

WE CAN # IT

BY LAUREN MORELLO



Social media is shaking up how scientists talk about sexism and gender issues.

When Fiona Ingleby took to Twitter last April to vent about a journal's peer-review process, she didn't expect much of a response. With only around 100 followers on the social-media network, Ingleby — an evolutionary geneticist at the University of Sussex near Brighton, UK — guessed that she might receive a few messages of support or commiseration from close colleagues. What she got was an overwhelming wave of reaction.

In four pointed tweets, Ingleby detailed her frustration with a *PLoS ONE* reviewer who tried to explain away her findings on gender disparities in the transition from PhD to postdoc. He suggested that men had “marginally better health and stamina”, and that adding “one or two male biologists” as co-authors would improve the analysis. The response was a full-fledged ‘Twitterstorm’ that spawned more than 5,000 retweets, a popular hashtag — #addmaleauthorgate — and a public apology from the journal. “Things went really mental,” Ingleby says. “I had to turn off the Twitter notifications on my e-mail.” Yet her experience is not as unusual as it may seem.

Social media has enabled an increasingly public discussion about the persistent problem of sexism in science. When a male scientist with the European Space Agency (ESA) wore a shirt patterned with half-naked women to a major media event in November 2014, Twitter blazed with criticism. The site was where the first reports surfaced in June of Nobel Prizewinning biologist Tim Hunt's self-confessed “trouble with girls” in laboratories. And in mid-October, many astronomers took to Twitter to register their anger and disappointment when the news broke that Geoffrey Marcy, an exoplanet hunter at the University of California, Berkeley, was found to have sexually harassed female subordinates for at least a decade.

“I have been in [the] field for 15 years,” wrote Sarah Hörst, a planetary scientist at Johns Hopkins University in Baltimore, Maryland. “It is my field now too & we are not going to do things this way anymore if I have anything to do w/ it.”

Scientists studying the rise of social media are still trying to understand the factors that can whip an online debate into a raging Twitterstorm. Such events often have far-reaching and unpredictable consequences — for participants as well as targets. Sometimes this continuing public discussion prompts action: *PLoS ONE* is re-reviewing Ingleby's paper, and its original editor and reviewer no longer work for the journal, for example. But women who speak out about sexism often face a vicious backlash, ranging from insults to threats of physical violence.

Although it is not yet clear whether the social-media conversation about sexism in science will help to create lasting change, some scientists think that it may provide a sense of solidarity for women across disciplines. “You may not be changing minds, but you may be finding people

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To hear a podcast discussion about Twitterstorms, go to: go.nature.com/vkydzt

who have your back,” says Brooke Foucault Welles, a communications scientist at Northeastern University in Boston, Massachusetts. “And that's powerful.”

BRAVE NEW WORLD

On 12 November 2014, the ESA Rosetta mission landed a spacecraft on a comet — a milestone for space exploration. But in certain corners of the Internet, Rosetta's landing day may be best remembered for the scantily clad women on Matt Taylor's shirt. Taylor, a Rosetta project scientist, sported the Hawaiian-style garment as he gave interviews to reporters at mission headquarters in Darmstadt, Germany, and answered questions on an ESA webcast. (His comments were also suggestive: Rosetta “is sexy, but I never said she was easy”, he told viewers.) It wasn't long before people following the historic comet landing took notice — and took to Twitter.

“What a lost opportunity to encourage girls into science,” tweeted Fernanda Foertter, a computer programmer at Oak Ridge National Laboratory in Tennessee. Others approached it with a bit more snark: “No no women are toooooooally welcome in our community, just ask the dude in the shirt,” wrote New York-based science journalist Rose Eveleth, who linked to a *Nature* video interview with Taylor.

What started as a trickle of tweets soon became a flood. By 14 November, the day that Taylor gave a tearful public apology on another ESA webcast, Twitter users had posted more than 3,100 messages using the #shirtstorm hashtag (see ‘Anatomy of a Twitterstorm’).

In many ways, #shirtstorm and other Twitter conversations about sexism are not new. It is only the venue that has changed, says Hope Jahren, a geobiologist at the University of Hawaii at Manoa who is active on Twitter. “Guys have been wearing girly shirts forever,” she says. “The women around them have been rolling their eyes and going home and saying, ‘What a buffoon. I'm so sick of this crap.’ They've been doing it in the women's room and doing it in the coffee room.” But now, Jahren says, “Twitter is that thought under your breath.”

The social-media service is also an enormous megaphone that claims to have 320 million active users each month. Research suggests that hashtag-driven Twitter conversations can help to amplify the voices of people who are not powerful by conventional measures.

One example comes from Foucault Welles and her colleagues' analysis of a hashtag that arose after police in Ferguson, Missouri, shot an unarmed African American teenager in August 2014. The killing quickly became a national news story, and the #ferguson hashtag became part of a broader US debate over police violence. Yet more than a year later, one of the most retweeted #ferguson contributors was a teenager from the Ferguson area.

