

Robert J. Marks On Algorithmic Specified Complexity (Part III)

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Austin Egbert:

The reversal of roles continues. Listen in as Dr. Michael Egnor wraps up his interview with our usual host, Dr. Robert Marks, as the two discuss the information evident in living things today on Mind Matters News.

Announcer:

Welcome to Mind Matters News where artificial and natural intelligence meet head on.

Michael Egnor:

Many evolutionary biologists claim that all of the information present in living things got there by natural selection of randomly assorted variation. Is that true? We'll ask that question today of Dr. Robert J. Marks, who is a distinguished Professor of Electrical Engineering and Computer Engineering and Director of the Bradley Center.

Michael Egnor:

Dr. Marks, welcome.

Robert J. Marks:

Thank you, Michael. Good to talk to you.

Michael Egnor:

It's wonderful to talk with you about information, which is a topic on which you have a great deal of expertise, and it's very clear that living things contain a lot of information. Is it possible for the Darwinian process of random heritable mutation and natural selection to generate all that information in biology or even any of it?

Robert J. Marks:

Well, my background is not in biology, but it is in computer science and computer engineering. And one of the things we do is do artificial intelligence. And I think maybe your question translated to artificial intelligence is, can anything happen in artificial intelligence from totally random unguided mutations and processes to allow for something to happen? And the answer is absolutely not. We did a lot of work, we meaning Winston Ewert and William Dembski, a lot of work on analyzing programs that were purported to generate information. And this was something that excited the people with the advent of the computer. They said, "You know, evolution is such a slow process that it's going to take us years and years in the laboratory to do anything. But if we have a computer, we can take these Darwin algorithms and we can simulate them on a computer and show that indeed it works."

Robert J. Marks:

And so people tried that, and there were people jumping up and down and saying, "Ah, yes, we have proven Darwinian evolution." There was a problem though with their simulations. Number one is that all of the simulations were guided to be successful. And they were random. They were stochastic. You had the three steps of evolution. You had the random mutation. You had the killing off of the weak and the

survival of the fittest, and then you had the re-population. The key in those three steps is survival of the fittest. How do you determine what the survival of the fittest is? In order to do that, you have to have something called a fitness function or an objective function. That needs to be imposed by the programmer. The programmer is telling you how the organism can better itself, and that is necessary in order to perform evolution on the computer.

Robert J. Marks:

The work that we did, which is summarized at a later level in our book, and I'll give a plug here, Introduction to Evolutionary Informatics. And let me say it again, Introduction to Evolutionary Informatics. In that book, we looked at a number of computer programs that purported to perform Darwinian evolution. And our report in the book is aimed at a high level, at a general consumption level. And they are based on publications and prestigious journals and conferences, and those are referenced there for people that want to dig in further. But we showed that in all cases that yes, it was required... And there's mathematics behind it.

Robert J. Marks:

The mathematics is based on something which is called the no free lunch theorem, which was popularized in the IEEE Transactions on Evolutionary Computing in 1997, where Walpert and McCrady showed something which astonished the area of genetic programming and evolutionary programming. Their conclusion and their mathematical proof was if you have no idea about the direction that you're going, you're never going to get there. And so it basically says that in accomplishing a goal, that one search algorithm is as good on average as another one. And this astonished the computer science field, especially those in evolutionary computing. But it caught on, and we took this up, and it's covered in the Introduction to Evolutionary Informatics book, for example, and we showed not only was this true, but we could measure the degree to which people infused information into the search process.

Robert J. Marks:

So we could measure in bits, the amount of information that a search process, the programmer put into a computer program in order to get it to succeed. And these programs were random. And so how do you say random things can succeed? Well, if you think about a pinball machine, that pin ball bounces around the different bumpers, but it eventually falls, well it goes through the flippers and goes down the little hole behind the flippers eventually. It's a random process, but it always has the same sort of result. And one of them that we took on, the biggest one, because it was part of the Dover trial was a program called Avida, A-V-I-D-A. And Avida purported to perform evolutionary algorithms, but it was chocked full of added information.

Robert J. Marks:

Now, the metric that we derived in order to measure the degree of information, which was put into an algorithm in order for it to succeed, is something called active information. This is something which can be measured in bits. And we were able to measure the amount of active information being put into Avida, and it was a lot. We also took on another algorithm called EV which purported to show Darwinian evolution, and showed it was chocked full of active information. And I don't think the people that wrote the program did this intentionally and tried to hide it. I think rather they were numbed by familiarity, that they were just so used to these Darwinian processes that they put them in there without thinking at all.

