Does Evolutionary Psychology Explain Mind?: Donald Hoffman

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Transcript - Long

Robert Lawrence Kuhn:

Don, I like you, I've been thinking about consciousness and to begin with we say, well where did consciousness come from? Obviously it came from an evolutionary process. And so there's a whole subculture of people talking about the evolutionary psychology of all different kinds of traits, including consciousness. How does this work?

Donald Hoffman:

Well, as far as perception and evolution goes, and consciousness, the standard view in the field is that natural selection has shaped us to have conscious experiences that truly reflect the state of the world. That our perceptions are, as they say, veridical, true to the state of the world. And the argument is quite simple. Those of our ancestors that didn't see truly were at a disadvantage in the competition with those of our ancestors who did see truly. And as a result they were less likely to have kids. Less likely to survive long enough to have kids. So we're the offspring of those who saw truly and therefore on evolutionary grounds, we can expect that our senses are in general reliable, not perfectly.

Robert Lawrence Kuhn:

If your senses are attuned to the world, goes the theory, that you are more likely to eat lunch than be lunch.

Donald Hoffman:

That's right. You're more likely to avoid that tiger and to catch prey yourself because you're seeing the truth and you're more likely to avoid the cliffs and the snakes and so forth. So if you see truly, you will have greater fitness than those who don't see truly, you'll have more kids, and so your genes for seeing truly will get passed on to your kids.

Robert Lawrence Kuhn:

And get amplified over generations.

Donald Hoffman:

Absolutely. The idea would be that they spread throughout so that very few of us will have perceptions that are marginally, that are false. So maybe a few people with psychological problems might have perceptions that are odd, in schizophrenia or something like that, but that's a rarity. Most of us can trust our perceptions. So that's the standard view, and I think that it utterly, it's utterly false. It mistakes some of the key points of evolutionary theory.

Robert Lawrence Kuhn:

Now that's a radical claim. What you're saying now is critiquing what is not only the standard theory but it seems like a very intuitive theory. That almost sounds obviously correct and you're saying it is actually wrong.

Donald Hoffman:

That's right. It seems obviously correct and it's actually in the textbooks. In the standard, for example, Vision Science textbooks, the argument is given that evolution guarantees that our perceptions are generally true.

Robert Lawrence Kuhn:

So the burden is on you.

Donald Hoffman:

It certainly is.

Robert Lawrence Kuhn:

To explain to me and everyone else why you have such a dramatic challenge to the accepted, conventional wisdom.

Donald Hoffman:

So first I'll give an intuition and then I'll give a little more hard reasons why. The first intuition is that evolution is about fitness, in the first place, and fitness and truth are very, very distinct notions. Fitness depends not only on the state of the world, but also on the organism and the state of the organism. So, for example, a steak could have high fitness value for a hungry lion that wants to eat. This can have much lower fitness value for that lion if it's full and it wants to mate, and the steak probably has no fitness value to a cow in any state. So the notion of what is the fitness of a particular aspect of the world is relative to the organism and its state. It's not about truth; it's about fitness that evolution is concerned with. So then the question that I addressed in my lab with my graduate students Justin, Mark, and Brian Marion and others, was let's run what are called evolutionary games. So, Darwin's theory has been made mathematically precise in evolutionary game theory. We can create any worlds we want to in the computer, and we can create organisms in those worlds with perceptional systems tailored the way we want, some that see all the truths, some that see part of the truth, some that see no truth, but they're only tuned to the fitness functions in that world. And we run these evolutionary simulations, and what we find is that truth goes extinct almost all the time.

Robert Lawrence Kuhn:

Truth goes extinct. Extinct? That's a remarkable word to talk about truth, about what's really out there in the world.

