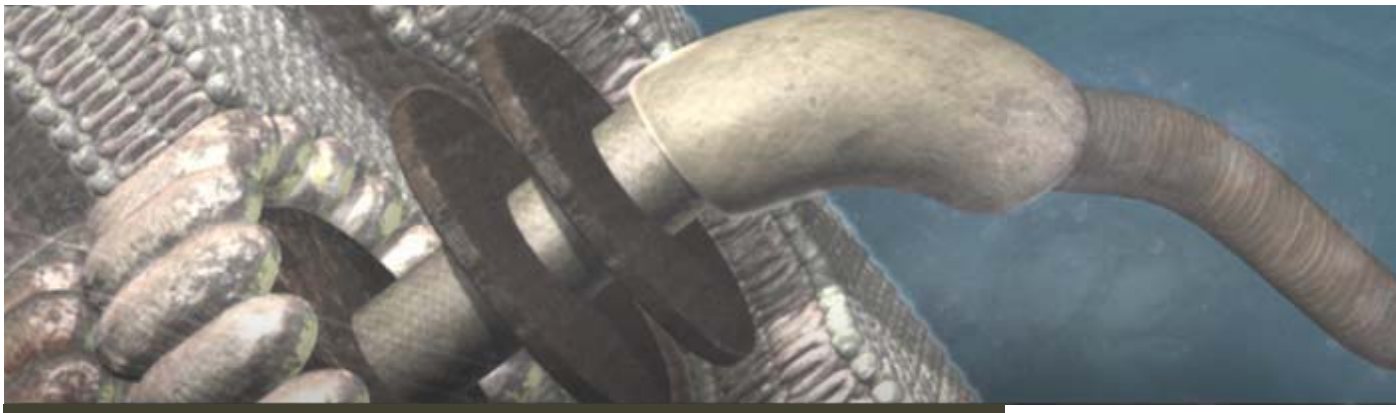

UNCOMMON DESCENT
The Intelligent Design Weblog of William Dembski, Denyse O'Leary and Friends.

20 July 2007

Casey Luskin interviews Robert Marks concerning his new Evolutionary Informatics Lab

William Dembski

Here's a fun interview with my friend and colleague Robert Marks. I hope you catch from the interview the ambitiousness of the lab and how it promises to put people like Christoph Adami and Rob Pennock out of business (compare www.evolutionaryinformatics.org with devolab.cse.msu.edu).

> Well-Informed: Dr. Robert Marks and the Evolutionary Informatics Lab
> July 20, 2007 10:40AM
>
> In today's episode of ID The Future, Casey Luskin interviews Dr. Robert Marks about his work in evolutionary informatics. Marks explains that evolutionary informatics seeks to emulate evolution on a computer, allowing for new engineering designs to be developed. Unlike Darwinian evolution, this process does not advance gradually, and requires a certain amount of external information to be fed into the computer before the process can begin; in other words, the systems must be designed before the evolution can begin. This contrast fueled Marks's interest in intelligent

> design, and has led him to critically analyze a number of evolutionary computer programs that claim to prove Darwin's theories.
>
> About Dr. Marks
> Dr. Marks is Distinguished Professor of Electrical and Computer Engineering at Baylor University in Waco, Texas. He is also the Evolutionary Informatics Lab's founder. His research and teaching focuses on computational intelligence, including fuzzy systems and neural networks. Dr. Marks' upcoming *Handbook of Fourier Analysis* will be released through the Oxford University Press. Marks also co-wrote *Neural Smithing: Supervised Learning in Feedforward Artificial Neural Networks* with Russell Reed. For more information on evolutionary computing and Dr. Marks' work, please visit the Evolutionary Informatics Lab homepage.
>
> TO LISTEN CLICK HERE

This entry was posted Friday, July 20th, 2007 at 6:15 pm and is filed under Intelligent Design. You can leave a response, or trackback from your own site. Edit this entry.

15 Responses

1

Freelurker

07/20/2007

11:16 pm

e

> … in other words, the systems must be designed before the evolution can begin."

That's not what Dr. Marks said. Crowther, the author of the article, is mixing ID concepts of design with engineering concepts of design (This happens all the time around here.)

Dr. Marks said that "… evolutionary computing has to do with emulating evolution on a computer and it's an entire field in engineering where the emulation of the evolution actually results in engineering design."

Engineering design is **the result** of the (emulated) evolution, it is not done before the evolution. Although I have issues with other things Dr. Marks said, in this he is correct and the article above is incorrect.