Michael Egnor:

It would seem to me Doc from what you're describing of this, that the idea that there's information put into these programs is pretty obvious. I mean, I think it's fascinating that you can measure it, that you can quantify it, but these programs are all elegant computational tools. And of course there's information being put in. How could experts like these Darwinists not see that? I mean, that's really blind. That's quite amazing.

Robert J. Marks:

I have this old theory of the difference between scientists and engineers. I'm an engineer. A scientist often come up with good theories and they like these theories, and they're vetted and they're placed up on a throne, and they're kind of worshiped like a queen and protected like a queen. Whereas engineers make the queen come down from the throne and scrub the floor. And if she doesn't scrub the floor, we fire her. And I think that that's probably the case here. Now, why do these people do this? I heard an old story... And this is well circulated so people might've heard about this before, but I call it the dead man syndrome. And it illustrates the challenges of being in a silo of belief, a silo of ideology that you can't see out of. The story of the dead man syndrome is that a man enters a psychiatrist office and says, "Doc,"... He was really sad by the way. He says, "Doc, I'm dead."

Robert J. Marks:

And he started sobbing. He went over and sat down and put his head down and started to cry. And the psychiatrist was just astonished. She said, "Well, come on. You're not dead. You're walking, you're talking, and dead people don't do that." The guy says, "Yeah, I know, it's astonishing, isn't it? That I can walk and talk, but doc I'm dead." So the psychiatrist thought of a way that he could make an explanation to the man and convince the man that he wasn't dead. So he had a diabetic finger prick thing and he asked the guy, "Do dead men bleed?" And the patient said, "Why, no, dead men don't bleed." He said, "Here, give me your finger." And so he picked his finger and the guy started to bleed. A little puddle of red blood came up and the guy's eyes got big. And he looked at the doctor and looked at the puddle, and looked at the doctor and he said, "Doc, this is incredible. You're right and I'm wrong. Dead men do bleed."

Robert J. Marks:

So the point of that story is if you're so ensconced in an ideology, that you are going to be pounding square pegs into round holes in order to defend that silo of ideology. And I think we point a finger at a Darwinist for doing that. But I think everybody has to be concerned about placing themselves in a silo of belief, and allow themselves open to other explanations, and go where the evidence leads us. I mean, this is what the scientists say, right? Go where the evidence leads us. And the evidence in terms of Darwinian evolution, especially as implemented and simulated by a computer, is that no, it simply doesn't work. Not unless it's guided. Not unless there's a teleological forcing function there. You have to figure out what is good. You have to figure out what that survival of the fittest is. And that is typically a place where active information is placed into the algorithm. And yes, it can be measured in bits in many cases. And that's pretty good. And I think we're very proud of being able to do that.

Michael Egnor:

I was myself raised in a Darwinist atmosphere and I believed it. I really believe that Darwin explained how living things came to have adaptations. I thought Darwin explained how man came to be. And it was really the intelligent design movement that helped me to see how wrong that is. What nonsense

that is. And I still, frankly, every time I look at this issue, it leaves me flabbergasted that Darwinians could really believe the stuff they believe. And they really are in a silo, but goodness gracious. The silo has very thick strong walls and these people can't get themselves out of it. So I point out also that, whereas you mentioned that certainly the goals to which evolutionary change tend, have to be specified. That you don't get anywhere unless you specify goals. But even randomness requires information and intelligence because there's an old Aristotelean adage that chance or accidents only occur as conjunctions of designed things. That is that there're conjunctions that you didn't intend, but they depend upon a milieu of design to happen.

Michael Egnor:

If you didn't have the milieu of design, randomness wouldn't even have any meaning. A good example is a car accident. So you're going through an intersection, some other guy goes from the intersection and you collide. Well, that's an accident. Nobody intended the collision, but everything else in that event is designed. The automobiles you're driving are designed, both you and the other guy were intending to go somewhere. The stoplight that one person ignored was designed. The road was designed. So randomness has to happen on a framework of design. So design even shows up in randomness, as well as in ... purposes.

Robert J. Marks:

Well, exactly. I guess I would add to this by making the statement that there are deterministic aspects of randomness, and this is a difficult concept to explain, but examples are obvious. If you flip a coin a million times, about 50% of the time it'll come up heads, if it's a fair coin. And that is a deterministic output of the randomness. So imagine setting up an evolutionary computing program where you have a specific outcome in mind, and you perform this operation a million times. Well, it's going to converge to that output, just like the coin flip converges to a 50% success rate. And this forming and this putting together of the stochastic framework in order for this to happen, is what the people in evolutionary computing do.

