

2022 Spence Award Mini Episode: Brian Anderson and Habit-Reinforcing Behavior

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The winners of the [2022 APS Janet Taylor Spence Award for Transformative Early Career Contributions](#) represent some of the brightest and most innovative young psychological scientists in the world. In a series of mini-episodes, [Under the Cortex](#) talks with each winner about their research and goals.

Today we hear from Brian Anderson (Texas A&M University) about his research on what captures human attention and how that influences behavior.

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Transcript:

Charles Blue ([00:18](#))

This is Charles Blue with the Association for Psychological Science with the final in our series of mini-episodes, talking to the winners of the APS Janet Taylor Spence Award for Transformative Early Career Contributions. Today I have the pleasure of talking with Brian Anderson with Texas A&M University about his work on attention and how it can evolve into obsession. I think the best way to get started is if you just tell us a little bit about your current field of research.

Brian Anderson ([00:49](#))

I consider myself a perception scientist, mostly a vision scientist and a cognitive neuroscientist. I want to know what people tend to look at when they view the world in front of them and why and more specifically, how the way they process their world changes. With learning. What you pay attention to tells us something very fundamental about your mental life, since what you pay attention to determines what information you have access to and are considering when you reason about your world and decide how you should act. I'm particularly interested in how what you direct your attention to can become ingrained and habitual to the point that you selectively process certain kinds of stimuli whether you want to or not. This sort of phenomenology plays a big role in addiction and other unhealthy and undesired habits. I want to understand how it happens that what someone pays attention to can go against their conscious will, how that contributes to unhealthy decisions like persistent drug abuse and what we can do about it.

Charles Blue ([01:49](#))

Are there any other examples for that? That's kind of an interesting concept. So what I pay attention to, whether I want to or not, like if I happen to be trying to get work done but there's some sports game going on in the room next to me, I divert my attention. That is something that will develop later in life or become habitual. What's the connection there that you're really trying to find? Am I missing

something?

Brian Anderson ([02:16](#))

Yeah. So it's basically how your prior experience is going to cause certain things to draw your attention and those will draw your attention, it turns out, in circumstances when you're happy to have that happen, in circumstances where you would much rather ignore it. The TV on in the background is a good example. So if you're a sports junkie, maybe you really love watching that at home and it's perfectly fine for you, but then you go on a date. So the person that you are absolutely compelled to try to convince is the center of your attention is consistently irked by the fact that you're looking past their head to the game on the television in the background. And it's that kind of I know I shouldn't be doing this, I know I should be looking at the person in front of me, but man, that game is drawing my attention just like it does at home and I really love whatever sport is on the TV. That's the kind of thing where looking at that right there and right now that's conflicting with my goals. But there's something about that rewarding experience I get whenever I watch it that just keeps me coming back whether it's good for me in this situation or not.

Charles Blue ([03:14](#))

Throughout your research then, have you come up with anything that's uniquely insightful in your opinion? What is it that we now know about this connection that we didn't know before?

Brian Anderson ([03:23](#))

Well, my research really helped establish just how involuntary the orientation of attention can be to both related and later in my career, punishment related. So when I got into attention research, the model of attentional control that stood for decades really claimed that what people pay attention to is a joint product of really two factors in underlying control mechanisms. One for your goals and intentions and another for the physical attributes of objects and specifically their perceptual salience or conspicuity like how bright they are. Under this model, you certainly tend to preferentially attend or pay attention to reward-related stimuli. But it's because you're motivated to do that. Reward shapes your goals and intentions. So when you're in the restaurant it's like, well, I want to watch the game. That's why people pay attention to the game. But that does a poor job of accounting for when it's distracting you from this wonderful person you want to impress in front of you. And so while reward certainly kind of has that role, my research shows that kind of intentional side of reward can't be the full story. And the same goes for why people attend aversibly, conditioned stimulus and things that they're afraid of.

Brian Anderson ([04:31](#))

People are distracted by those kinds of stimuli even when they're completely past irrelevant. They're no longer predictive of anything. They're not rewarding to you in this moment or haven't been for a little while. There's nothing about them that causes them to stand out more than anything else from the background in terms of how physically bright or salient they are. What my research shows is that these kinds of previously rewarded stimuli will draw your attention when everything about historical theories of attention says they shouldn't. Which gives us pretty compelling evidence that you really can't help it. So let me give you a really compelling experimental example of how this works, please. Let's say I just

show you an object. So right here in my office, I'm sitting on my desk, a tissue box. I'm going to pick it up. If I gave you money every time you looked away from it, can't look at it. You got to look away from it to get money. What do you think that would do you?

Charles Blue ([05:21](#))

I'd be forced to stare at the darn thing because it's like whatever you do, don't think about elephants kind of situation.

Brian Anderson ([05:27](#))

Yeah, in that particular situation. But I could throw a little twist on there and I can give you lots of practice. So you look away from it. I pay you. You look away from it. I pay you. You look away from it, I pay you. You do that over and over and over again.

Charles Blue ([05:42](#))

I'd be getting really good at it.