2

j

07/21/2007

7:21 am

e

[Just for laughs:] Robert Pennock in *Discover* (February 2005):

> Avida is not a simulation of [Darwinian] evolution; it is an instance of it. All the core parts of the Darwinian process are there. These things replicate, they mutate, they are competing with one another. The very process of natural selection is happening there. If that's central to the definition of life, then these things count.

3

j

07/21/2007

11:36 am

e

Freelurker: "Engineering design is the result of the (emulated) evolution, it is not done before the evolution."

design (verb) - **2 b :** to have as a purpose **c :** to devise for a specific purpose or end

design (noun) - **6 :** the arrangement of elements in a product or work of art

Engineering encompasses both of these. And, of course, design (verb) must occur before use of evolutionary algorithms, or else no useful design (noun) will result.

4

William Dembski

07/21/2007

11:18 pm

e

Freelurker: The design comes out because it was first put in. If you've looked at www.evolutionaryinformatics.org , you'll know that that's the whole point of the project: how information makes evolution possible — not how evolution generates information from scratch.

5

russ

07/22/2007

2:05 pm

e

Dr. D., the link you posted in #4 doesn't work due to the comma at the end of the URL.

6

Freelurker

07/22/2007

11:43 pm

e

Dr. D. wrote: "The design comes out because it was first put in."

When you refer to the design that comes out, I'm taking it as a reference to the same thing that Dr. Marks referred to as *the engineering design that results from emulated evolution*.

When an engineering team announces that they have come up with a design for a new system, that means that they can tell you, as a minimum, the components of the system and the arrangement/interaction of these components. This is true whether or not they

have used evolutionary computing to produce the design. If the new system is a circuit board then they can tell you the components that will go on the board and their arrangement on the board. If it's a new aircraft then they can tell you about the engines, the wings, the controls, and how they will all fit together. If it's a new software component then they can tell you about the software units (e.g. classes) that comprise the software and how they will interact.

I would not want to be on an engineering team that announced that they were ready for a Design Review and then, at that review, did not describe their system in the terms discussed above. If they could only discuss the *purpose* of the system, then they would fail that review because they would not have produced a design; they would have so far only defined the *requirements*. If they could only describe (no matter how completely) the future runs of evolutionary algorithms, then they would fail the review and be told to come back when they could actually tell someone the design of the system.

Within this context of what engineers mean by "the design," the slogan "The design comes out because it was first put in" just doesn't make any sense.

I have indeed been through the contents of the evolutionary informatics website. Nothing there and nothing in the interview of Dr. Marks is in conflict with what I have said above about engineering design. This is not to say that I endorse the claims of evolutionary informatics.

(P.S. I *would* like to be a fly on the wall if an engineering team were to call a Design Review and then proceeded to tell the bosses/customers about the complement of chance and regularity.)

7

DaveScot

07/23/2007

12:36 pm

e

freelurker

crowther made no mistake - marks was quite clear that ga produces little if any new information

in the real world when ga is employed it is given as inputs every scrap of information that can possibly assist in reaching its goal

i have quite a bit of experience in ai assisted printed circuit board layout - the ai is given volumes of rules that constrain it, the same rules that a human must work within, then it’s turned loose to find a way to route the circuit

the layout it produces, if it succeeds, contains no new information - all does is finds information that already existed - the circuit diagram plus the layout rules contain all the information in the result - what the ai does is sorts through what’s possibly a virtually infinite number of solutions looking for ones that come closest to the optimum for manufacturing cost

in this case the least number of circuit board layers is usually the prime target as more layers usually mean higher cost and lower production yield

the advantage an ai has in this search process is that it can lay down, take out, move, and rearrange routed connections thousands of times faster than a human - the disadvantage is that it has a hard time thinking ahead to prevent getting boxed into a partially completed layout that is physically impossible to complete

in practice the ai works interactively with a human pcb engineer guiding it along the way

a simpler hypothetical example would be a computer finding solutions to rubic’s cube - all possible solutions already exist and are defined by the rules of how the faces may be moved and the pattern that is the goal - the problem is that there are a virtually infinite number of possibilities that are dead ends so finding ones that work is difficult - again the computer’s advantage is that it try out possible solutions far faster than a human

this is essentially how evolution works and given that extinct cell lines vastly outnumber those that have survived billions of years its evident that evolution hits a lot of dead ends where further evolution becomes impossible

that’s a basic limitation of natural selection which generally only allows improvements in fitness to survive - it doesn’t backtrack to lesser fitness when it hits a blind alley but rather gets stuck on fitness peaks where no further improvement is possible in small steps because any small step is a backwards step and it isn’t capable of big steps across the valleys - intelligence is required to make those big steps across otherwise impassable obstacles

8

Freelurker

07/24/2007

4:25 am

e

DaveScot wrote: "crowther made no mistake - marks was quite clear that ga produces little if any new information"

As I said before, my beef is with Crowther's statement that:

> "… in other words, the systems must be designed before the evolution can begin."

