#bropenscience is broken science

Kirstie Whitaker and Olivia Guest ask how open 'open science' really is

Over the last decade, a vocal and hardworking group of psychological scientists have set about reforming the ways we carry out analyses, share data and code, pass around manuscripts, and select which findings to report (e.g. Altmejd et al., 2019; Frank et al., 2017; Shanks et al., 2013). This group has been spurred into action by a variety of disappointing stories about irreplicable research (Open Science Collaboration, 2015) – due to both purposeful misconduct and variable guidance for transparent reporting standards – as well as inspired by the pre-existing ideals of 'open science'.

It might not come as a surprise to psychologists, however, that it is a very narrow demographic of researchers who have the institutional support to spend time on such projects as well as the fortune to be publicly acknowledged for their hard work. Open (psychological) science often seems to have even fewer diverse voices than psychology as a whole (Murphy et al., 2020) – a phenomenon replicated in the tech world with 'open source' being even less diverse than tech overall (Finley, 2017) – and sometimes it can become a toxic feedback loop, disincentivising minorities from taking part.

As a jocular retort to one of a few cases of strange and aggressive behaviour from some open science people towards others online, one of us (Olivia) coined the expression #bropenscience in a June 2017 tweet. This was after a discussion with other women within the open science movement, who had noticed this phenomenon, but were looking for a concise description. #bropenscience is a tongue-in-cheek expression but also has a serious side, shedding light on the narrow demographics and off-putting behavioural patterns seen in open science. The phrase is a necessary rhetorical device to draw attention to an issue that has been systematically underappreciated. It evokes a visceral reaction. By design. Labelling broblems allows us to tackle them. As a field, psychology is well-equipped to self-reflect on patterns of behaviours and rhetorical devices – most of us are used to analysing complex social dynamics. However, #bropenscience has also been misunderstood and

misrepresented, not least because Twitter has a tricky interface and people love drama!

Here we will clarify the important points for those who might not have been following these discussions. We will explain why having a hashtag like #bropenscience, or at least having this dialogue, is useful as part of the process of achieving openness in scholarship. Along the way we will explain what open science and open scholarship are, why we care about them, and finally, we will describe specific actions that readers can take to help promote equity and inclusion, the fundamentals for openness.

We offer our opinions as open science advocates, albeit with different priorities and expertise. Just as it is important for scientists to criticise the scientific process, so too must open science advocates critically engage with the suggested reforms.

How to spot a bro

Let's get the clichés out of the way: not all men are bros, and not all bros are men. Bro does not refer to half of the world's population. There are similar neologisms with the same prefix: brocialism, socialism that ignores gendered oppression; broscience, unfounded fitness advice; and the prevalence of brogrammers in the technology industry (Chang, 2018). In all contexts, bros are identified by their behaviour and attitude, not their gender.

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Within the open science movement a bro will often be condescending, forthright, aggressive, overpowering, and lacking kindness and self-awareness (Reagle, 2013). Although they solicit debate on important issues, they tend to resist descriptions of the complexities, nuances, and multiple perspectives on their argument. They often veer into antisocial patterns of dialogue, such as sealioning, the act of intruding on and trying to derail a conversation with disingenuous questions (Kirkham, 2017). You've interacted with a bro if you've ever had the feeling that what they're saying makes sense superficially, but would be hard to implement in your own research practices. In general, bros find it hard to understand – or accept – that others will have a different lived experience.

At its worst, #bropenscience is the same closed system as before. There may be a little more sharing within a select in-group who have the skills and resources to engage with new initiatives but it doesn't reach out and open science up to those who historically have had little or no access to it (cf. Finley, 2017). It creates new breaks within science such as excluding people from participating in open science generally due to the behaviour of a vocal, powerful and privileged minority. It's a type of exclusionary, monolithic, inflexible rhetoric that ignores or even builds on structural power imbalances. It offers brittle and even hostile solutions and chastises those who do not follow them to the letter. As we shall discuss, open science and scholarship are more than that.

As early career open scientists, neither of us fit neatly into many of the broposed solutions – most researchers don't, and science is not a monolith. We have both dealt with published findings that cannot be reproduced. We are driven by frustration at the inefficiency of current research practices. Our work and philosophies are different and that's a feature, not a bug. A diverse and inclusive definition of open science is necessary to truly reform academic practice.

Open and inclusive scholarship

Open science – and open scholarship in general – is not new, and has always had many definitions (Leonelli et al., 2015; Open science, 2006). The open scholarship umbrella (overpage) articulates some of these dimensions.

