

Our manifesto for

Credibility in Neuroscience

Our vision:

To ensure that neuroscience research is as robust, reliable, replicable, and reproducible as possible; in short, to ensure the credibility of neuroscience.

Our commitments:

1. Supporting a shift in research culture that's welcomed and desired by the whole neuroscience community.
2. Equipping all neuroscientists - regardless of career stage, location, research topic or specialism - with the skills, knowledge, tools and processes they need to carry out neuroscience research, which is as credible as possible.
3. Changing the landscape in which neuroscientists operate, so that the influences which drive neuroscience research also drive the most credible research.

Background:

Neuroscience research, though varied in its approach, principally involves conducting experiments to test or to generate hypotheses, collecting and analysing data, and then disseminating the findings via the publication of scientific papers. Progress is mostly cumulative, based on a combination of findings from many studies.

Recent decades, however, have seen an increasing pressure to publish as many papers as possible (1), and incentives to publish only surprising and novel findings. This puts a huge burden on researchers to produce the 'right' results (2). Moreover, the preference for certain kinds of 'narratives', with a fixation on novel, simple dramatic findings and an aversion to those which are complex, uncertain or which repeat earlier studies, has led to worrying levels of non-reproducible research (3). This renders science vulnerable to a bias that skews scientific understanding, contributes to hyped expectations, and jeopardises the translation of research to real-world applications (4-7).

Without challenging this trend of recent decades the progress of neuroscience, along with other biosciences, is at risk of being subverted – to the detriment of both science and society.

As neuroscientists, we have a duty to strive for the best science: science that is reliable, sustainable and will make a difference to our future. Our starting point is to work on these three commitments as a collaborative neuroscience community. However, neuroscience does not exist in a bubble, and we will also engage with all our stakeholders, including journal publishers, other societies, universities and funders, and importantly the wider public arena. All society is affected by neuroscience and the British Neuroscience Association recognises its part in ensuring the best neuroscience for society.

How are we meeting our three commitments?

Supporting a shift in research culture that's welcomed and desired by the whole neuroscience community.

We need to achieve a cultural change in neuroscience. We recognise that change is difficult, and that there are barriers to change from within the neuroscience community. Importantly, to achieve this shift in culture, it must be embraced by the profession as a whole, not just by individuals or groups within it. Working together, collaboratively and supportively, we will ensure the whole neuroscience community is ready to embrace credible research practices, meeting the challenge of coordinated action in a decentralised system. This will include:

- Creating a space for vigorous discussion and debate to explore reasons to change.
- Raising awareness amongst the neuroscience community of how change is already underway - for instance, how major funders support reproducibility (8, 9) - giving researchers confidence that they will not be disadvantaged by changing research practice.

- Directly addressing specific concerns which hold people back from change, for example, the fear of being scooped, by providing practical advice on how to change without compromising their own research or careers.
- Engaging with all those in the sector – whether in academic, commercial or clinical settings – to share best practice and work together to produce the best neuroscience.
- Making sure no-one is left behind; at present, different geographical areas, institutions, and sub-fields within neuroscience are at different stages on this journey. We will make use of the British Neuroscience Association (BNA)'s national network of local groups to identify areas of particular need and ensure the sector moves forward as a whole.
- Changing the BNA's own practices so that we place value on credibility; for instance, by making replicability a factor when selecting abstracts for presentation at BNA meetings, and using the BNA journal to promote new ways of disseminating research findings.
- Encouraging behavioural change by providing direct incentives for researchers to try something new; for example, pre-registration (10), or submitting papers with 'CRediT' taxonomy (11).
- Monitoring commitment to credibility and celebrating success, for example by awarding BNA prizes for research groups working to increase credibility of their research.

Equipping all neuroscientists – regardless of career stage, location, research topic or specialist technique – with the skills, knowledge, tools and processes they need to carry out neuroscience research which will stand the test of time.

To do things differently, neuroscientists at whatever stage of their career need to be provided with the ability to use new tools and approaches for research. Some of these are very new and there will not necessarily be colleagues or mentors from which people can learn in the usual way.