“People who don't have power really can have their voices heard,” Foucault Welles says. “They can reframe the story.”

And that can make Twitter an important outlet for younger scientists, who often don't know how to respond to instances of sexism or sexual harassment. One 2014 survey of 666 scientists — including 516 women — found that 64% had experienced sexual harassment, and only 20% of that group said that they knew how to report such behaviour¹. Most were students or postdoctoral researchers at the time they were harassed.

When scientists talk about sexism and harassment on Twitter, it presents younger researchers with a model for confronting such issues. “This way, they can see other people are going through it, and there is a positive effect to speaking out,” says Zuleyka Zevallos, a sociologist who manages the Science Australia Gender Equity Project at the Australian Academy of Science in Canberra.

For Ingleby, venting about her sexist journal review on Twitter paid unexpected dividends. She and her co-author, both postdocs, had waited three weeks for *PLoS ONE* to decide whether to grant their appeal and re-examine their paper. By making their plight public, Ingleby drew public support from other scientists — and, privately, invaluable advice from more-experienced researchers about how to deal with the journal. “I did get some messages that called me a feminazi and all that stuff,” Ingleby says, “but that was by far the minority.”

She has one crucial piece of advice for those who may follow in her footsteps: “Be a bit more prepared for things going viral. Maybe pick a few quiet days in your calendar.”

IN THE EYE OF THE HURRICANE

Determining which factors can fan a handful of messages into an Internet firestorm, or what gives a hashtag staying power, is tricky. One study², published in 2012 by researchers at the University of Pennsylvania in Philadelphia, suggests that Internet content goes viral when it elicits a strong emotional reaction. Marketing researcher Jonah Berger and decision scientist Katherine Milkman analysed the popularity of 6,956 news stories posted to the *New York Times* homepage between 30 August and 30 November 2008. The pair found that stories that inspired intense positive emotions, such as awe or amusement, were the most likely to go viral; anger, anxiety and other strong negative feelings also propelled articles to wide readership, but sadness seemed to reduce the chance that a reader would share a story with others. The recent science Twitterstorms, which are often fuelled by a combination of frustration, anger and black humour, fit with those ideas.

Yet an element of randomness is also at play. Joseph Reagle, a communications researcher at Northeastern University, sees this in the story of Cecil, a lion killed by an American tourist in Hwange National Park in Zimbabwe in July. The animal's death became an international cause célèbre, inspiring a hashtag (#CeciltheLion) that racked up 1.2 million tweets in one month — despite the fact that hunters kill dozens of lions in Zimbabwe each year³.

To Reagle, Cecil's tale also suggests that ‘hashtag activism’ is here to stay. “We are seeing the emergence of a genre,” he says. “And we will see it repeated.”

The conversations sparked by popular hashtags can shift the focus of media coverage and broader public discussion. The #YesAllWomen hashtag began in May 2014, in response to a shooting spree in California in which the killer said that his motivation was a hatred of women. Women used the hashtag to connect this violent misogyny to examples of everyday sexism and harassment — giving rise to a new wave of media coverage⁴. “That's one of the really interesting things that starts to happen with some hashtags — they become news in their own right,” says Samantha Thrift, a feminist media scholar at the University of Calgary in Canada.

Hunt learned about the amplifying power of social media the hard way on 8 June. “You fall in love with them, they fall in love with you, and when you criticize them, they cry,” he said in a speech at the World Conference of Science Journalists in Seoul. His comments were tweeted by audience members, creating an Internet furor that quickly hit mainstream news outlets.

On 10 June, Hunt told BBC Radio 4 that he was “really sorry”. But in later comments to *The Observer*, he said that he had been “hung out to dry” and forced to resign an honorary post at University College London. “It has done me lasting damage,” he said. “What they did was unacceptable.”

For those in positions of power, such as Hunt, finding themselves at the centre of a Twitterstorm can be deeply unsettling, given social media's ability to upend traditional hierarchies. But many women who talk about sexism, feminism and gender issues online face a harsher reception, from abusive comments to threats of physical harm. When Eveleth tweeted her criticism of Taylor's shirt, she received death threats. When others joined the fray, such as Jacquelyn Gill, a palaeoecologist at the University of Maine in Orono, they became targets, too.

“I stand with @roseveleth and others who are calling out sexism despite online harassment,” she tweeted. “I'm reporting abusive tweets as I'm able.” She added: “Free-speech apparently only applies to dudes

threatening violence to women with an opinion — not the women with an opinion. #shirtstorm”.

The reaction to her commentary was swift and punishing. “For the next 72 hours I got death and rape threats,” Gill says. “It was a non-stop barrage of people trolling those hashtags.”

