BOREDOM GETS INTERESTING

Implicated in everything from traumatic brain injury to learning ability, boredom turns out to be anything but boring.

BY MAGGIE KOERTH-BAKER

In 1990, when James Danckert was 18, his older brother Paul crashed his car into a tree. He was pulled from the wreckage with multiple injuries, including head trauma.

The recovery proved difficult. Paul had been a drummer, but even after a broken wrist had healed, drumming no longer made him happy. Over and over, Danckert remembers, Paul complained bitterly that he was just — bored. "There was no hint of apathy about it at all," says Danckert. "It was deeply frustrating and unsatisfying for him to be deeply bored by things he used to love."

A few years later, when Danckert was training to become a clinical neuropsychologist, he found himself working with about 20 young men who had also suffered traumatic brain injury. Thinking of his brother, he asked them whether they, too, got bored more easily than they had before. "And every single one of them," he says, "said yes."

Those experiences helped to launch Danckert on his current research path. Now a cognitive neuroscientist at the University of Waterloo in Canada, he is one of a small but growing number of investigators

ILLUSTRATION BY PATRYCJA PODKOŚCIELNY

engaged in a serious scientific study of boredom.

There is no universally accepted definition of boredom. But whatever it is, researchers argue, it is not simply another name for depression or apathy. It seems to be a specific mental state that people find unpleasant — a lack of stimulation that leaves them craving relief, with a host of behavioural, medical and social consequences.

In studies of binge-eating, for example, boredom is one of the most frequent triggers, along with feelings of depression and anxiety[1,2]. In a study of distractibility using a driving simulator, people prone to boredom typically drove at higher speeds than other participants, took longer to respond to unexpected hazards and drifted more frequently over the centre line[3]. And in a 2003 survey, US teenagers who said that they were often bored were 50% more likely than their less-frequently bored peers to later take up smoking, drinking and illegal drugs[4].

Boredom even accounts for about 25% of variation in student achievement, says Jennifer Vogel-Walcutt, a developmental psychologist at the Cognitive Performance Group, a consulting firm in Orlando, Florida. That's about the same percentage as is attributed to innate intelligence. Boredom is "something that requires significant consideration", she says.

Researchers hope to turn such hints into a deep understanding of what boredom is, how it manifests in the brain and how it relates to factors such as self-control. But "it's a ways out before we're answering those questions", says Shane Bench, a psychologist who studies boredom in the lab of Heather Lench at Texas A&M University in College Station. In particular, investigators need better ways to measure boredom and more reliable techniques for making research subjects feel bored in the lab.

Still, the field is growing. In May 2015, the University of Warsaw drew almost 50 participants to its second annual conference on boredom, which attracted international speakers from social psychology and sociology. And in November, Danckert brought together about a dozen investigators from Canada and the United States for a workshop on the subject.

Researchers in fields from genetics to philosophy, psychology and history are starting to work together on boredom research, says John Eastwood, a psychologist at York University in Toronto, Canada. "A critical mass of people addressing similar issues creates more momentum."

A MEASURE OF MALAISE

The scientific study of boredom dates back to at least 1885, when the British polymath Francis Galton published[5] a short note in *Nature* on 'The Measure of Fidget' — his account of how restless audience members behaved during a scientific meeting. But decades passed with only a few people taking a serious interest in the subject. "There are things all around us that we don't think to look at, maybe because they appear trivial," says Eastwood.

That began to change in 1986, when Norman Sundberg and Richard Farmer of the University of Oregon in Eugene published their Boredom Proneness Scale (BPS)[6], the first systematic way for researchers to measure boredom — beyond asking study participants, "Do you feel bored?". Instead, they could ask how much participants agreed or disagreed with statements such as: "Time always seems to be passing slowly", "I feel that I am working below my abilities most of the time" and "I find it easy to entertain myself". (The statements came from interviews and surveys that Sundberg and Farmer had conducted on how people felt when they were bored.) A participant's aggregate score would give a measure of his or her propensity for boredom.

The BPS opened up new avenues of research and made it apparent that boredom was about restlessness as much as apathy, the search for meaning as much as ennui. It has served as a launching point for other boredom scales, a catalyst for making the field more important and a tool for connecting boredom to other factors, including mental health and academic success.

