacy and unfortunately this isn't really thought in lot of schools but its understanding how ecosystems work.

It's absolutely critical and there is a great site called "ecoliteracy.org" and they have a whole curriculum online and tools for teachers and all kinds of things. But if you look at ecosystems and you study what nature has developed its amazing, it's so efficient and it's so beautiful like I said we just take it for granted.

We don't even think about it, because it is so flawless and it's not like you get the blue screen of death when you are typing on your computer the spiny beach ball. Nature systems just work in the most efficient manner and studying those systems helps us as humans as we get more and more powerful with our science it can help to guide the direction that we are going in.

So that the systems we are design actually work in conjunction with all of these systems that have been evolving for a very long time and have achieved this sort of elegant synergy with all of the systems that its' embedded in.

All of us, as people, we know we are embedded in our families, but we are also within our cultures and our societies, and the global system that we have whether it's the economy or whether it's the biological world in the ecologies. That ecological literacy is about helping us to understand how it is we interact with all of these larger systems.

And so the combination to me of understanding ecologies, but also understanding the process of design, how are we intentionally creating products? How are we intentionally creating infrastructures so that we can be as healthy as possible in the future?

And not just us, but our kids, our grand kids and people who are 1,000 years from now that this is the most important work of our time.

Dr. Biology: It sounds really serious. And it is. But you are also really passion about this, and I can't believe that your daily existence is just tied into that. What I'm getting at is, I'm passionate about what I like to do as a scientist and as a biologist. Part of that passion is there is fun too. So if we figure out how to make all these things would help the planet get back in balance, fun, I bet we make a big impact. So, where is the fun in this? What are we going to do? What are we going to be able to do?

David: Well personally, my company makes inflatable domes and I go around the world with these inflatable domes. I give people tours of the observable universe and I've yet to encounter anybody that doesn't want to walk inside of a big bouncy dome and [laughs] fly to the universe.

I mean there's a lot of angles here but that's why the idea of gaming is really important and I think that appreciating our ability to really enjoy ourselves as human beings to appreciate beauty is absolutely critical as we try to communicate these bigger ideas and that for way too long the idea of environmentalism, it's almost been this sort of anti-human thing to a lot of people. They draw these distinctions. It's like "Oh you just don't like who we are and rather see us not here or whatever."

And the thing is when you really start to open your eyes and see the beauty that's in nature in the incredible ways that we interact with the world around us and the incredible ways that we can begin to see it as a game, that we are actually really fortunate to be alive at this time in history. We have more access to more knowledge. To more people. To more history. To more understanding of life as well as the power individually to tap into all that and do something with it.

I personally when I wake up I'm grateful every single day for being alive right now because there were large spans of human history where nothing had really not changed for tens of thousands years and at this point it's like every single day you can wake up and discover entirely new fields of understanding. You can go out and engage new ideas and encounter new people and get online. You don't even have to think about it.

Friend somebody in Africa on Facebook and it's like "oh yes. Sure." But I mean that's so extraordinary. It's amazing that can happen and so it's really important to keep that context in mind and what I would like to see specifically and it's starting to happen is the gaming industry is really starting to tackle some of this problems a lot more.

There's a book by a lady named Jane McGonigal called 'Reality is Broken and Games can Fix It.' [Reality is Broken: Why Games Make Us Better and How They Can Change the World] And she's trying to really encourage the gaming community to take on these challenges and to really crowd source the intelligence of all of these gamers so that we can be looking for problems so that we can be understanding all the different ways we can be looking at these complexities and discovering new things through play.

Dr. Biology: So is Fate of the World one of those types of games?

David: It is. It's interesting. I haven't played it. It hasn't come out yet but I have talked to the developer and he says it's been fascinating watching what people do because you can pull cards about what you're going to do. And so you have the option of installing all of the renewable energy you want and doing all these things or you have the option of nuking a country. It's pretty morbid but he says what happens, this is the first time around, most people including the scientists they try to destroy everything and see how fast that can happen.

The second time around they try to figure out how to make things perfect and then the third time around they try to figure out something that's going to work [laughs] and so I think what he was telling him what it suggests to me more than anything is that by having environments that we can work through ideas we don't have to go through the pain of actually waiting for all of that to happen in the real world in the physical, ecological, biological world.

That we need to be able to run through these scenarios in our heads so that we can understand there are consequences to our actions and that while we have the capacity and the luxury honestly of being able to think about some of this things, let's just figure out what all the options could possibly be and try to think as big a picture as possible so that we can engage and take responsibility for where we are going as human beings.

Dr. Biology: What do you classify yourself as and I'm going to set you up. Do you think of yourself as a scientist, an artist, a designer or something else?

David: Generally none of the above and I always had a problem with all of it. I'm definitely not a scientist even though I hang out with them all the times. Some of my best friends [laughs] and I'm an avid reader of a lot of different sciences and I create art but I think that calling myself an artist it's never set well with me because I almost feel like you call yourself an artist and you give yourself a pass.

That it's just your prerogative to be creative all the time and I was like "Well, that's part of it. That's fun but I'm not comfortable with that."

A designer, that's kind of interesting because I work on designing things but I've never been able to really pigeon hole what I'm doing in particular and I think that's probably true of a lot of people out there.

