

~~#Feminism~~ We can # it

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

By Lauren Morello

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 just only around 100 or so ~~Twitter~~ followers on the social-media network, Ingleby — an evolutionary geneticist at the University of Sussex, UK — figured 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 science because men had "marginally better health and stamina", and that ~~The reviewer also suggested~~ adding "one or two male biologists" as co-authors to would improve it ~~the analysis~~. The result 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 ~~is fuelling~~ an increasingly public discussion about the persistent problem of sexism in science. When a male scientist with the European Space Agency's Rosetta mission wore a shirt patterned with half-naked women to a major media event in November 2014, Twitter blazed with criticism. The ~~social-media~~ site was where the first reports surfaced in June of Nobel prize-winning biologist Sir 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 had 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 the outcome of this continuing public discussion is positive prompts action: *PLOS One* is re-reviewing Ingleby's paper, and its original editor and reviewer no longer work for the journal, for example. ~~ESA scientist Matt Taylor apologized publicly for his ill-chosen shirt~~. But women who speak out often face a vicious backlash,

ranging from insults to threats of physical violence. ~~And scientists studying the rise of social media are still trying to understand the factors that give rise to Twitterstorms, and how they judge their impact.~~

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 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 toooooo totally 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 ~~these~~ 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, ~~referring to the Rosetta incident~~. “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, ~~“Now~~ Twitter is that thought under your breath.”

The social-media service is also an enormous ~~powerful~~ megaphone that claims to have 31620 million active users each month. ~~And~~ Research suggests that hashtag-driven Twitter conversations can help to amplify the voices of people who are not powerful by ~~traditional~~ conventional measures.

One example comes from Brooke Foucault Welles, ~~a communications scientist at Northeastern University in Boston, Massachusetts,~~ and her colleagues’ analysis of ~~have been analyzing~~ 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 ~~Early conversations labelled with #ferguson~~ hashtag became part of a broader debate over police violence. Yet more than a year later, ~~were dominated by members of the affected community, including those from groups that are often marginalized: young people, ethnic minorities, and women. That remained the case even as the online debate around the shooting grew more intense and drew contributions from politicians and celebrities.~~

~~Foucault Welles and her colleagues have found that one of the most re-tweeted #ferguson contributors was a 17-year-old 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, ~~in part because those perpetrating such offenses are more powerful than their targets. A lack of a clear reporting procedure can also be a problem. For example, o~~One recent 2014 survey of 666 scientists — including 516 women — found that 64% ~~of respondents had experienced sexual harassment, while in the field, and only 20% said that they knew how to report such behaviour. Most were students or postdoctoral researchers at the time they were harassed, and only 20% said that they knew how to report such behaviour to their universities or field-site supervisors.~~

~~But w~~When scientists talk about sexism, harassment and gender issues 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, ~~which eventually agreed to re-review her paper.~~ “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 study, 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 analyzed 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 appeared to reduce that 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.

~~The findings held even when Berger and Milkman controlled for factors such as how useful, surprising or interesting the stories were — judged in part by follow-up laboratory experiments — and how the article had been positioned on the *Times* homepage.~~

~~Yet there also seems to be an inescapable element of randomness is also at play, says Joseph Reagle, a communications researcher at Northeastern University, sees this in the story of — In July, for example, the death of Cecil, a lion in Hwange National Park in Zimbabwe, became an international cause célèbre after news outlets reported that the animal was killed illegally by an American tourist in Hwange National Park in Zimbabwe in July. The animal's death became an international cause célèbre, inspiring a related hashtag, (#CeciltheLion), that racked up 1.2 million tweets between 11 July and 12 August in one month, — despite the fact that hunters kill according to Brandwatch, a social-media monitoring firm in Brighton, UK.~~

~~Reagle says that it is not clear why Cecil's death grabbed global attention, given that dozens of lions are killed in Zimbabwe each year, and animal abuse is a worldwide problem.~~

~~To Reagle, Cecil's tale also suggests But what is readily apparent is that so-called 'hashtag activism' is here to stay. "We are seeing the emergence of a genre," Reagle he says. "And we will see it repeated."~~

~~The cConversations 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 his motivation was a hatred of women. Women used the hashtag to connect this violent misogyny to Over time, the discussion morphed to focus on examples of everyday sexism and harassment — sparking giving rise to a new wave of media coverage.~~

~~"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.~~

~~For those in positions of power, finding themselves at the centre of a Twitterstorm can be baffling, given social media's ability to upend traditional academic hierarchies. Hunt learned this 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, South Korea. His comments were tweeted by audience members, sparking an instant Internet furor that quickly hit mainstream news outlets.