But it also has some widely acknowledged flaws, says Eastwood. One is that the BPS is a self-reported measure, which means that it is inherently subjective. Another is that it measures susceptibility to boredom — 'trait boredom' — not the intensity of the feeling in any given situation, which is known as state boredom. Studies consistently show that these two measures are independent of each other, yet researchers are only beginning to tease them apart.

This can be particularly confounding in educational settings. Shifts in teaching style or classroom environment are unlikely to reduce students' trait boredom, which is intrinsic and slow to change, but can be very effective at reducing state boredom, which is purely situational. The BPS has often been misused to measure both forms of boredom at the same time, yielding answers that are likely to be misleading, says Eastwood.

Scientists are still hashing out how to improve on the BPS. In 2013, Eastwood helped to develop the Multidimensional State Boredom Scale (MSBS)[7], which features 29 statements about immediate feelings, such as: "I am stuck in a situation that I feel is irrelevant." Unlike the BPS, which is all about the participant's habits and personality, the MSBS attempts to measure how bored people feel in the moment. And that, Eastman hopes, will give it a better shot at revealing what boredom is for everybody.

WHEN SHE WAS WORKING ON HER DISSERTATION, SHE DECIDED TO MAKE A VIDEO THAT WOULD BORE MOST PEOPLE TO TEARS.

But to measure boredom, researchers must first make sure that study participants are bored. And that is a whole different challenge.

THE MOST BORING VIDEO EVER

One way to create a particular mood, used for decades in psychology, is to show people a video clip. There are scientifically validated videos for inducing happiness, sadness, anger, empathy and many other emotions. So when she was working on her dissertation at Waterloo in 2014, Colleen Merrifield decided to make a video that would bore most people to tears.

In Merrifield's video, two men stand in a white, windowless room. Silently, they take clothes from a pile between them and hang them on a white rack — a camisole, a shirt, a sweater, a sock. The seconds tick by: 15, 20, 45, 60. The men keep hanging laundry. Eighty seconds. One of the men asks the other for a clothes peg. One hundred seconds. They keep hanging laundry. Two hundred seconds. They keep hanging laundry. Three hundred seconds. They keep hanging laundry. Shown on a loop, the video can last for as long as five and a half minutes.

Perhaps unsurprisingly, the people to whom Merrifield showed this found it stupefyingly dull[8]. But then she tried using the video to study how boredom affected the ability to focus and pay attention. Her protocol called for participants to carry out a classic cognitive attention task — watching for star-like light clusters to appear or disappear on a monitor — then to sit through the video to get good and bored, and finally to do the task again so that she could see how boredom affected their performance. But she found that she had to redesign the experiment: the task was boring people more than the video.

This was not entirely unexpected. Previous studies of boredom had often used tasks instead of videos. But it also demonstrated the problem. There are so many ways for researchers to bore people with tasks — asking them to proofread address labels, say, or to screw nuts and bolts together — that it had always been difficult to compare individual studies. For instance, different studies have found boredom to be correlated with both rising and falling heart rate[9]. But without a standardized method for inducing boredom, it is impossible to work out who is right.

In 2014, researchers at Carnegie Mellon University in Pittsburgh, Pennsylvania, published a paper[9] that aimed to begin the process of standardization. It compared six different boredom inductions, representing three broad classes — repetitive physical tasks, simple

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cognitive tasks, and video or audio media — as well as a control video. The researchers used the MSBS to see how intensely each task elicited boredom, and a measure called the Differential Emotion Scale to see whether each task elicited boredom alone, or a number of other emotions. All six tasks were significantly more boring than the control and all six caused boredom almost exclusively. The best of the bunch was a task that required participants to click a mouse button to rotate a computer icon of a peg a quarter of a turn clockwise, over and over.

After that, says Danckert, "I think I might be abandoning the video" to induce boredom in the lab. Instead, he will rely on behavioural tasks.

The inexactness of the tools leaves holes in what researchers can reasonably say about boredom. For instance, many real-world problems that are highly correlated with boredom are connected to the idea of self-control, including addiction, gambling and binge-eating[10]. "I characterize boredom as a deficiency in self-regulation," Danckert says. "It's a difficulty of engaging with tasks in your environment. The more self-control you have, the less likely you are to be bored."