Brian Anderson ([05:43](#))

Yeah, you think you'd be really good at looking away from it. You think everything in your body, everything in your brain would propel you away from it. But it turns out it's the exact opposite. The more that I pay you to look away, and the more you get paid for looking away, the more you develop a tendency to look at it, because your brain is just wired to orient you, to rewarding things, whether it's good for you or not. And so let me throw another twist on that. Let's say I show you the tissue box, and every time you look at it, I shock you, and it hurts a little bit. Not much. A little bit. It's very uncomfortable. What do you think that would do to you?

Charles Blue ([06:18](#))

I would definitely try to look away at that point. I like to avoid pain.

Brian Anderson ([06:23](#))

Don't do that. It's like a slap on the wrist. Right. For most kinds of behavior, that's exactly what happens. You do the thing that causes you to experience an aversive event less frequently. It's just basic reinforcement learning, but it turns out, with attention, the more I shock you for looking at it, the more you ironically tend to look at it.

Charles Blue ([06:44](#))

And I'm really trying not to look at it right now.

Brian Anderson ([06:46](#))

Yeah, it's very effective. And that's that white bear, right? That's a different phenomenon. Don't look

at it, and it causes you to look at it. We actually have really clever ways, experimentally, of ruling that out. We don't tell people, don't look at the box, because that will have an ironic effect like you hinted at earlier. But we can take that out of the equation and show, the more I shock you for looking at it, the more you tend to look at it, because your brain is wired to orientate the threat, and you just do that automatically whether you want to or not.

Charles Blue ([07:17](#))

So there's a shifting of attention. But this is not anything that's related to people with attention deficit disorder or anything that is, I guess, would be considered slightly away from what we would consider normal. This is normal. This is the way that the human brain just naturally perceives the world and gets behaviors ingrained.

Brian Anderson ([07:37](#))

Yeah, absolutely. That's one of the things that I found most fascinating in my career, is that when I got into this, it was known that attention can have this kind of pattern sometimes, but it was thought to be the consequence of a broken attention system and addiction. So when you're addicted to a substance, it's not uncommon to have a really difficult time ignoring cues for the drug, even though you want to be absent and you know it's bad for you. You don't want to keep going back. Attention just keeps going back. And we kind of knew that for some time, but it was only in the context of addiction. And people just kind of assume that, oh, this is what addiction does to you. It breaks you in kind of interesting ways, and that is unique to addiction. But it turns out through a lot of the research that I and my colleagues have done, that actually what you experience with drug dependence, in that case, is just drugs having working on you in the same kind of way that reward works on anybody else. It may be amplified by drugs because it's a very powerful reward experience. But the process by which that affects you is a normal, healthy process that drugs are co-opting. They're the kind of way that everybody's attention system works.

Charles Blue ([08:45](#))

So looking to the future then, if you needed to advance this research, where are the gaps? What don't we yet know? What would you like to be able to find out to take this to the next level of understanding and maybe even some sort of therapeutic intervention if it were necessary?

Brian Anderson ([09:02](#))

Yeah, I think you hit the nail on the head there. The main challenge I see in my field these days is what to do about these kinds of attentional biases, especially in the case of addiction, anxiety disorders, other conditions in which attentional biases contribute to mental health issues. You can't get your eyes off the drug. What do we do about it? Approaches to attention and bias modification have a dismal history in my field. They really just don't work well at all. I don't have a good solution right now, and I don't know anyone else who does either. But I think we're making progress. And at the very least, I can give you some really good insights into why some historical approaches for intentional bias modification and addiction and other conditions didn't work so well and maybe a little bit better on what to try moving forward as a potentially more promising approach.

Charles Blue ([09:50](#))

Sorry, I had my mic on you. Maybe if you could just point to something that we can do. Is there something that people in the public or therapists or people can actually work towards to help break this unhealthy attention bias?

Brian Anderson ([10:07](#))

Yeah. So don't reward people for ignoring something. If you do that, you're just going to wind up making it all the more attention-grabbing. So that's a bad thing to do. So don't give them incentives to try to practice ignoring something. You just make it all the more attention-grabbing.

Charles Blue ([10:23](#))

Something like if you have children and they want to play video games, you don't say, well, if you stop playing video games for a week or if you stop at 06:00, I'll give you a dollar every night. That's a bad idea.

Charles Blue ([10:35](#))

Wind up making it all the more attention-grabbing. And don't overtly punish people for paying attention to it either, because that just makes it an aversively, conditioned stimulus that's also going to be attention-grabbing. And so if you see your kids looking at stuff you'd rather have not have them look at, if you punish them right sharply right then and there, it just makes it all the more attention-grabbing. Attention is a habit-driven thing. So what do you want to do? You want to create new habits that can compete with those old habits. So don't think about what you want to do to make something less attention-grabbing. Think about what you want to do to make something else more attention-grabbing that can compete for your attention. When you have that thing in your environment you want to ignore. Attention is a competitive process. So my recommendation, based on my findings so far is rather than try to fight against that, plug into it and train attention to favor some other stimulus through reward learning and other kinds of habit learning in order to create a more effective competitor for the things that you don't want to pay attention to.

Charles Blue ([11:29](#))

I'd like to thank Brian Anderson very much for chatting with us. This has been under the Cortex. Thanks again for your time.

Brian Anderson ([11:35](#))

Thank you.

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