(2020) *323*, 6, 54–61). Due to the permanent information overload produced by modern communication technology, described by the authors as the "attention economy", users are particularly vulnerable to the systematic exploitation of such weaknesses in decision making.

The groups of Menczer and Hills have analysed large datasets to study the formation of "echo chambers" where people are exposed to an artificially narrowed spectrum of opinion. They have also made simulations to recreate such effects and better understand them quantitatively. In these, they could describe how factors such as social influence and following/unfollowing can lead to a rapidly increasing polarisation and segregation of communities.

What to do

The crisis after the 2020 presidential election in the US has demonstrated the urgent need to re-establish some sort of democratic understanding. Although the election result was very clear once all the votes were counted, a large fraction of Republican voters continued to believe in baseless fraud claims swirling in their online communities. The Bright Line Watch survey in November found that, even after the result was officially confirmed, nearly half the Republican voters questioned still expected the result to be overturned. While voters don't have to agree on who should be president, it is essential for the basic functionality of a democracy that they agree on what the result of an election says.

Elsewhere, the efforts to limit the damage caused by the global COVID-19 pandemic are increasingly undermined by misinformation — sometimes spread by the same circles that also want Donald Trump to stay in the White House. With political stability in the US and public health around the world being endangered by the social spread of misinformation, what can be done to stop this?

Based on her analysis combining rational and cultural reasons to believe the peer group more than the scientific consensus, De Cruz suggests three strategies that address one, the other or both. By improving the message, she argues, such as explaining mechanistic workings rather than just offering naked facts, science communicators could win over those who care about the factual correctness but would not believe them if it were just one claim against a contradicting one. To pick an example from biology, many lay people struggle with the idea of speciation, having one species at one point and two species at a later time. Explanation of the known mechanisms by which chemistry and biochemistry operate in making formerly compatible populations incompatible might help sceptics to understand that the science of evolution doesn't require them to believe in miracles.

To reach those denialists who are in it for the social sense of belonging to the group, De Cruz suggests improving the messenger instead. Thus, scientists with a religious affiliation could convince their fellow believers that acceptance of the scientific consensus may be compatible with their cultural identity provided by the religion.

The third strategy concerns the communications landscape, which in recent years has served conspiracy theories too well. Problems that have already been identified include the undue amplification of maverick views both by traditional media eager to retain their customers and by online media platforms where algorithms boost content based on its click rates regardless of its truthfulness.

Menczer's institute at Indiana University has developed algorithmic tools to detect and curb the influence of bots and other inauthentic agents. While individuals can already use such tools — some of which are available as mobile phone apps — to protect themselves from misinformation, a widespread and systematic use would be necessary to improve the communication landscape.

In the run-up to the 2020 presidential election, social media giants Facebook and Twitter started marking and removing posts containing misinformation, and this is a start. More work to improve the communications landscape as well as the messages and messengers will be needed to stop our globalised culture from slipping deeper into the swamp of misinformation.

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Q & A

Karin Nordström

Karin Nordström is a Professor in Neuroscience at Flinders University and a Senior Researcher at Uppsala University. She studied biology, math, and chemistry at Uppsala University (1994–1998), followed by the evolution of vision for her PhD (1999–2003), which was supervised by Dan Nilsson of the Lund Vision Group and Dan Larhammar in Uppsala. She did a postdoc with David O'Carroll at the University of Adelaide before starting her own research group in 2009. Karin Nordström studies hoverfly motion vision and is especially interested in how sensory selectivity is achieved at the neural level.

What drew you to your specific field of research? Pure luck. My PhD work was focused on understanding the early evolution of vision, which I think is a genuinely interesting topic, but to investigate this I predominantly used molecular techniques, which didn't suit me at all. After my PhD, I took six months off to travel the west coast of Australia with my partner (now husband), and I wasn't sure if I wanted to stay in science. At the end of the six months, I found myself broke and living with my in-laws in Adelaide. I remembered meeting David O'Carroll at a conference, so I called him, and I was pretty much offered a job right away. David and I worked really well together, and I stayed in his group for almost six years. He introduced me to the field of motion vision as well as taught me electrophysiology, and I was hooked from day one. I simply fell in love with electrophysiology and the sound of a healthy recording.

