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David Eagleman: A Renaissance Man of Modern Neuroscience

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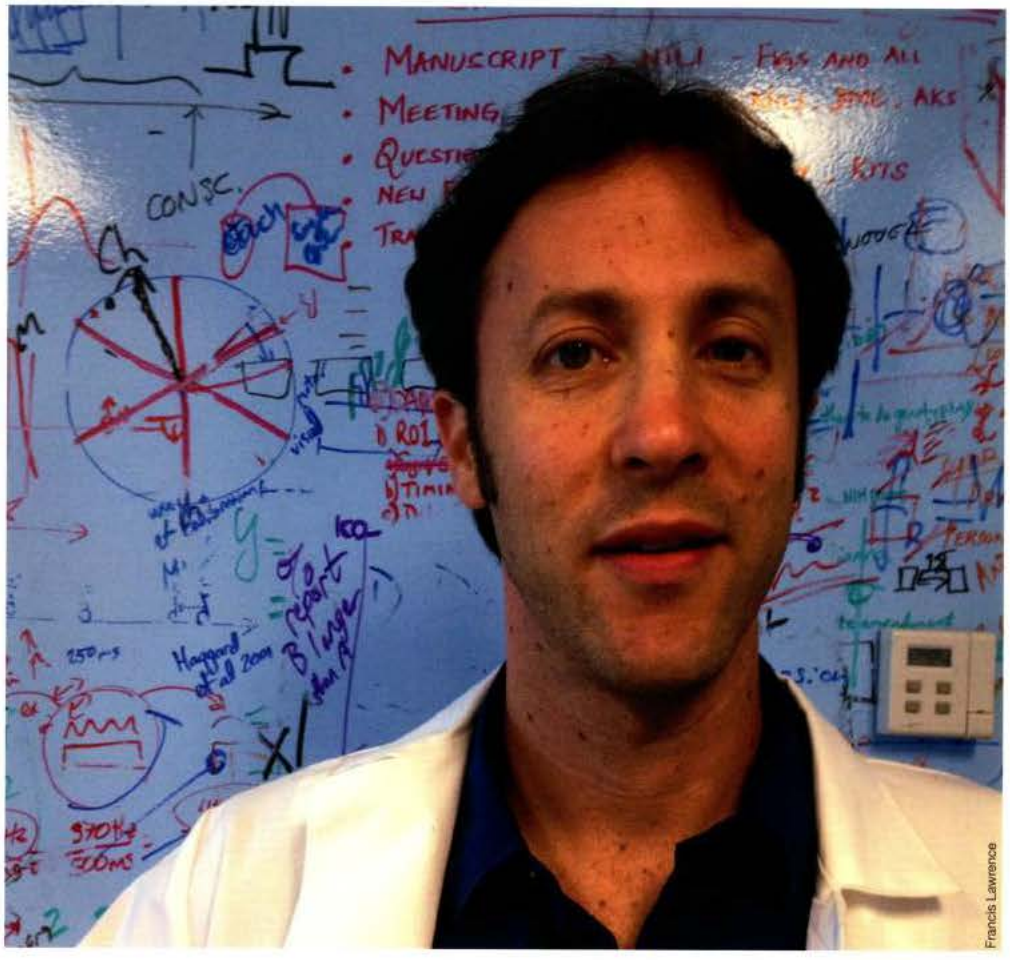
David Eagleman

a renaissance man of modern neuroscience



Dr. David Eagleman is a prominent neuroscientist currently rooted at Baylor College of Medicine in Houston, Texas. Dr. Eagleman is a best-selling author of both non-fiction and fiction works, including Incognito, *which explores the unconscious brain, and* Sum, *a collection of vignettes.* Sum *is an international best-seller and was recently adapted into an opera, which will be performed at the Royal Opera House in London this year. Eagleman's lab is working on a variety of projects which explore the complex inner workings of the human brain, and what the discovery of these processes means for the human race. Editor-in-Chief, Francis Lawrence, spent his winter term in Eagleman's lab, and took the opportunity to have a nice chat.*

What are your areas of research?

There are several prongs to the laboratory. The overarching umbrella ... is how the brain constructs reality and how that can be very different inside different people's heads. I [also] study time perception and how that can work in different situations. [Thirdly, I] study synesthesia, which is a good in road to understanding how one tiny genetic change can make someone different from someone else. I study neurolaw, how this all matters on a societal level ... the fact that people can be very different on the inside and how that makes a difference in how you run the society or how you run social policy. I'm also interested in ... issues of empathy, how people view in-group and out-group distinctions. Finally, the fifth prong is plasticity — how the brain rewires itself, changes itself — and so we are just launching several projects that will take advantage of plasticity to feed new kinds of data streams into the brain through neural channels.

What is something that most people don't realize about time perception?

That time is not necessarily a fixed flowing river, but [it] is a construction of the brain and it is malleable, so that under different circumstances you can think that things are longer or shorter. Maybe people do realize that, but I don't think people have any notion of the degree to which we can manipulate that in a laboratory and make people think something lasted longer or shorter than it did.

What is synesthesia?

It is a blending of the senses where some sensory stimulation leads to an anomalous or unusual sensory consequence. For example, hearing music that causes someone to see a color or shape or texture, or eating something [that] puts a feeling on your fingertips or hearing something [that] puts a feeling in your mouth. So it is a ... merging of the senses. It used to be thought people were just being poetic or metaphorical, but now it is clear that it is a genuine perceptual phenomenon triggered by cross talk in the brain.

Could you talk about something you are wondering currently or found out recently about synesthesia?