There is therefore a role for the BNA in equipping neuroscientists, for example by:

- Providing training and guidance for neuroscientists in how to navigate new research practices which are designed to improve credibility. These include but aren't limited to: pre-registration of research, Registered Reports, Exploratory Reports, Open Science initiatives, research consortia, and use of data repositories.

- Raising awareness of alternatives to the 'Null Hypothesis Significance Testing', which currently tends to be the default way to assess data, but may not always be the best; for instance, it may be better to use Bayesian statistics, or modelling.

- Introducing concepts such as pre-registration at student level, for example, through pre-registering undergraduate research projects which are then carried out by subsequent student cohorts (12), and for postgraduates presenting posters at conferences (13).

- Supporting post-graduate / PhD students and Early Career Researchers who may be isolated and are at a vulnerable stage in their career pathway.

- Supporting more established researchers, who are often least able to take time out for training and who face multiple pressures and responsibilities; enabling them to adopt new research practices and lead change from within the profession.

- Establishing whether standard operating practices (SOPs) for neuroscience research would help to improve credibility, and developing such SOPs where appropriate.

- Changing the landscape in which neuroscientists operate so that the influences which drive research also drive the most credible research.

Many factors in neuroscientists' professional environment threaten the credibility of research. These include publication bias, how funding is awarded, the criteria for promotions, cultural expectations, and the attention given to some types of research over others, both in terms of scientific promotions and awards, and in wider society. We must transform the rewards for neuroscientists so that they are aligned with rewarding the best neuroscience. Specific proposals include:

- Monitor the Research Excellence Framework (REF) to ensure it places explicit value in transparency and reproducibility of research, focussing on quality rather than quantity.
- Campaigning for institutional hiring policies that value reproducibility, Open Science, and other factors which support credibility of research, and which reject the use of Impact Factor as a direct proxy for research quality and a researcher's abilities.
- Actively working with universities, publishers, funders, and other award-bodies, to ensure that all stakeholders recognise the value in different approaches, such as blue skies thinking, exploratory research, and replication studies or hypothesis-testing research.
- Explore the introduction of a neuroscience Registered Reports Funding model (14) – a symbiosis of grant application and Registered Reports, which is designed to streamline the research journey from initial funding to publication.
- Partnering with and promoting initiatives that share our objectives, for instance, the UK Reproducibility Network (15) and the San Francisco Declaration on Research Assessment (16), to ensure we are co-ordinated when engaging with stakeholders and potentiate each other's work.
- Working with university press offices and scientists to overturn the narrative that is currently typical in the report of research outcomes, and to develop new narratives that value uncertainties, probabilities and caveats (17).

References

1. Current Biology, 2014: Publication metrics and success on the academic job market
2. Nature Human Behaviour, 2019: The importance of no evidence
3. Lancet, 2014: Biomedical research: increasing value, reducing waste
4. Nature Human Behaviour, 2017: A manifesto for reproducible science.
5. British Medical Journal, 2014: The association between exaggeration in healthrelated science news and academic press releases: retrospective observational study
6. Lancet, 2014: Reducing waste from incomplete or unusable reports of biomedical research.
7. Lancet, 2019: Avoidable waste in the production and reporting of research evidence
8. AMS, BBSRC, MRC, Wellcome, 2015: Reproducibility and reliability of biomedical research: improving research practice
9. AMS, BBSRC, MRC, Wellcome, 2015: Responding to concerns about research reproducibility
10. cos.io/prereg
11. www.casrai.org/credit.html
12. Nature, 2018: Reboot undergraduate courses for reproducibility
13. Trends Cogn. Sci. (2018) Title TBA: Revising the Abstract Submission Process
14. Nicotine & Tobacco Research, 2017: Improving the Efficiency of Grant and Journal Peer Review: Registered Reports Funding
15. www.ukrn.org
16. sfdora.org
17. BioMedCentral Med., 2019: Claims of causality in health news: a randomised trial