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Superstitions reach into every corner of human endeavour — including the science world.

BEHAVIOUR

A lookout for luck

Scientists are as sceptical as they come — but many still engage in personal rituals or use totems in the lab and field.

BY KENDALL POWELL

While investigating how experience can influence brain circuitry, students and postdocs in Robert Froemke's neuroscience lab have developed various rituals to 'bring luck' to their investigations.

The electrophysiologists of the group, who record the activity of single neurons, watch their monitoring apparatus obsessively, even

though their experiments can run unattended.

By contrast, the molecular biologists leave their experiments to run unmonitored to avoid 'jinxing' the results, Froemke says.

One student routinely calls off her Friday-night plans, because in the past when she's cancelled, she's noticed that she had greater success with training the mice in her studies.

Froemke's lab members know that none of these minor rituals actually improves the

odds of their experiments working, but they do them anyway — if somewhat furtively.

Such rituals "tap into something deep about the human condition", says Froemke, a Howard Hughes Medical Institute faculty scholar at the New York University School of Medicine.

As a graduate student, he recalls, he wouldn't leave his own neuronal-recording experiments, even to visit the toilet. "It's both heartwarming and a little heartbreaking," he says. "These things make the science really personal and the process our own."

Whether in archaeology or astronomy, rituals and lucky charms abound among rational, logical scientists who are fully aware that engaging in them has no effect whatsoever on their science. Some principal investigators decry them as distractions or a waste of energy. But other lab heads and behavioural experts support their use, arguing that they serve important roles that might benefit research.

There is some evidence that rituals can soothe anxiety and reduce stress levels, and might therefore serve to prepare experimentalists for a gruelling day's work¹. The uncertainty and long hours of science can be hard to deal with — so hard that some labs and scientists turn to familiar rituals and routines to lower the pressure, build team spirit and normalize the culture of frequent failure.

Rituals, say psychologists and behavioural-science experts, can also personalize a project and bring an illusion of control to an unpredictable endeavour. "By the very nature of the word, experiments are often not going to work," says Stuart Vyse, an emeritus behavioural scientist at Connecticut College in New London who has studied the psychology of superstition.

Researchers who are setting up complex experiments or planning a risky field expedition prepare meticulously for every contingency, he says. But that might not seem like enough to some people. "Once the person has done everything they can think of that rationally can help the outcome, then they are looking for something extra," Vyse says.

THE BENEFITS OF DISTRACTION

For Loren Davis, an archaeologist at Oregon State University in Corvallis, and his team, that something extra was a totem dubbed Rock Ness. At a dig in an Idaho canyon in 2007, Jessica Curteman, then a master's-degree student in Davis's group, unearthed a rock that looked like the head of the mythical Loch Ness monster. Curteman whipped out a marker pen and drew an eye on it. Ever since, ►

► Rock Ness has enjoyed a prominent place in the field each summer to ‘watch over’ digs around the western United States, says Davis, who studies early human inhabitants of the Pacific Northwest.

Curteman, now a senior archaeologist for the cultural-resources department of the Confederated Tribes of Grand Ronde in Oregon, is the keeper of Rock Ness. She says that the propped-up rock ‘reminds’ team members at the field site to keep the floors and walls of their excavations neat and organized as they uncover fossils and artefacts. Sometimes, she reports with a wink, the rock seems to ‘move closer’ to researchers who need an emotional boost, perhaps to yank more sandbags out of a site or to deal with a disruptive rodent burrow.

Dimitris Xygalatas, an experimental anthropologist at the University of Connecticut in Storrs, has found evidence both in and out of the lab that repetitive hand motions and ritualistic prayers soothe anxiety.

In one lab study, his team induced anxiety in a group of participants by asking them to prepare a public speech on an artwork². A control group was not given the stress-inducing task. Both groups were then asked to clean the artwork while their hand motions were recorded and analysed. The high-stress group showed more-repetitive and predictable — or more-ritualized — hand movements. The work, say Xygalatas and his co-authors, suggests that people perform rituals as a way of coping with anxiety.

In fieldwork not yet published, Xygalatas’s team induced stress in study participants by having them write about a natural disaster. The researchers found that indicators of anxiety, including increased heart rates, were reduced more quickly in individuals who participated in ritualistic prayers afterwards, compared with those who did not.