Michael Egnor:

An example of what Aristotle meant by saying that randomness or chance depends critically on purpose, is that if I set out to design a random number generator, I would need to go to school for a decade to learn computer engineering, to learn electronics, to learn all of that, to design a random number generator. So at the tail end of this thing would come out random numbers, but there's nothing at least bit random about the effort that it takes to reach that point. A random number generator is not itself a random thing. It's a highly designed thing.

Robert J. Marks:

It's a highly designed thing. And I would also argue that all random numbers generated by computers are themselves deterministic, believe it or not. In fact, they refer to them as pseudo random number generators. And there's a little algorithm that spits out numbers that look random, but underneath them all, they're not random. In fact, I have a student right now that is looking at training a neural network to forecast random numbers. Because if these random numbers are being generated by a deterministic algorithm, then we should be able to discover what this deterministic algorithm is. Is there a way that we can gain that system and literally figure out what the next random number is?

Robert J. Marks:

In fact, the only place in the world that randomness exists is in quantum collapse. And that's the only place that there's true randomness. One of the big problems that I see... We talked about the critics and living in silos, is that I read their works all the time. The critics, however, I don't think read our works. I get into arguments. We talked about Dr. Shallot, for example. I think he just had in mind this idea concerning Mount Rushmore and Mount Fuji, that they had different amounts of information. He had his head stuck in the silo of Shannon information theory, and not understanding the context of what was going on. If he had gotten a copy of my book or read some of the articles that we have generated, then he would understand what was exactly meant by this.

Robert J. Marks:

I have also gotten into a challenge with a great gentleman, Randy Isaac, from the American Scientific Affiliation. I think he's a former IBM guy with a physics background. And I couldn't shake him off the idea that all information was not physical. He kept going back to the physical definition of information and I couldn't shake him out of that silo. He said, "Well, Ralph Landauer, one of the great physicists, said that all information is physical." And that's not true. That's one of the many definitions that we can have of information. So I wish before they made critical comments concerning our work, that they literally read it and became familiar with it, so that their, their comments would be useful.

Robert J. Marks:

By the way, I should mention that many times I have engaged with opponents of our work, and they have been right. I can think of at least in two occasions where they found a mistake in our reasoning. Now it didn't detract at all from the main thrust of our conclusions, but they were right. And if you look at our papers at the end, we will have an acknowledgement to these people that did read our work and made critical well- civilized interchanges with us. We acknowledge their contributions and we appreciate it. And of course that back and forth is always important. As long as it's done in a civilized way, as opposed to a pugilistic way, which we see a lot of.

Michael Egnor:

Well, that's one of the great tragedies in this, is that as I found when I began reading intelligent design literature, is that the questions that intelligent design scientists raise, and the points they make are very, very profound important points. And a great deal more progress could be made in biology ,and intelligent design, and evolution, if the people on the Darwinian side would simply engage with honesty, with integrity, with a genuine desire to learn. Because they have things they could teach us. These people are very smart people, but they come at intelligent design as an enemy instead of as a tool for better understanding evolution. And it's a real shame.

Robert J. Marks:

Exactly. Remember in the Science Rising, the film that you occurred in, there was a film clip of a guy that made a profound statement. He says science and academia that exists in these silos have already decided that sciences are already decided in a materialistic naturalistic framework. And that our job is to fill in the details. Walter Bradley made a great observation. He was being deposed by an ACLU attorney, and they asked first of all, if he was a Darwinist. Well, they actually asked he was a Christian trying to appeal to the genetic fallacy of discrediting him. And he says, "Yes." And he said, "How can you be objective in looking at these things and be a Christian at the same time?" And Bradley's comment was I think, ingenious.

Robert J. Marks:

He said, "Look," he says, "I'm not the one with the silo. It's you that are in the silo. I can accept naturalistic things happening. I see materialistic consequences all the time. I don't prescribe to it as a philosophy, but I also have a broader perspective because there's many things that I can bring into conclusions that are outside of your narrow silo. It's not me that's in the narrow silo, it's you." And the ACLU attorney immediately switched directions in his questioning.

Michael Egnor:

Right.

Robert J. Marks:

It was just a brilliant comeback. And I think it's very apropos.

Michael Egnor:

One of the first intelligent design theorists that I read was on Phillip Johnson who passed away recently. And I owe him a tremendous debt because he opened that insight to me. And a point he made that for me was sort of the cornerstone of my coming to understand better I think the controversy between the Darwinian viewpoint and the ID viewpoint, is he said that Darwinism isn't really much of a scientific theory. It's a philosophy. It's a metaphysical system. And it kind of dresses up as a scientific theory, but it really is a philosophical system for attempting to explain biology on purely materialistic terms. And we should address it that way. It's a philosophical problem. It's not a scientific problem.