Open access, beginning with the creation of arXiv in 1991 and formally defined in 2002 by the Budapest Open Access Initiative, is probably the most well-known to academics, although open source (defined in 1998 and built heavily from the free software movement started in 1983) has been around longer (Haider, 2018; Moore, 2018). Open educational materials can also trace their origins to the free software movement, again in 1998. Open data was defined in 2007 to promote transparent government, and the two origins of citizen science (also known as community science) in 1995 and 1996 define broad participation in research. Preregistration and open notebooks are intended to build more transparency into research projects, and they stem from the Food and Drug Administration Modernization Act of 1997 and Kerr's definition of hypothesising after results are known (HARK-ing) in 1998.

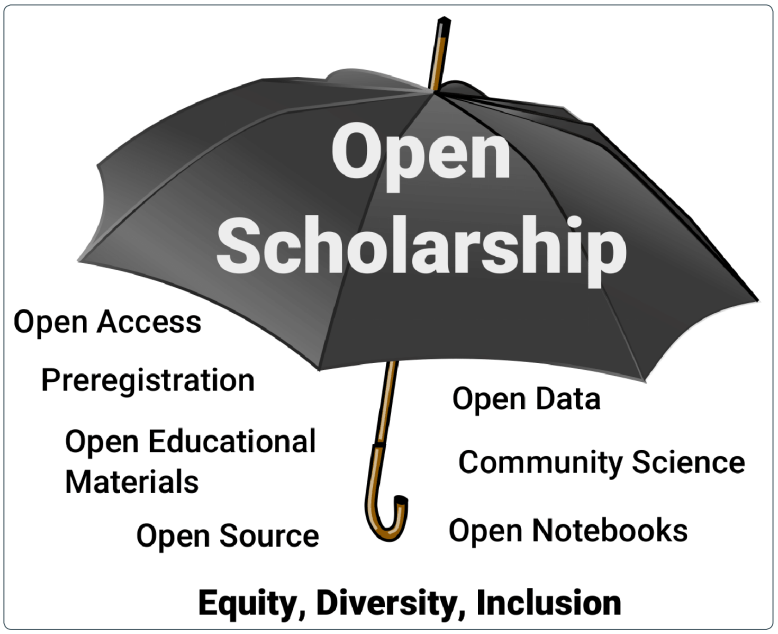
It's likely infeasible to include all the possible open scholarship elements mentioned above in your work. Therefore, and to change metaphors, we encourage you – the reader – to take a healthy and balanced portion from the open science buffet. When she proposed the buffet in a 2019 talk, Christina Bergmann was warning new members of the community not to bite off more than they could chew. Binging from the many different topics that fall under open scholarship will leave you feeling overwhelmed and exhausted. Her message: take what you can and what benefits you now, and then come back for more when you have the time and mental space to develop a new skill.

Each visit to the buffet will be different from the last, but everyone who participates will be working

towards improving scholarship for our global community. At its core, open scholarship reminds many of us why we wanted to conduct research in the first place: to learn and to educate. But the recommendations that work in one context may not be applicable in another. They will need to be adapted according to local needs in a framework that is sensitive to community specific power structures (D'Ignazio & Klein, 2020). In other words, equality, diversity and inclusion are necessary for the success of any, and every, aspect of open scholarship to create the justice it set out to accomplish (Østergaard et al., 2011; Rice, 2011). There is no open science if science is not open to all.

The true revolution, then, lies in empowering the historically disempowered. Let's return to the buffet of actions. Reconsider that meal as a pot-luck. Everyone could bring a dish – a skill, a technique, a question – something that they want to share. Rather than ordering off a pre-set menu, we will all benefit from a greater diversity of options. There will be challenges that open scholarship advocates have never considered, and pathways that have never been trod. The foundational point of open access, open data, and free and open source software, was to facilitate transparent and equitable research and technology. It follows precisely that diversity and inclusion are fundamental to those goals.

Sadly, current leaders in academia and technology are homogeneous (Blickenstaff, 2005; Henrich et al., 2010; The Royal Society, 2014). What we call bropen science replicates this dynamic (Bahlai et al., 2019).



The open scholarship umbrella showing some of the many facets of open academic work, based on a figure by Danielle Robinson and Robin Champieux (Robinson, 2018). https://osaos.codeforscience.org/what-is-open/

Homogeneous groups of people preferentially hiring and promoting others like themselves are a result of laissez-faire attitudes, resulting in what Jo Freeman (1970) calls the Tyranny of structurelessness: 'As long as the structure of the group is informal, the rules of how decisions are made are known only to a few and awareness of power is limited to those who know the rules'. That is, regardless of individual intentions, groups can easily develop and perpetuate elitist, yet informal social structures, recreating the same biases inherent in society at large. Bro-y culture dominates at the leadership level in science and technology because it always has and there aren't enough explicit processes to deconstruct these biases.

