Alexandra Magold

Good morning, everyone. How are you? Let me guess, not too long ago, you rolled out of bed. However, we all know that when we're babies, we can't even do that. We had to learn that movement. And yet to this day, we keep learning new movements.

Alexandra Magold

Unfortunately, the way it usually works is by repetition. You're looking at it and you're trying to do it again and again and again until one day it might resemble somewhat what you had in mind. My name is Alexandra Magold and it is a great pleasure to be talking to Ophern Donchin today. He is professor at Ben-Gurion University and head of the Laboratory for Motor Learning.
He and his team are investigating the deep inner workings of our brains and how this whole process of movement and repetition works and allows us to learn.
Opher, originally, you're a mathematician from MIT. What brought you to neuroscience?

Opher Donchin

Right. Math is the study of the things you can think. I was particularly interested because I was, at the same time that I was an undergraduate math major, I was also an athlete. And I was on the Crew team right, the rowing team. And it was the first sport which I'd really been good in any way. And I knew that the reason that I was good at it was because I was with eight other people in the boat. And something about having those people around me made it possible for me to be there and and pull for them in a way that I never could for myself.

Opher Donchin

And I wondered about that. And I noticed the way that my brain did things like saying, hey, you know, maybe we're a little bit hungry and maybe we shouldn't work so hard or maybe we ate too much or maybe we shouldn't work so hard. All these things your brain tells you that you think our thoughts. But they really are just trying to get out of doing the work you're asking it to do. Right. And it was it was that that really got me started because I started and it really forced me to notice, you know, the part of me that was doing all this mathy stuff and the part of me that was so using my brains thinking and the part of me that was trying to row, which was all about putting my brains thinking aside and the way those interacted.

Opher Donchin

That's what got me interested in the body and how the body and the brain interact, and it was a first step in a long path that led me to the study of movement.

Alexandra Magold

It sounds a little bit like a black box, so, for people who are not part of this field. How do you manage to get any idea of what's going on in our heads?

Opher Donchin

I work a lot with model and what I did. It's the same sort of tension. So there's the body brain tension and then there's the fuzzy, you know, who are we sort of versus deep, hard scientist tension. So what brought me into the field. Was this desire to understand something about who I am. But what I work on is a very, very simple movement where we just move our hand from one place to another. Right, and that seems like it should be so simple that it would be possible to understand and in fact, it's possible to write down you know simple models with two equations in them that describe what's going on reasonably well.

Opher Donchin

And then the exciting thing, the thing that we're playing with right now is is watching that interact with who the person is, with what they think they're doing, with what they want to do with how motivated they are. Right. And watching that change, how they behave and watching that change, how the model behaves and trying to think of ways that you could model these changes.

Opher Donchin

And how well they fit the behavior and then trying to look for these different parameters you made up for the model, you know, the parameters of motivation and the parameters of knowledge and knowledge that you can express and knowledge that you can't express trying to look for those parameters in neuro-behavior right in what's going on. You know, physiologically with EEG, with single units, with MRI recording's. Different people take different technological approaches, but it all basically comes down to that using a movement that is simple enough that you can believe that your model has some validity.

Opher Donchin

It's obviously going to be wrong, but at least it's somewhat useful and then trying to see if you can find correlates of parameters of the model. In the in the neural activity. It is amazing that this is such a simple movement, has been fruitful for 20 years and continues to be fruitful. The things we're talking about now, which, again, have to do with the noise in your system and and the motivations and the and what you know, we don't know. They're totally new for us.

Alexandra Magold

Let's say you had unlimited resources. What is the most interesting question you would want to tackle?

Opher Donchin

So the real deep question in the field is whether that's just a fantasy or whether that's really there. Right. If I had an endless lab with endless graduate students would be really to sort of combine the different methodologies to be able to have, you know, in the same experiment with a lot of subjects, not with 10 or 20, but with five hundred like them taking things from different parts of the world.

Opher Donchin

The online version of experiments now where you can do a thousand two three thousand subjects. Right, combined with neuro recording's. Right. And somehow put that together to really get a picture of at the millisecond level, right. What are the neural processes that are going on that would be and and then and then

Opher Donchin

the question you really want to ask is, are people different from each other?