They don't quite know where they fit and I don't think it's necessary because I don't see any walls or lines in the sand or heavy distinctions between science and arts and design and the humanities. I feel like all of that is a continuum of existence it's all parts of life that we can engage and by creating all of these distinctions then we try to categorize everything and specialize everything and we get very, very specialized thing. One particular thing and one of my favorite things is to constantly step back away from the specialization. The specialization is critical and it gives you deep insights in the very specific things but the skills sets we need now more than anything as a species is to be able to step back and see the big picture.

Dr. Biology: With this program I ask three questions to my guest. The same three and I'll modify slightly because typically I have the, a biologist or a classical scientist. The first one is when did

you first figure out what you were going to do? Was there really an 'Aha' moment that you really in your case felt like "This is my niche? This is my place. This is my trim. I got my trim going here."

David: When I think about that I always credit it with when I was very young. I think I was four five or five. There's a chair in my grandparents' house. I would get up and I would... there's a light switch and an exposed bulb on the ceiling that didn't have a fixture on it. I would flip that light switch and I would watch the filament turn on and off and I was always completely intrigued by what was happening like what was created in that sudden creation and that disillusion and its interesting because out of that sort of as a kid that I either become an astronaut or an actor and so now I'm kind of doing both where I get to go around.

I'm really lucky because I get to play with these data sets of the universe in a way I'm for being an actor and at the same time I'm flying around the universe but that filament, that kind of coming in going out its for me that's a metaphor for what is it that brought us here? What created all of this? And where are we going with it all? So I think that for whatever reason [laughs] I think this happens to a lot of us. You're very young and some of your earliest memories have a huge impact of how your life unfolds but that was my particular moment.

Dr. Biology: So what if I took it all away from you right now. I'm not going to let you do what you do which is kind of tough because you do a lot but then I remove the science and the kind of collaborative design element to it and what this is more of an exercise of...what would you do if you had a different kind of life that you needed to live? Not that you get to do it all over again as a lot of us would say. "That's pretty cool. I enjoyed doing what I'm doing." What would you shift to? What would be your ultimate career?

David: Yes. I'll definitely answer the former. What you just said. I'm pretty happy with where I've ended up but given the choice I think I would probably choose to be a biologist. [laughs] or an ecologist more specifically because I really am becoming more and more intrigued with the workings of all of these systems and I've gained this incredible respect and understanding of why people are driven to understand living systems. Living systems are absolutely fascinating.

They have still not agreed on the definition of what they are and I would love to do more fieldwork around that like actually studying these things most of what I do is in the realms of computing and things and like for instance one of my colleagues I'm working with right now, she is an ecologist working at the California academy of sciences that specializes in sea horses. So she gets to dive and find sea horses in the ocean. That's so cool [laughs] so I think that would definitely be my preference.

Dr. Biology: The last question. Someone wants to be like you. They want to be the scientist artist renaissances person that induce blend it all. What's your advice?

David: I would say don't set any initial parameters for yourself. Really find out what you're passionate about. Priority number one. I didn't get here by any linear process. I had no idea of where I was going to end up with all of this. I've always followed my intuition on that and I've started reading even when I was in junior high I would start reading books that were so far afield from what we were being taught in class but I felt compelled to go in that direction.

I would really encourage that. I think a lot of times we undervalue intuition and I think that's a critically important skill that we all have. Even though when you're first starting down whatever particular path it is that might not have any clear resolution, I had no idea of what I was going to be doing when I grow up.

That overtime if you just stick with what you care about it will present itself to you. Things do unfold and you just have to be patient. You really have to understand that the jobs at the future don't exist yet. We're inventing these things as we go along.

Dr. Biology: Any skill sets?

David: Actually the most important skill sets of the future is going to be 'Understand how ecology's and living systems work.' That is the primary challenge facing humanity. Especially like green chemistry I take that back. I might really going to green chemistry too because these are people that are looking at how do you create materials that can work within an environment that doesn't degrade the environment, doesn't introduce toxins. My recommendations, whatever field you want to go into, understand how that field can impact humanity and all of the species on earth in a very positive way and in order to do that you just have to know how all these interactions happen.

Dr. Biology: David I want to thank for being on Ask a Biologist.

David: Thank you so much.

You've been listening to 'Ask a Biologist' and my guest has been Media artist David McConville.

David is the president of the Buckminster Fuller Institute and co-founder of Elumenati. This is the design and engineering company that is particularly good at creating an immersive projection spaces for a range of purposes. Like your local science center. He's also a Creative Director of Worldviews network. This is a collaboration of artists, scientists and educators using storytelling and visualizations to engage people in discussions about the environment and to help understand global changes and how they impact life on earth.

For those you who might want to explore Worldviews Network the address is worldviews.net. The ask about podcast is produced on the campus of Arizona State University and is recorded in the Grassroots Studio, Allison's school of life sciences, which is an academic which unit of the college of liberal arts and sciences. Remember even though our program is not broadcast live you can still send us your questions about biology using our companion website. The address is askabiologist.asu.edu or you can just Google the words 'ask a biologist.' I'm Dr. Biology.

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