Tobias Hauser

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SPEAKERS

Caswell Barry, Steve Flemming, Tobias Hauser

Caswell Barry 00:00
Hello, and welcome to brain stories. I'm Caswell Barry. I'm here with my co host Stephen Fleming.

Steve Flemming 00:07
On brain stories, we aim to provide a behind the scenes profile of the latest and greatest work in neuroscience, highlighting the stories and the scientists who are making this field tick.

05:37

Yes, definitely. I mean, it has really over the last, I think when I started out, I did my start in my PhD, and I thought it would be a cool idea to use these mathematical models. In mental health. Before the word competition, psychiatry was even a term. And obviously, the last 10 years, it really has seen like an explosion of people using it. And when I

and hours every day. And it's really, really impairing. So Are many patients that we're working with, they struggle to keep up their job because of their OCD. OCD really takes a life of its own and takes over their life and kind of many patients that we're working with. Talk about, like it's sitting on their shoulder and dominating what they're doing. So it's really impairing. And there's a lot of work that we have to do to D stigmatise OCD, and actually make it make the public more aware, more aware of what it is, and we're working, we have a couple of public engagement project on that front. Now, it's very common, it affects 3% of the population about that's one in 33 people and it's very hidden, because those affected by OCD, they are usually aware of it. And they are aware that this is all that they can't quite rationally explain why it happens to them. So they often keep it on the list, they don't really talk and share it with your, with their friends and family. And so that's why we are not very aware of it. And I think there needs to be a change as well that we understand how common it is. But even though it affects 3%, which is like much more common than, let's say, autism, or schizophrenia, if you look at the research funding, it's it's a fraction of that. So you can compare how much money we probably spent, for example, spending in the UK, and it's much, much less than for autism, or schizophrenia. And that shows just that we are still very early days in OCD research. And that's how I come to your original question, which is, how do you study as the and one of the challenges with OCD is really, that we know, we still know fairly little, I think we've made a lot of progress in the, let's say, bigger or more researched disorders like depression, anxiety, maybe even schizophrenia, whereas OCD is only very few people in the world that actually study OCD. And so we are still probably a bit behind from what other disorders have. And so there are a few competing ideas of what is driving our city. And that comes because of the heterogeneity of those, thoen t tgve theys txam.le,sin the wecinaiag, t ur

likely to be innovative. I don't mean, but as all the circumstantial evidence we have. And indeed, we see that it's mainly from strike loops, which are affected if we talk about the neuroanatomy and we know that they are tightly linked to dopamine functioning. And so I think that's where probably the strongest evidence comes from. So the idea is that there are these loops between the Olympic striatum so areas deeper sitting deeper in the brain, and mainly the prefrontal cortex. So the thing that sits above your eyes, which is critical for thinking and more complex computations, and these loops seem to be somewhat out of order, at least that's what most of the evidence is showing. And in our own work, we have shown that such like reward prediction errors that I mentioned at the beginning to RL, that they are different in activity in OCD compared to healthy controls and colleagues from Cambridge and actually took it a step further and so that if you administer dopamine, then you can norm kind of normalise these alter prediction errors in OCD. So that's probably the best evidence that there might be this aberrant processes linked to OCD.

Steve Flemming 26:02
And do you think that that influence or dopamine is going to be reducing the obsessions? Or you keep having your obsessions, but you're just less likely to be worried about them or act on them?

26:15
Yeah, I mean, that is like that is very much out there. And we don't have no idea how how, and this is really, this is a critical thing, right? So we, on the one hand, we have this brain mechanism, understanding, we know how certain information is processed, but then how do we translate that to an experience that someone has the symptom? And this is kind of the main gap that we try to bridge, which is really challenging? And so we're not quite sure is the short answer, the longer slightly longer answer is we try to kind of look at symptoms, try to break them down and try to understand how could we, how could information processing and our our model goes wrong in order to give rise to the symptoms? And so you could think of a hyperactive prediction error system. So with a system that always tells you, you're wrong, even though you're right, or that makes you doubt what you're what you know, and that may be makes you less confident, and it made me make you go ahead and check more and more, because you're constantly thinking you're wrong. And so that is one of the ideas that people have put out there, including us.

Steve Flemming 27:41
And just, as you mentioned, the challenge of animal models in this area, we're just thinking out loud, slightly wacky idea, could you not have an animal model where you kind of just index a state with a neural marker and then just see that the mouse is always stuck in that state? Has anyone been thinking along those lines?

28:03
Not that I know of. So what they usually because it's difficult to do define the states, right? So it sounds maybe a little bit like working posttraumatic stress disorder where you expose them to like a stress inducing state and then you have it recall reappearing? Which, yeah, it's probably a different process from what OCD is doing. So there are some motions that suggest that there might be a traumatic event, which is triggering it, but I think the evidence is fairly weak. And I think it's more likely that there is no trauma related to it. So it's then an animal model where you traumatise it in a way, is that an adequate

model? And so the standard animal models, they usually just have

bits and bobs that need to be in place in order to do that. So we need to be able to measure these tasks. And these behaviours in a in a reliable and crude manner, needs to be accessible, and so on. And that's where we, for example, have developed the brain explorer app, which is an app for Android and Apple Store rate, which you can just download. And we've turned all these tasks that we usually do in the scanner, into games that you can play short form games on your iPhone or Android device. And by playing these short games, we can collect data. And by doing that we can collect 1000s and 1000s of people across the globe, essentially, we have people from all over the world. And we can actually then not own not only look at it development, but also we have a better representation of the actual population, which gives us better insight into OCD and the development of OCD. So that's where we are currently really working on.

Steve Flemming 33:51
And you're actively recruiting for that. So people should go to your website, and they can play the game.

33:56
Oh, yes, definitely. So if you're interested, or if you have kids around or anyone just tell them, you can go on brain explorer dotnet and

And, yeah, I think it really got sucked into it. And that's when I then decided that I want to know more about the methods and get better with that. And that's when I then came to UCLA. And I guess the rest is history.

Caswell Barry 36:56
Is there anything you do differently knowing what you know, now and you have any dead ends or ways

Okay, in which case, there is time for the thing that we ask everyone. So we're about to wrap up. But before we do, we'd like to ask each of our guests the same question. And that question is this. What is your favourite fact about the brain?

40:24
Yeah, so as I said, I was very interested in development. And it's amazing to know that the brain develops for a very long time, you know, 30 years ago, people thought when children were born more or less dense, that's it, and then the brain is fixed. But obviously, that's not the case. So my favourites fact is that we talked about dopamine and these dopamine projections, going from the brainstem to the prefrontal cortex and so on. And it actually turns out that at least in animal models, these so called mega cortical connections are amongst the last one to develop. So they grow throughout adolescence, which is really cool. So they kind of connect from the midbrain, first to destroy it, and then sit there for a while and then continue going on into the prefrontal cortex at the very late at late adolescence, and that can tell us a lot about what is going on, and how why people react differently to rewarding things or punishing things. And I think that's, that's probably the one mechanism that is developing the latest, at least as far as we know.

Caswell Br