Well two things are going on currently. One, [synesthesia] appears to be genetic. It runs in family trees, so we are trying to figure out the genetics of it. It is a real challenge because like many conditions, it may be different genes in different families. It may be polygenetic even within a family, so it's a heck of a challenge to try to find this. We have been working for many years, so I hope not to fail there. Currently we are [also] pursuing a hypothesis that sensory processing dysfunction in autism is actually a form of synesthesia. A lot of autistic kids can't stand certain words or sights or touches or smells. What I realized in looking at this carefully is, it's not necessarily that everything sounds louder to them — because if that were the case they would not like loud sounds equally — but it is very particular. It's particular sounds that matter to them and that made me wonder if it was a network property, just like synesthesia, but instead of the sound triggering a color or a texture or a shape, it is triggering

nausea or dizziness or aversion or something like that.

Would you say you found your niche or the best way for you to investigate the world?

I think there are many ways of investigating the world and so this is one approach [which] is very fruitful, but it is not the only one. Personally I spent a fraction of [my] time exploring the world through literature also, which is a different way of understanding humans and motivations and desires and loves and things that science is a little impotent on. [But] as far as a day-to-day job, yeah, I think it is optimal for me as far as how to spend my daylight hours.

What do you feel is your role in the neuroscience community?

Well ... sometimes I describe myself as a theoretician — which is not quite correct — and people don't understand that, because what I do is experiments all day. I work with numbers and data and fMRI and so on, but the reason I think of myself ... [as a theoretician] is because there are laboratories that study the brain at all these different levels — from molecules to synapses to neurons to networks of neurons — and what's needed is a theoretical framing to stitch all these pieces and parts together, and find out how they fit together. That's the part that I do.

Now what would you say is the most important thing from neuroscience to communicate to laymen?

It depends what we mean by important. I've been really interested in social issues lately. One of the things I think is underappreciated is the degree to which half of us, as people, are products of our culture, our communities, our family, the movies we watch, [and] the fables in our culture. All those things make us who we are, so there is no sense in imagining yourself back as a caveman because you would be so totally different, in ways you can't even imagine ... We all think there is this hardcore version of us that ... has some decorations of culture on [it], but it's probably not that. Very little of that hardcore [self] is in there. I think that is a very important concept for people when they think of people from other cultures and choices they make and wonder, "Oh how could they make that sort of choice?" It's actually a big pluralistic world.

What was your purpose in writing *Incognito: The Secret Lives of the Brain*?

Ah interesting question ... it was probably multipurpose. When I write a book, it allows me to crystallize my thoughts on something, and I'm always about three times smarter when I finish the book than when I start it. I think there is this illusion that people have when an author sits down and writes a book it's because the author has got all the stuff figured out and wants to express it to the world. But in fact the process of writing a book translates into figuring a lot of stuff out — really crystallizing ideas on the fly. You sort of know generally where you are going and you sort of know what's happening in front of you, but you figure a lot of stuff out along the way about the route. I always learn things from writing a book.

Like by making connections?

Yeah ... so there's that and the other half of it, as far as purpose goes, is I believe strongly in the endeavor of popular science. I don't understand why, but popular science sometimes has a bad reputation within the science community, where there is a lot of pettiness about this. People feel like if you are spending your time doing that at night, then you aren't reading academic papers or writing academic papers. But the fact is ... [with] *Incognito*, I spent a lot of time writing that book, polishing that book, making the best book I possibly could. I didn't know if anybody would be interested in it by the time it was done, but then it became a *New York Times* bestseller for almost four months, and what that tells me is there is a real public appetite for science and these ideas ... Instead of writing an academic paper that is read by 17 people on the planet, here was an opportunity to turn a lot of people on to a lot of ideas. You know, I think it is so critical for the future of education, for our legislation eventually, for our future of warfare, just in terms of ... teaching people what is known [and] what has good evidence behind it. It changes how people look at the world, what people think about social policy, how they think about international policy, how they think about what they want to teach their own children. I feel like *Incognito* is probably the biggest impact that I have had in my life so far, in terms of actually being able to turn people on to a whole constellation of ideas.

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You, in the book, discuss the mind as being unaware of many of these processes of the brain and you say that throughout. These terms, "mind" and "brain", what do they mean to you and how are you using them?

The way I try to phrase it most consistently in the book is the conscious mind and the unconscious brain. The conscious mind is the part that flickers on when you wake up in the morning. It is the part that wasn't there when you were sleeping but is there when you are awake. The surprise to me when I got into neuroscience and studied it (for the last 18 years now) is to get this deeper and deeper understanding of how little the conscious mind has to do with what is actually happening under the hood. The vast activity in your brain is unconscious. You don't have access to it.

Would you say that the conscious mind is still a physical section or constellation of the brain?

Well, okay, it probably isn't a section in terms of the geography. And the reason we know that is because you can damage essentially any part of the brain and, so far as we know, there aren't lesions that cause someone to be a zombie in that they keep doing the same things with their conscious mind ... That [the] mind arises as a property of the brain may be an epiphenomenon, and that's probably the best guess. But as I talk about in the last chapter of the book, I devote it to this issue [of whether there are] other possibilities.

What is our evidence consistent with? Does it necessitate that consciousness is an emerging property of the physical pieces and parts? And the answer is: not necessarily. I mean that is the operational hypothesis that all of us come into lab every day with and we pursue this in lab — how the physical structure of the brain translates to consciousness — but we are absolutely certain that is an unsolved question. Not only do we not know how to translate the physical activity of the pieces and parts into consciousness, but nobody even has a good idea, even a seed of a shadow of an idea about what such a theory would look like.

To figure out how you could make a theory that translates one into another ... leads to a whole branch of philosophy that suggests that consciousness is an inherent property of the world, a part of the fabric of the cosmos, like gravity. It might be a special thing.

Interview by Francis Lawrence

Want to learn more about Dr. Eagleman's research and views on life? Read the entire interview online at

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