I don't know where anyone has laid out the argument that Crowther's statement follows from evolutionary informatics.

Dr. Marks himself says that engineering design is a result of the evolutionary computation.

9

j

07/24/2007

5:41 am

e

Freelurker, I think that what Dr. Dembski wrote can be reasonably construed in only two ways:
1. "The design [(noun) of the result] comes out because [the design (verb) of the program] was first put in."
2. "The design [(noun) of the result] comes out because [the design (noun) of the program] was first put in."

In either case, this does make sense in the context of what engineers means by "the design." And in either case the point is that the input of intelligent design (in the form of target location and search-space structure, etc.) at the start is necessary for the program to yield intelligent design at the finish.

10

j

07/24/2007

9:07 pm

e

Freelurker: “I don’t know where anyone has laid out the argument that Crowther’s statement [“… in other words, the systems must be designed before the evolution can begin.”] follows from evolutionary informatics.”

For the record: Dr. Marks, in the linked interview:

> “Teleological” means that there is a goal in mind for the evolution process. Any time we go to the computer and actually simulate the evolution we have some sort of goal in mind, yet if you go over into the biology area, they say Darwinian evolution is not teleological — it has no goal. It’s just a process of meaningless, random events and, boom!, all of a sudden you have something which appears designed. Yet, intererestingly, in my limited exposure to some if the literature in biology, everything they do in computer modeling of evolution is teleological. And so, one of the things that I would like to see, and I have [as] a[n open] challenge, is to actually show me an emulation of a computer model that is nonteleological. And I don’t believe that there is one. We have looked at some different programs in the area of biology, and one of the things that is often claimed is that there is a magical design which occurs with the computer doing the evolution — again, not paying attention to all of this information that is snuck into the side. And what we have done, [is] we’ve been able to look at, for example, a paper from Tom Schneider at NIH, which actually proposed a[n] evolutionary program, *ev*, and we’re actually able to show that the amount of added information that he was using was incredible! There were two stages to it. One where he actually put together the program, and then he used an evolutionary program to do a search of this model, and it turns out his model was so information-rich that he didn’t even require an evolutionary program. He could have done it just by blind queries and it works better, and we actually were able to show this, and have it on one of our papers at evolutionaryinformatics.org — and we actually showed that the amount of added information that he placed into his algorithm was such that there only was required 8 bits of information that he needed to search for.
> …
> The other one we’ve looked at, which we haven’t published as of yet, is the Avida program. Now the Avida program has been written by some very top people in the area of computational intelligence and biology. They purported to show through this process that, gosh, evolution can, indeed, happen on the computer. And it was [Avida researcher, philosopher Robert] Pennock who was one of the witnesses that testified

> at the Dover trial. There was reference made [at Dover] to this program called Avida. And Avida, like many of these other programs that we see in the evolutionary literature, said “Wow! Look at the magic of evolution. Look at all this information that we gained without having information.” I am actually starting to believe that there’s a law — a type of law of conservation of information. That is, you can’t get much more information out of an evolutionary program than you put in. Well, we have also done an analysis of Avida and will very soon be publishing a paper showing that the amount of information that was snuck in from the side was such that the program would not have a snowball’s chance if it didn’t have this extra information placed into the side. They also talk about it being “non-targeted.” It does have a target. And they even say, “It looks like it has a target, but it doesn’t have a target.” Well, it does have a target, and we’ll be showing that and actually giving measures of the amount of information — in bits — that was added to the Avida program.

Dr. Dembski and Dr. Marks, in “Conservation of Information in Search: Measuring the Cost of Success” (2007):

> …attempts to characterize evolutionary algorithms as creators of novel information are inappropriate.

11

Freelurker

07/24/2007

9:26 pm

e

j wrote:
1. “The design [(noun) of the result] comes out because [the design (verb) of the program] was first put in.”
2. “The design [(noun) of the result] comes out because [the design (noun) of the program] was first put in.”
I’m not sure what “putting in design” means in an engineering context, but if you are simply saying that the programs (the tools) need to be designed before they can be used in the design of the results (the products), then fine. That is reasonable to the point of being trivial. Unless I’m mistaken, some of your colleagues are saying more than that; they are saying that the products are designed before the evolution is started. You are the only one so far who has said otherwise.