Aside from alleviating physiological stress, argues Xygalatas, a ritual can also confer a psychological lift. “If it boosts your confidence and you believe you are going to be better and less stressed, then you are going to perform better,” he says.

But some group leaders see rituals and lucky charms as a waste of time, or a distraction from the hard work of research. Patrick Druckenmiller, Earth-science curator at the University of Alaska Museum of the North in Fairbanks, has never developed rituals during fieldwork, nor does he encourage it. “I am mostly on my guard the whole time, making sure that work is getting done, the field crew is reasonably happy and, most importantly, safe,” he says. Distractions, he adds, can be dangerous at the remote field sites in the Arctic where he and his team work, with harsh, unpredictable weather and the risk of bear encounters. “In such settings, there is little time or opportunity to develop other follies.”

But some researchers say that rituals and routines, such as doing a brief dance before running an experiment, saluting a cuddly toy



Behavioural ecologist Walt Koenig checks on an acorn woodpecker (*Melanerpes formicivorus*).

above the bench or listening to a specific playlist of songs, can help scientists to relax. This can be an important aspect of work that often requires both fine motor control and sharp focus. Benelita Elie, a PhD student in cancer biology at the City University of New York, likes to set the tempo of her music playlists to match the tempo of her bench work. During shorter experiments, she always hums along to a specific piece by Bach that she knows by heart. “It gives me predictability,” she says, “in a space where there is a lot of unpredictability.”

TEAM TOTEMS

When rituals or totems are part of a group setting, Xygalatas says, they can become traditions that promote social bonding. Rock Ness brought a sense of fun to Davis’s field team and helped them to gel. “It’s an intellectual pursuit, but it’s also a lot of physical labour, and we all have to work as a team to get things done,” he says.

Michael Long, a neuroscientist at New York University School of Medicine, says he has seen lab rituals that served to lighten the mood after inevitable experimental failures. During Long’s graduate-school days at Brown University in Providence, Rhode Island, he developed a daily ritual to ward off failure — and the routine spread through his lab. Studying delicate slices of rodent brains, he had to keep the cells alive in a lab dish for several hours and record the activity of the firing neurons. The tricky experiments took all day, but Long wouldn’t know until the end whether he had obtained good recordings. On those days, he started buying lunch at his favourite hot-dog shop, Spike’s Junkyard Dogs.

“The days I ate at Spike’s, I had beautiful slices. It happened every time, so then everyone else in the lab started going to Spike’s more and more often,” recalls Long. A lab mate’s husband even

adopted the practice, and ate there before a job interview. “I don’t even know if they liked hot dogs,” says Long with a laugh.

Some scientists partake in group rituals that have a serious side. In Japan, it’s common practice for universities and research institutes to hold an annual memorial service for animals that have been killed as part of experiments. Researchers say that they participate in these services to show appreciation and gratitude for the animals and to console their spirits³.

About half of the services are religious in nature, and those are about evenly split between Buddhist and Shinto rites, says Naoki Morishita, an ethics professor at Hamamatsu University School of Medicine in Japan, who has studied the ritual services. He says that they are deeply rooted in Japanese cultural and spiritual beliefs. “Communication with the soul of the dead is at the heart of it,” he says. “Japanese researchers participate to express feelings of gratitude and appreciation. They do not feel calm without it. In that sense, the memorial service is important for them.”

“Once the person has done everything they can think of that can rationally help the outcome, then they are looking for something extra.”

ROUTINE SUCCESS

Elsewhere, researchers use rituals and habits on a daily basis. In his work, Walt Koenig, a behavioural ecologist at the Cornell Lab of Ornithology in Ithaca, New York, has two routines to help him to locate the nests of acorn woodpeckers (*Melanerpes formicivorus*) and band the birds for study.

To find active nests, which are usually 6–12 metres above the ground in the cavities of oak

trees, Koenig yells, “Hello?” in a specific, drawn-out vocal tone towards nest holes to get a bird to peer out. “I’m sure that it has to have that particular nasal quality to get them to look out,” jokes Koenig. Catching the adult birds is a feat that involves climbing a tree, setting an ambush to trap the birds inside the cavity and sawing a new entrance from which to carefully remove them. “It’s something of an art form,” says Koenig.

So, when he triumphs, Koenig performs his second ritual, both as a celebration and as a quirky benediction for the bird’s continued health. “When I finish banding and measuring them, I kiss them on the head and say, ‘Live long and prosper.’”