On 10 June, Hunt told BBC 4 Radio that he was “really sorry”. But three days later, his comments to ~~the Guardian~~ *The Observer*, ~~he added fresh fuel to the raging online debate.~~ Hunt 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 added. “What they did was unacceptable.”

~~For those in positions of power, such as Hunt, finding themselves at the centre of a Twitter storm 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—experienced this retaliation when she defended another woman on Twitter.~~

~~Journalist Rose Eveleth had objected when Taylor, the ESA scientist, wore his infamous shirt to mission control on the day that his team landed a spacecraft on a comet. Photos and videos from Rosetta mission headquarters were beamed around the world, and Eveleth wondered what message Taylor’s shirt sent to girls and women watching the events unfold.~~

~~When Eveleth received death threats for expressing that opinion on Twitter, Gill joined the fray. “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.” ~~One message [did XXX]; another [did YYY].~~

As the situation worsened, some of Gill’s colleagues wrote a computer program to scan Twitter for threatening messages that mentioned her username. That ~~spared Gill from constantly~~ minimized the time that she spent monitoring her account for serious threats ~~the fast-moving stream of vitriol.~~ But ~~there was no computer program could~~ spare Gill ~~her from the awkward conversations she had with~~ University of Maine officials, after realizing that some of her harassers ~~on several~~ Twitter were discussing ~~how~~ messages outlined an effort to get her fired from her university job 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.

The problem is not limited to science: ~~In a study of 2,849 Internet users~~ *October 2014*, the Pew Research Center in Washington DC reported that 40% ~~of Internet users~~ 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 ~~But the same~~ study, which involved 2,849 participants and has a 2.4% margin of error, illustrates how much worse the problem is for women generally. Women aged 18-24 are most likely to be targeted, with 70% reporting online harassment — ranging from name-calling to stalking and to physical threats. And social media is the place where women of all ages are most vulnerable, the survey found.

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. Part of the difficulty comes lies in deciding how to measure such effects.

One approach draws on network analysis. Preliminary work by A team of computer scientists at Carnegie Mellon University in Pittsburgh, Pennsylvania, tracked Twitter users' interactions before, during and after 20 finds that Twitterstorms do not create lasting connections between participants. The team examined the outcomes of 20 such events between 2011-2014, — most centred on targets of broad interest such, such as including those sparked by US late-night television host Stephen Colbert and fast-food chain McDonald's, and found that Twitterstorms did not affect participants' “mention networks”. 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, the researchers say,~~ suggests that Internet dust-ups do not usually lead to sustained discussion or greater awareness of a given issue.

But oOther 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 based on her own experience using the social-media-service. 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 subsequent study, published in January, confirmed her hunch: that when women tweet about sexism, it improves their sense of well-being. The ~~research~~ study involved 93 female

university students who were presented with information about sexism in academia, politics and the media. One group of students was ~~then~~ 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 three-day study, but participants those in the other groups did not experience any boost showed no change.

These results, ~~while~~ 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 — ~~as evidenced by greater use of “cognitive mechanism words” such as “because” or “therefore”.~~

Twitter can also help to build a sense a community among scientists in different disciplines who are confronting sexism, and sexual harassment and other gender-related issues. Gill, the palaeoecologist, ~~says that she has begun to connect with researchers in astronomy, anthropology, engineering, and computer science — among other fields. “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.”~~

Sometimes these bonds grow out of dark humour, such as the #distractinglysexy hashtag birthed by 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 ~~posted a picture~~ 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 discussion of sexism is limited in some important ways. It often ignores the concerns of women whose experiences with sexism are ~~complicated~~ exacerbated by racism, discrimination on the basis of race, based on sexual orientation, or both 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. "For example, the backlash that women of colour face on social media is really intense." 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 issues 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 [a] 'no Blacks' sign," tweeted Chanda Prescod-Weinstein, an astrophysicist at the Massachusetts Institute of Technology 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 while although social -media can help to create a community discussion about sexism, gender and racism 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, Foucault Welles sees Thrift finds great value in the ongoing social-media discussion 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." "You may not be changing minds, but you may be finding people who have your back," she says. "And that's powerful."