We said earlier that not all bros are men. And that's true, but they are more likely to be from one or more of the following dominant social groups: male, white, cisgender, heterosexual, able-bodied, neurotypical, high socioeconomic status, English-speaking. That's because structural privileges exist that benefit certain groups of people. It is not sufficient to look only at the actions of one individual person interacting with another. All systems are built in cultural and historic contexts that contain power systems that perpetuate structural racism, ableism, sexism, cissexism, heterosexism, classism and linguicism. #bropenscience draws attention to these biases within the context of open science, and it rightfully makes people feel uncomfortable. But that feeling can be harnessed as a reminder that to meet the goals of open scholarship we must dismantle all the systemic biases faced by our colleagues, not just brolleagues, around the world.

Everyone's a little bro-y sometimes! Almost no one wakes up in the morning with a goal to exclude people and oversimplify complex problems. Online, we call such folks trolls and the mute or block button is the best way to deal with them. An uncomfortable truth is that intent is rather beside the point in many cases (McEwan, 2011). The social consequences of 'bro culture' are severe, and necessitate collective action.

Actions you can take

So what can you do? There are relatively few opportunities to learn best practice for leadership in open scholarship. We recommend the Mozilla Open Leadership Framework as a good place to start. They define open as following three core principles:

- Understanding: You make the work accessible and clear.
- Sharing: You make the work easy to adapt, reproduce, and spread.
- Participation & inclusion: You build shared ownership and agency with contributors through accountability, equity, and transparency to make the work inviting, relevant, safe, and sustainable for all.

These principles are deliberately broad (for the first time, no pun intended). Any initiative, technical or otherwise, can benefit from reflection on how

understandable, reusable and inclusive their project is. Leaders in any community can reflect on whether their work is open by default, or open by design.

Inclusive actions that you can take to make science more open to underrepresented minorities include using a microphone at in person events or providing live transcription and sign language translation for online events so that hard of hearing and autistic colleagues (among others) can engage more effectively. As we have all experienced during 2020, it is necessary – and will be for a long time to come – to support effective remote participation in a meeting or conference. We recommend – when applicable – that in person events are held where members of traditionally underrepresented groups are likely to be awarded a visa and are more able to afford the travel. Even remote events require careful consideration regarding time zones or political relationships between countries such as the US sanctions on Iran. Use appropriate pronouns and inclusive language and provide flexible working schedules or funds for childcare (Alex Chan has an exceptional list of ideas for inclusive and accessible events). We also recommend having a code of conduct for online and offline events (Favaro et al., 2016).

Pay attention to how much you speak and who is making decisions within a group. Decision-making by majority vote from within a biased community treats everyone as equal, but is not an equitable process. Familiarise yourself with the processes through which the abbreviation for the conference on Neural Information Processing Systems (formerly NIPS, now NeurIPS) was altered in 2018 (Else, 2018). Years of misogynistic jokes by attendees – 'nips' being a contraction of the word 'nipples' – contributed to a toxic and unpleasant event for women.

Listen to the people who are not usually heard

Try to reflect on the power you have within a given system. If you'd like to increase the number of Black people who code, you could offer to answer questions (an individual action), donate to organisations working to train traditionally underrepresented groups in computer programming (a financial action), or implement changes in how your organisation hires, rewards, incentivises and retains its staff members to maintain a diverse community (a structural action). Editors and tenured faculty members can and should do the most to improve equity and inclusion in academia.

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If you have benefited from open scholarship practices you are already in a privileged group. See what you can do to lift up others around you. Question why open scholarship centres some issues more than others. Why is reproducibility framed as a core issue while sexual assault that closes off academia to too many women is not (see: Haider, 2018; Mirowski, 2018; Henk, 2020)? Question why the Global South is dramatically underrepresented and why class and geography explain so much of the variance in who gets into and remains in academia (Albornoz, 2018; Chan, 2018; De Los Arcos & Weller, 2018; Kuchma, 2018; Piron, 2018). What are the actions you can take that will improve scholarship for all?

Ultimately, the only way to dismantle structural and systemic biases is to listen to those who experience them. If you practice lots of aspects of open scholarship, our call to action is to listen to those who do not or cannot. Read what they write, hear what they say, and digest their reasoning. This is how to help them become truly open. Work towards accepting that they may have different priorities and constraints to you. If they ask for educational materials, send them one of the many specific guides that address their needs. But also, if you have power in a certain context, practice saying, 'Is there anything I can do to help?' and letting, 'No, I'm happy being different to you' be an acceptable answer.

To those of you who are confident that you already support people with less institutional power we have a different message. Keep on keeping on. Research is tough, even in the most supportive environments. Take care of yourself. Maintain a healthy work-life balance. Rest and have fun when you need to. Whether you consider yourself to be a member or not, there is nothing that you have to change about yourself to join the open science movement and community. It is our responsibility to become more inclusive of your needs, to make you feel welcome and supported in conducting and disseminating your best quality work. There is no conflict. We are all working together to build a better world.

Key sources

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