But does this mean that self-control and boredom are measures of the same thing? Even Danckert is uncertain. Consider people with a history of traumatic brain injury. "Failures of self-control are their problem," he says. "They might be inappropriately impulsive; there's increased risk-taking; they might also engage in drug and alcohol abuse." Danckert certainly saw his brother, Paul, experience all those things in the wake of his injury.

But in Danckert's research sample of people with traumatic brain injury — who are predominantly in their 40s — ageing seems to have weakened the link between boredom and self-control. In data that are not yet published, Danckert says, his patients report levels of self-control no lower than those of the general population, but their boredom-proneness scores are much higher. By contrast, Danckert's brother seems to demonstrate the opposite effect. He struggled for years with self-control issues, but eventually became less bored and reclaimed his love of music. "It's the most important thing in his life, next to his children," Danckert says.

So there is reason to suspect that boredom and self-control can exist independently — but there is not yet enough evidence to understand much beyond that.

PAINFULLY DULL

Despite all this uncertainty, researchers see themselves as laying a foundation, creating tools and standards that will allow them to tackle really important questions. "We're establishing boredom as a testable construct," says Bench.

Defining boredom is an important part of that. Different researchers have different pet definitions: a German-led team, for example, identifies five types of boredom[11]. But most workers in the field agree that, at least some of the time, people will work very hard to relieve boredom. This not only presents a more active version of boredom than most people are probably used to, but also has tangible connections to efforts to address boredom in the real world.

Lench and Bench are testing whether the drive to become un-bored is so strong that people might be willing to choose unpleasant experiences as an alternative. This idea builds on research that has shown a correlation between sensation-seeking behaviour, even risky behaviour, and high boredom-proneness scores[12]. It is also similar to findings published in *Science*[13] in 2014 and *Appetite*[14] in 2015. In the first study, researchers asked people to sit in a room with nothing to do for as long as 15 minutes at a time. Some of the participants, particularly men, were willing to give themselves small electric shocks rather than be left alone with their thoughts. The second paper described two experiments: one in which the participants had access to unlimited sweets, and another in which they had access to unlimited electric shocks. Participants ate more when they were bored — but they also gave themselves more shocks. Even when it is not very pleasant, apparently, novelty is better than monotony.

Novelty might also have a role in overcoming boredom in the classroom. In 2014, for instance, researchers led by psychologist Reinhard Peckrun of the University of Munich in Germany reported[15] how they had followed 424 university students over the course of an academic year, measuring their boredom levels and documenting their test scores. The team found evidence of a cycle in which boredom begot lower exam results, which resulted in more disengagement from class and higher levels of boredom. Those effects were consistent throughout the school year, even after accounting for students' gender, age, interest in the subject, intrinsic motivation and previous achievement. But other studies suggest that novelty can disrupt this cycle[16].

Sae Schatz, director of the Advanced Distributed Learning Initiative, a virtual company that develops educational tools for the US Department of Defense, points to one experiment[17] with a computer system that tutored students in physics. When the system was programmed to insult those who got questions wrong and snidely praise those who got them right, says Schatz, some students, especially adult learners, saw improved outcomes and were willing to spend longer on the machines. Schatz thinks that this could be because the insults provided enough novelty to keep people engaged and less prone to boredom.

> "WE'RE ESTABLISHING BOREDOM AS A TESTABLE CONSTRUCT."

Looking to the future, researchers such as Eastwood are intent on finding better ways to understand what boredom is and why it is correlated to so many other mental states. They also want to investigate boredom in people who aren't North American college students. That means testing older people, as well as individuals from diverse ethnic and national backgrounds. And, given the impact that boredom may have on education, it also means developing versions of the BPS and MSBS that can be administered to children.

Many researchers likewise hope to expand on the types of study being done. To get beyond self-reported data, Danckert wants to start looking at brain structures, and seeing whether there are differences between people who score highly on the BPS and those who don't. These data could help him to understand why boredom manifests so strongly in some people with traumatic brain injury.

There's also a need, Danckert says, for more scientists to realize that boredom is fascinating. "We may be on the cusp of having enough people to advance a little more quickly," he says. ■

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