Donald Hoffman:

It really is. It's a bit of a surprising result. We found that the only time that truth has any chance of survival is if fitness functions involved are in some sense almost the same as the structure of the world. So for example, if you have a resource like water and the resource can have a very little amount of water all the way up to a very big amount of water, so that's a linear order they call it, of the amount of water, and if the fitness of the water for the organism is dependent, is very little for a small amount of water and very large for a large amount of water, so it's what we call monotonic, then truth has a chance to survive. But any other function and it doesn't have a chance, any non-monotonic function and the truth organisms in our simulations will go extinct. And we've done this with evolutionary game theory; I should mention that we've also done it with genetic algorithms. So we try to actually get populations of organisms with genes that we randomly mutate and have them breed and reproduce, and we can't even get truth to breed. So truth never even rises to the point that it can actually compete.

Robert Lawrence Kuhn:

So a critical assumption here is that what is required to fitness for a given species is different in some ways than the way the world is really structured. That's a critical assumption that you make in order for the results to occur that evolution drives truth being your perceptions being a reality to extinction. You need that assumption.

Donald Hoffman:

That's right. And I agree with you. So the assumption, the condition is that if fitness is not essentially the same thing as truth, then truth will go extinct. But mathematically, it's almost always the case that fitness is distinct from the structure of truth. That they're not isomorphic or homomorphic.

Robert Lawrence Kuhn:

Some specific examples in the real world as far as human fitness is concerned?

Donald Hoffman:

So for example, in the case of the water example, if you have too little water you die of thirst, too much you can drown, a couple of glasses of water is just right. So here's a fitness function that is penalizing you for too little, rewards you for just the right amount, and then penalizes you for too much. Salt; too little you die, too much you die, just the right amount. So this is, homeostasis is ubiquitous in human life and it's about homo – we try to maintain homeostasis; not too little, not too much. And so it means that in general, fitness is a non-monotonic function of the structures in the world. So what we did was we, in the computer, can simulate hundreds of thousands of different worlds with different numbers of territories and resources, different fitness functions. So we do what are called Monte Carlo simulations; we run millions of trials. We can create organisms that can see all the truth in those worlds, part of the truth, none of the truth, that are tuned to fitness or not, and so we run many hundreds of hours of simulations, millions of trials and we can –

Robert Lawrence Kuhn:

For each organism, artificial organism that you have, how many fitness functions would you have that you would compare fitness functions with reality?

Donald Hoffman:

We would try several different fitness functions. So we could try - we would try monotonic fitness functions. Often Galician fitness functions are reasonable fitness functions, so we will throw in two or three like – different fitness functions like that to try out.

Robert Lawrence Kuhn:

And run millions of trials.

Donald Hoffman:

Millions of trials. That's right. And we'll have different strategies compete against each other, and what we find is that natural selection drives true perceptions to swift extinction.

Robert Lawrence Kuhn:

That's just a startling statement.

Donald Hoffman:

It's absolutely startling, and it has strong implications. It means that our –

Robert Lawrence Kuhn:

What does it mean for us? What does it mean in terms of our perceptions of the world? We can't trust it? We can trust it to survive but, and mate, and eat, but in terms of understanding the world, what does it mean?

Donald Hoffman:

It means that our perceptions are a great guide to keep us alive. They're very, very useful, they're for fitness. But if we think that they're giving us an insight into the ultimate nature of objective reality, they're not. So the jewel beetle is an interesting example of this. It's this beetle in the outback of Australia. The males are brown, glossy, and have bumpy wing cases. The males can fly; the females are flightless. The males fly along looking for females and when they find an available female, they alight and mate. Another species out in the Australian Outback, the Homo sapiens, the males of that species likes full beer bottles, doesn't like empties, and tosses the empties out into the desert. It turns out the bottles are bumpy, glossy, and just the right shade of brown to tickle the fancy of these male jewel beetles. They swarm the bottles, they forsake the females, and the species almost went extinct. The government of Australia had to actually pass laws to save the species. And what this shows, here's a beetle, a species, that had survived for hundreds of thousands, perhaps millions of years, quite well. The males had found the females and mated. Sounds like their perceptions were true indicators of what the females were. Not at all. Apparently they had a little trick, something that's bumpy and glossy and brown, find it and mate it, the bigger the better. So throw a beer bottle out there, the whole thing came crashing down, the species could have gone extinct. And that's what evolution does for us; it gives us perceptional systems that are not there to tell us the truth, they're tricks and hacks that let you survive long enough to reproduce.