Who were your key early influences? Definitely my parents. They were both microbiologists, so I grew up around academics and their children, and I always saw science as a plausible career path. Asking questions and being curious about the world were actively encouraged in my home. My upbringing has also helped me as a woman in science. My professor dad was convinced that there was nothing stopping women from succeeding, that it was all down to skills and will, whereas

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my mom is a vocal feminist and always emphasized the structural obstacles women face. This put me in a really good position for understanding the view of people who literally do not see the issues, while myself being extremely aware of them.

What is the best advice that you've been given? At the start of my career I was one of the very few women in motion vision. At the same time, my sister was a newly graduated engineer and also had to deal with often being the only woman in the room. We spent a lot of time supporting and encouraging each other, to vent frustration and to give each other tips on how to succeed, while staying sane. At this time, we were guided by a quote from Madeleine Albright: "There is a special place in hell for women who don't help each other". Roughly at the same time, Eric Warrant taught me the importance of paying it forward in science. Following these pieces of advice has helped me a lot. They remind me that I am not in science for my own benefit, even if I am having a lot of fun doing it, but that I am here to facilitate for those who are yet to come, and to make academia a better place.

What makes a great collaborator? I learned the hard way to be very selective when choosing my collaborators. I now know that, for me, the best collaborator is someone who challenges my scientific thinking, complements my skills, and won't allow sloppy questions, all while still being 100% supportive on a personal level. Paloma Gonzalez-Bellido and Shannon Olsson both tick these boxes, and I have produced some of my best work with them. They are incredible scientists and mentors, generously share techniques, and I know that they have my back when needed. We work really well together and have fun doing so. Undertaking field work in the Himalayas with Shannon is one of my fondest scientific memories.

What have been your biggest mistakes…? Trusting the wrong people, believing that a verbal agreement cannot be broken, not paying attention to local politics, recruiting the wrong people to my group — the list goes on and on… I try to learn from every mistake, but sometimes it can be very hard to bounce back. Building resilience and learning to focus on the positives have for me been key to survival.

How has being a parent affected your career? My son was born during my postdoc. David O'Carroll, my postdoc mentor, never doubted my ability to simultaneously be a mom and a successful scientist, and this gave me confidence. He also supported me with flexible work hours and so on. Many of my peers were not as fortunate and are no longer in academia. Most importantly though, my husband, Travis Lloyd, has provided unwavering support during my career. He is the one picking up the slack when I go to conferences, and he has happily moved with me every time my work has required it. Caitlin Moran said in her recent book (*More Than a Woman*), "all too often, women marry their glass ceiling". I am very fortunate that the hot Aussie surfer I met at a seedy Townsville bar in 2000 turned out to be my greatest supporter.

Which historical people would you like to meet? Australia has such a rich history. I would love to meet the Kaurna people (the traditional owners of the land where I currently live) from before the arrival of Europeans and find out about the local flora, fauna, and seasons. What did the landscape look like before the arrival of Europeans? So much regarding land management and sustainable living is lost and/or ignored.

I would also love to meet the Scott sisters. They were nineteenth-century Australian scientific illustrators who made exquisite paintings, particularly of Lepidoptera. If they had been born 100 years later, or been men, they would probably have been recognized as the skilled entomologists they were. I would love to meet them and talk about insect biology, life cycles, and metamorphosis.

What do you think are the biggest problems science as a whole is facing today? I think that the lack of career paths is a big problem. I see many extremely talented scientists swap for a more reliable profession 5–10 years post PhD. Sadly, it is far from always the best people who remain. Similarly, at least in Australia, professional staff rarely have continuous appointments, and they rely on the short funding cycle of their lab heads, meaning that extremely skilled staff often leave the university sector. This brings me to another big issue: funding, which is dropping and becoming more and more competitive. We spend so much of our time writing grants rather than doing science. However, the biggest issue to me is the climate crisis, with associated habitat destruction, deforestation of rainforests, and the horrible state of the Great Barrier Reef. As a biologist working on wild insects, my research is directly impacted by the way we treat the environment, but more importantly I worry about our future. It is mind-blowing that this is not constantly top of the news. I don't understand why we fail to tackle this collectively.

Which aspect of science do you wish the general public knew more about? The importance of basic science! I wish we were better at communicating to the public how important it is to allow scientists to follow their passions and to not necessarily work toward an application or a medicine, or something 'useful'. Historically, most groundbreaking discoveries would never have been made if scientists had not been allowed to follow their curiosity. The push of funding toward 'useful' science is going to be counterproductive in the end. It is very difficult to predict what knowledge will be needed in the future. A timely example is that, in 2019, coronavirus research was considered basic science.

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