12

Freelurker

07/24/2007

10:28 pm

e

j wrote: "And in either case the point is that the input of intelligent design (in the form of target location and search-space structure, etc.) at the start is necessary for the program to yield intelligent design at the finish."
This is just the trivial statement that the program needs to be set up and the data has to be entered by people before the search can be run. It doesn't address the issue I have raised. I'll ask you directly; do you believe that the product has already been designed before the search is started?

13

j

07/25/2007

9:42 pm

e

Freelurker,

> "they are saying that the products are designed before the evolution is started."

I now think I see the problem. It appears that you interpeted Crowther's use of the word "systems" to mean "product" rather than "evolutionary computer programs" (which I'm pretty sure is what he meant), and Dembski's second, implied use of the word "design" to mean "detailed arrangement of parts of the final product" instead of "detailed arrangement of parts of the program" (which I think is what he meant). If so, you are thinking about design too narrowly. (See the Dembski quote at the bottom.)

> "if you are simply saying that the programs (the tools) need to be designed before they can be used in the design of the results (the products), then fine."

You are missing the whole point of the ID critique of evolutionary algorithms. It's not just a matter of the tool (the program) being designed, it's that the tool is designed and additional information is provided, such that the probability of finding a suitable design is vastly improved (or even made certain). Any way in which the tool or it's use is biased to make it more likely to find a design matters. With their recent paper, Dr. Dembski and Dr. Marks have now provided a way to quantify that bias.

> "This is just the trivial statement that the program needs to be set up and the data has to be entered by people before the search can be run."

This isn't trivial. Those who believe in Darwinian evolution believe that astronomically improbable designs can be found without any guiding bias in the program and entered data. ID says otherwise.

Before a design is discovered or invented (the word "invent" is derived from a word that means "to find" in Latin) it exists in the Platonic design space. There are several ways to find the design. Some important ones are (1) abstract thought (2) serendipity (3) trial and error. Computers can be used to speed up the last of these. But, on average, no nonteleological search method is better than randomly guessing at possible designs. Thus, if a design is unlikely to be found by simply guessing, then it is still just as unlikely to be found through Darwinian evolution (or any other algorithm, since any algorithm could be considered a "search method" if so desired). In order to do better, some information about what would constitute an appropriate design is needed. This can only be supplied by an intelligent agent.

> "do you believe that the product has already been designed before the search is started?"

It depends upon what you mean by "designed." If you mean strictly "the components of the system and the arrangement/interaction of these components", then No. But that's not the only definition of design. I *would* say that the product has been indirectly designed (verb 2b) through the design (noun 6) of the program.

William A. Dembski, *No Free Lunch*, p. 223:

> Indeed, both intelligent design and evolutionary algorithms have a lesson to learn from each other. The No Free Lunch algorithms show that for evolutionary algorithms to output CSI [complex specified information] they had to receive a prior input of CSI. And since CSI is reliably linked to intelligence, evolutionary algorithms, insofar as they output CSI, do so on account of a guiding intelligence. The lesson, then, for evolutionary

> algorithms is that any intelligence these algorithms display is never autonomous but always derived. On the other hand, evolutionary algorithms do produce remarkable solutions to problems — solutions that in many cases we would never have imagined on our own. Having been given some initial input of CSI, evolutionary algorithms as it were [can] mine that CSI and extract every iota of value from it. The lesson, then, for intelligent design is that natural causes can synergize with intelligent causes to produce results far exceeding what intelligent causes left to their own abstractions might ever accomplish. Too often design is understood in a deterministic sense in which every aspect of a designed object has to be preordained by a designing intelligence. Evolutionary algorithms underwrite a nondeterministic conception of design in which design and nature operate in tandem to produce results that neither could produce by itself.

14

Freelurker

07/25/2007

10:44 pm

e

J,

Yes, in an earlier response to you, I pointed out our differing interpretations of Crowther's use of the term "the systems." But that comment of mine didn't make it through moderation.

Thank you for all of the effort you have put into your comments here.

I have nothing else to say at this time.

15

j

07/27/2007

6:15 am

e

You’re welcome, and thanks.

(By the way, in the Demsbki quote in my previous comment: “No Free Lunch ~~algorithms~~**theorems**“.)