As the stream of vitriol became overwhelming, some of Gill's colleagues wrote a computer program to scan Twitter for threatening messages that mentioned her username. That spared Gill from constantly monitoring her account for serious threats. But no program could spare her from the awkward conversations that she had with University of Maine officials after realizing that some of her harassers on Twitter were discussing how to get her fired in retaliation for her ‘Shirtgate’ activism.

“I've run up against the real-world consequences of speaking as a woman on the Internet,” she says.

This problem is not limited to science: in a study of 2,849 Internet users, the Pew Research Center in Washington DC reported that 40% had been harassed online. Although men are more likely to be called offensive names or purposefully embarrassed, women are more likely to be stalked or sexually harassed as a result of their Internet use. The survey also found that social media is the place where women are most vulnerable to harassment of all types, ranging from stalking to physical threats.

Faced with such attacks, some scientists have begun to rethink how they participate in online discussions about sexism. Some retreat entirely; others, wary of being silenced by abuse, try to find safer ways to engage online. One female researcher who has suffered Internet harassment now tweets about feminist issues under a pseudonym while also maintaining an active Twitter account under her real name. “It makes me feel safer,” says the researcher, who asked not to be named. “Although, in a lot of these cases, if someone wants to find you, they will.”

MAKING SENSE OF A MOVING TARGET

Researchers tracking the rise of social media are trying to understand whether intense discussions online translate into real-world change. The difficulty lies in deciding how to measure such effects.

One approach draws on network analysis. A team of computer scientists at Carnegie Mellon University in Pittsburgh, Pennsylvania, tracked Twitter users' interactions before, during and after 20 Twitterstorms between 2011 and 2014 — most centred on targets of broad interest, such as US late-night television host Stephen Colbert and fast-food chain McDonald's⁵. The researchers found that these events did not create lasting links between participants, as measured by who these users follow or message on Twitter. This suggests that Internet dust-ups do not usually lead to sustained discussion or greater awareness of a given issue.

But other studies show that intense Twitter discussions may affect contributors in ways that are harder to quantify. Mindi Foster, a social psychologist at Wilfrid Laurier University in Waterloo, Canada, decided to investigate the psychological effects of tweeting on the basis of her own experience using social media. After hearing an anti-Semitic remark on a television programme one night, Foster joined Twitter to vent her anger — and it felt good.

Foster's research seems to confirm her hunch: that when women tweet about sexism, it improves their sense of well-being⁶. The study involved 93 female university students who were presented with information about sexism in academia, politics and the media. One group of students was asked to tweet publicly about what they had learned, another to tweet privately and a third to tweet about the weather. (A fourth group was told to do nothing.)

During the three-day study, each participant filled out a daily questionnaire on her emotional state. Those who were assigned to tweet publicly reported a greater sense of well-being, on average, by the end of the experiment; those in the other groups showed no change. These results,

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ANATOMY OF A TWITTERSTORM

On 12 November 2014, the European Space Agency (ESA) landed a spacecraft on a comet as part of the Rosetta mission. On the same day, ESA scientist Matt Taylor wore a shirt covered with half-naked women to mission control, prompting Twitter discussions under the #shirtstorm and #Shirtgate hashtags about the message that the garment sent to women and girls. Two days later, palaeoecologist Jacquelyn Gill started the #scishirt hashtag to encourage scientists to post pictures of their favourite (non-sexist) shirts.



The shirt

HASHTAG DEMOGRAPHICS

Tens of thousands of tweets about the shirt may have been seen by tens of millions of people (reach). Gender estimates (Twitter does not ask for this information) suggest that the majority of tweets using #shirtstorm and #Shirtgate came from men.