He has passed the rituals on to junior researchers as a symbolic way of sharing his successes, and says that he would be disappointed if they failed to repeat his speeches. “You hope that your little rituals will make it work the next time round,” he says. “I do indeed show them and claim, only partly tongue-in-cheek, that such things are important to the project.”

For his part, Davis carries a personal totem in his pocket — a replica of a 13,000-year-old spear point — to remind him how luck led to the discovery of the original.

On a field trip to Idaho in 1997, he accidentally used the wrong compass setting, and so incorrectly laid a baseline that shifted his field site. That mistake uncovered a pit loaded with stone tools and spear points. It was an incredible find that documented the technologies of some of the earliest hunter-gatherers in North America. “If I had not set the line wrong,” Davis says, “we would have missed it.”

A collaborator of Davis’s, Dennis Jenkins at the University of Oregon in Eugene who also studies North America’s earliest inhabitants, always dons his lucky field hat before entering a work site, and takes it off when he leaves in the evening. He also considers his bright orange, multi-pocket field vest and the buck knife that hangs from his belt indispensable items that support his field ‘persona’, which he says helps him to lead students through dicey situations.

Xygalatas says that charms and rituals might offer some people a sense of stability or control when dealing with the erratic nature of experiments and science. “We know the world is a very chaotic place, and we have no control over most of it. But we can trick ourselves,” he says. ■

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COLUMN

Tackling bias head on

We need a new normal for women, says **Shari L. Gallop**.

As an early-career female researcher in coastal geoscience and oceanography, I was surprised by the level of gender inequality that I encountered once I’d finished my PhD and landed an academic post as a lecturer.

I had my eureka moment in 2015, just after starting my lectureship at Macquarie University in Sydney, Australia. When I looked at the committee of a major international coastal-geoscience conference that I was planning to attend, I saw that not one of its 12 members was a woman.

I have had enough of the lack of women as keynote conference speakers in the discipline, or as editorial-board members for related journals. I am tired of often being the only female speaker at a conference session or the only woman working on a collaborative project.

I can easily name at least ten people who have been (and are) instrumental in my career. Of these, eight are male and only two are female. And although a couple of my close collaborators in my field are women, I’m probably unusual in that respect. I cannot think of one woman in my immediate research area who is a professor, or who is older than about 50.

We need a ‘new normal’. And some of my colleagues and I are working to create one.

BUILD A NETWORK

I started talking with female colleagues about this issue in 2015, and found that we all wanted to see change. Gender bias in science is not self-correcting. So, in 2016, we founded Women in Coastal Geoscience and Engineering (WICGE), an international network with a growing membership of more than 200 and hundreds of additional supporters on our social-media platforms. We aim to inspire, support and celebrate women at all stages of their careers through networking, mentoring and pushing for equal representation and opportunities.

We launched WICGE in March 2016 at the International Coastal Symposium, a key biennial conference in our discipline. We didn’t know where this journey would lead us, only that we needed to do something. A discussion panel at the launch made it clear that identifying and combating gender bias was important to everyone in our discipline.

We also learnt that many women face the same daily manifestations of gender bias, such as being ignored in favour of male colleagues, receiving fewer invitations to write grants or having fewer opportunities to do field work after becoming parents. Not surprisingly, many



women have chosen to leave the discipline.

WICGE’s online presence is raising the profiles of women in our discipline. We have been running events at regional and international conferences to promote awareness of gender bias, and this year we conferred the first WICGE award for Best Paper Led by a Woman.

We also conducted a global survey (not yet published) in 2016 of more than 300 coastal geoscientists worldwide on their experiences and observations of gender bias.

The results show that this is a global problem that affects daily work life and long-term career progression.

CALL IT OUT

Everyone in our network agrees that we all need to identify bias and take action. That means checking for gender equality in everything from conference committees and keynote-speaker lists to journal editorial boards and expert panels in geoscience societies, as well as in lists of peer reviewers for manuscripts and grants. We have already successfully pushed for gender balance on some conference committees and keynote-speaker line-ups. We also need to be alert to gender disparity in our own projects, papers and grant applications, and in lists of suggested reviewers when we submit a paper.

By continuing to call out gender bias and inequality, we will help to build the track records of individual female scientists and to elevate women into more-visible leadership roles in the geosciences and other disciplines.

You don’t need to be a professor or in a senior position to take action. We can all make a difference. ■

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