Robert J. Marks:

I don't think anybody that has looked into the mathematics of Darwinism as is covered in our book... I'll plug it again, Introduction to Evolutionary Informatics, can ever come to the conclusion that Darwinian evolution works without some sort of guidance that... If it did happen, there needs to be a great amount of external guidance in that process. There needs to be lots and lots of active information in the process to make it work. It can't be done just through a random process.

Michael Egnor:

One thing that fascinates me about ID theory, is trying to understand the ID theory in light of more classical metaphysical systems, so for example, tokenism or Aristotelianism or Platonism and so on. And it's very interesting that Aristotle said that in order to understand any process in nature, you really need to know four causes of that process. You need to know the material cause, what matter the thing is made of, the formal cause, which is sort of the principle that gives it structure and dictates what it does, what it's doing, the efficient cause, which is the cause that actually gets it going and actually starts it off. And the final cause, which is sort of the goal to which the change is tending.

Michael Egnor:

And he said that the final cause is the most important cause. In fact, he called it the cause of causes, in a sense that he saw in nature not as being pushed along like you would hit billiard balls and push them, but as being drawn along, as being pulled along towards goals. And I think that that dovetails very beautifully with the ID point, that you don't get evolutionary change unless you have goals, unless you have something in nature that sort of pulls the change in certain direction. And that's exactly what Aristotle said. That change is meaningless, unless there's a goal.

Robert J. Marks:

Now I think that some physicists recognize this and some biologists recognize this. And I think it's also true of physics that the universe... Well, why are we here? Why is the universe so perfect? Or why are our bodies so complex? And they refer to the idea cosmologically as the anthropic principle. And I suspect there is an anthropic principle for biology, which says that we are here, we are complex. And of course it had to happen because if it didn't, we wouldn't be here to notice it. That strikes me as kind of ridiculous. What is your sense?

Michael Egnor:

Yeah, I see the principle that they're talking about here as just kind of another way of talking about teleology and talking about purposes and nature.

Robert J. Marks:

Yes.

Michael Egnor:

There's an example that has been given to sort of refute. One of the ways that people made this argument have tried to downplay the idea of purposes is they've said that, "Well, if the universe didn't have these particular characteristics, we wouldn't be here to note it, so that it's no surprise that the universe seems to be made for us, because if it weren't made for us, then we wouldn't even be here to know it." So that means that it could still be by chance, that there doesn't have to be a purpose. And I think that's faulty reasoning. And the example people have given is imagine that you are facing a firing squad and they put the blind fold on you, and the firing squad has got like 12 marks, and they're standing like six feet away from you. And they say, "Fire." You hear the guns fire, but you're still alive.

Michael Egnor:

They missed. And they tear off the blindfold. And the first question you would ask is, "What happened? Why did you miss? How did this happen?" And to answer that they say, "Well, it was just chance. And if it wasn't because of that, then you wouldn't be alive here to ask the question." But that doesn't mean it's not a valid question. It's a perfectly valid question to ask why are things the way they are, even if your continued existence depends on it. It doesn't mean that the question goes away.

Robert J. Marks:

Well, in fact, if I was in that firing squad situation, I wouldn't just shrug my shoulders and say, "Well, you know, I'm here. So it must have happened." I would spend a lot of time investigating what the heck happened. That would be very interesting.

Michael Egnor:

Maybe you got 12 friends on the firing squad. Maybe... The fix is in somehow. And when you look at the universe and you look at the existence of life, existence of human beings, the fix is in. And just because our existence depends on the fix, doesn't mean that the fix isn't worth understanding. The fix is still there. And it's fascinating. And of course, people who are traditionally religious Christians and Jews and Muslims and people who've thought about this a lot, may well have some insight into the nature of that fix.

Robert J. Marks:

Yeah. I think that the anthropic principle be it for cosmology or for human biology consists of the guy at the firing squad, just shrugging his shoulders and walking away. So well, it happened.

Michael Egnor:

Right. Which is crazy, which is a deliberate effort to not understand what happened.

Robert J. Marks:

Yes.

Michael Egnor:

And that's to me what comes through again and again, when I look at Darwinian arguments, is that it boils down to a deliberate effort to not understand. Well, Dr Marks, thank you very much for joining us. It's absolutely fascinating. Thanks again to all our listeners for listening to Mind Matters News, and please listen to us again in the future.

Michael Egnor:

Thanks.

Announcer:

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