#shirtstorm
53,905 tweets
Gender split:
22% female

#Shirtgate
38,457 tweets
Gender split:
21% female

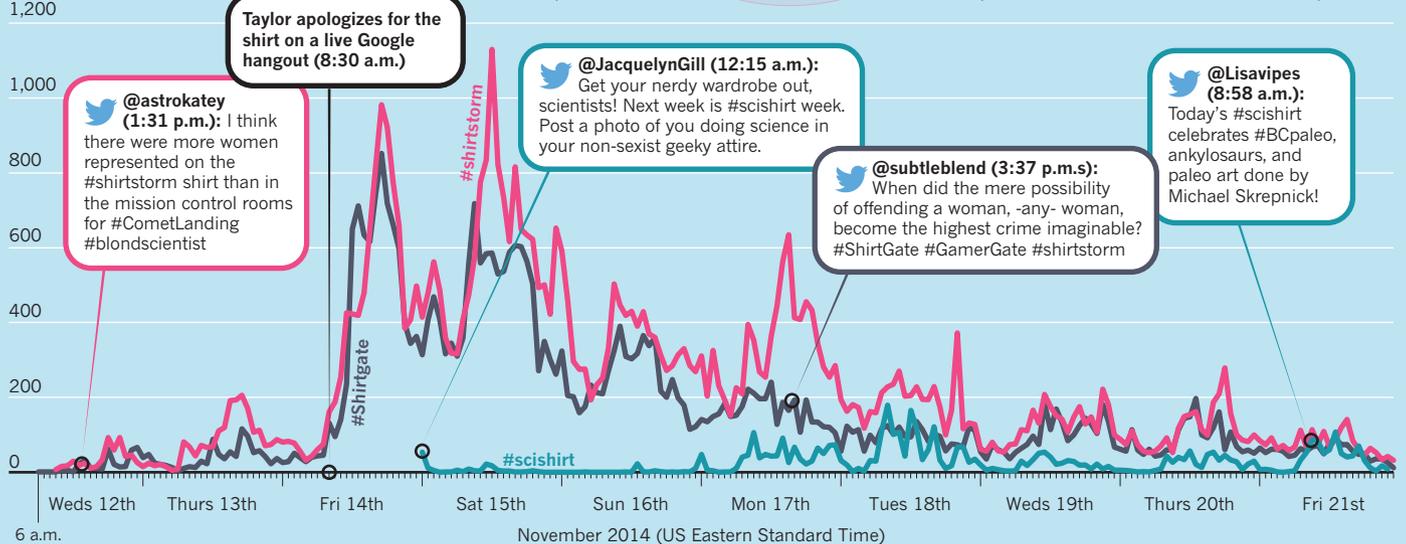
#scishirt
4,424 tweets
Gender split:
67% female

Reach:
49.5 million unique users

Reach:
32.7 million unique users

Reach:
5.5 million unique users

Number of tweets
1,200



SOURCE: KEYHOLE; SHIRT IMAGE: NATURE VIDEO

although preliminary, are in line with earlier research that shows that expressive writing — such as writing in a diary — can provide similar benefits. But Foster speculates that public tweeting may confer an extra boost because it spurs writers to think more deeply about what they are saying.

Twitter can also help to build a sense of community among scientists in different disciplines who are confronting sexism and sexual harassment. Sometimes these bonds grow out of dark humour, such as the #distractinglysexy hashtag birthed in reaction to Hunt's comments. Thousands of female researchers posted pictures of themselves in labs and at field sites, up to their knees in mud or swathed in shapeless biosafety suits. "Filter mask protects me from hazardous chemicals and muffles my woman cries," wrote Amelia Cervera, a biochemist at the University of Valencia in Spain, who shared a photo of herself wearing the face-obscuring gear.

Gill, a palaeoecologist, says that she has begun to connect with researchers in astronomy, anthropology, engineering and computer science, among other fields. Such links can help researchers to learn from each other's experiences of confronting sexism. "Some of our disciplines have been better at gender equality than others," she notes. "Some of us have been having these discussions for a long time."

But the ongoing Twitter conversation about sexism is also limited in some important ways. It often ignores the concerns of women whose experiences with sexism are exacerbated by discrimination on the basis of race, sexual orientation or disability. For example, a US survey of 557 female scientists from ethnic minority groups found that two-thirds felt pressure to prove themselves over and over again — beyond what was asked of white colleagues. And 48% of African American respondents said that they had been mistaken for janitors (caretakers) or administrative staff in their workplaces.

"If you are a minority within a minority, you are actually dealing with multiple problems," says Zevallos. That is just as true on Twitter as it is in the lab or office.

And this can make women who are dealing with the effects of multiple

forms of discrimination feel excluded from conversations that focus on sexism or sexual harassment. Such concerns surfaced recently in the wake of the Marcy sexual-harassment case, which had prompted a vigorous online debate under the #astroSH hashtag. "If you are not talking about and confronting racism with same vigilance as sexism, might as well hang 'no Blacks' signs," tweeted Chanda Prescod-Weinstein, an astrophysicist at the Massachusetts Institute of Technology (MIT) in Cambridge. "And I say that as a victim of both sexual assault and sexual harassment." Sarah Ballard, also an MIT astrophysicist, echoed the sentiment: "We can't rely on crowdsourcing meting out of justice- (Mostly white) crowds will stand up for white women, *crickets* otherwise."

And although social media can help to create a community discussion about sexism and other forms of discrimination, fighting for equality requires the real-world cooperation of universities, governments and other institutions. Some of these have taken action in response to sexist incidents that online discussions helped to bring to wider attention. But although Twitter may be hard to ignore, it does not have the authority to set and enforce expectations for fair treatment.

Despite those caveats, Thrift finds great value in the ongoing social-media conversations among scientists, which she sees as a form of public education — and the first step towards concrete change. "That's hugely important," she says. "If we don't name something as sexist, as harassment, as misogyny, it will continue unchecked." ■

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