



# Talking science, online

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Traditional scientific conferences and seminar events have been hugely disrupted by the COVID-19 pandemic, paving the way for virtual forms of scientific communication to take hold and be put to the test.

Coming together to talk about science is a tradition tracing back to the mid-seventeenth century, when English physicians and natural philosophers began meeting regularly in London and Oxford<sup>1</sup>. The frequency of scientific assemblies and their attendance remained largely steady for three centuries<sup>2</sup>. However, economic prosperity and increasingly affordable travel have accelerated academic mobility, leading to huge growth in the size and number of conferences over the last century (see Related links).

As an example, the Society for Neuroscience (SfN), which was founded in 1969 and is thus one of the longest-running neuroscience communities, organized meetings for fewer than 6,000 people in its first decade. In the late 1980s, the number of attendees started growing substantially, peaking at ~44,000 visitors in 2005, before plateauing at ~35,000 participants in the years since (see Related links).

The worsening climate crisis has raised serious questions regarding the ethics and necessity of conference travel in the name of scientific progress<sup>3</sup>. Is the estimated carbon footprint of ~1.5 tonnes CO<sub>2</sub> per conference participant<sup>4,5</sup> ‘worth’ the perceived scientific advancement? Moreover, the custom of affluent academic institutions hosting external visitors for in-house seminars has also received increased scrutiny. Has this practice become an indulgence that serves only the rich?

For some years, such concerns have spawned online seminars and conferences<sup>4,6</sup> (for example, the [Green Seminar Series](#)). However, the COVID-19 pandemic has brought an abrupt and major disruption to scientific meetings and business-as-usual. As such, COVID-19 has served as a catalyst for already-brewing attempts to modernize the methods of scientific discourse.

Here, we discuss the advantages and disadvantages of taking science talk online.

## COVID-19 as a catalyst for change

When widespread lockdown hit in early 2020, small groups of scientists offered alternative events, online. These events could be clustered talks, formatted as online ‘conferences’, as were adopted quickly by Neuromatch, which demonstrated the viability of a free and exclusively online 3-day conference, with ~3,000 attendees and more than 100 lectures<sup>7</sup>. Larger neuroscience communities,

such as the Bernstein Network and the Federation of European Neuroscience Societies (FENS), soon followed, with online substitutes for their in-person events. SfN cancelled their annual event without such a substitute, but other online meetings, including Neuromatch 3.0, endeavoured to fill the gap in October. In addition, SfN has recently announced a virtual meeting — the ‘[SfN Global Connectome](#)’ — in January 2021.

As a viable alternative to the often demanding schedule of multi-day conferences, weekly seminar series also went online. Many neuroscientists have gathered around [World Wide Neuro](#)<sup>8</sup>, an open-source and free-access web platform (created by the authors), that disseminates information about such events, with more than 330 hosted lectures since March 2020. The format is decentralized and attracts an average of more than 200 viewers from across the globe per lecture, creating a continuous, slow-motion, worldwide conference.

## Benefits of going virtual

In March 2020, organizing and participating in virtual events was a novel and sometimes awkward experience for many — but, after months of trial and error, it is difficult to deny its benefits.

From our experience as organizers, the most immediate benefit of going online is the dramatic reduction in venue, travel and organizational costs. These savings translate into lower registration fees for attendees. Indeed, most online events in neuroscience have already lowered their fees substantially or removed them entirely. However, the financial longevity of this conference model remains to be tested.

Another positive aspect of going online is improved access and exposure to science for many, as geographic and financial obstacles disappear; anyone with an internet connection can now enjoy front-row access (see visitor maps made public by [@worldwideneuro](#) on Twitter). Talks are often recorded and can be revisited later on, and parallel sessions no longer compete. Questions and comments can be delivered via chat, regardless of the asker’s status, lowering access barriers and democratizing active participation (but see concerns below).

Another immediate and clear beneficiary of online conferences has been the environment. A recent study calculated the carbon footprint for a large online astrophysics

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conference as roughly 0.33 kg CO<sub>2</sub> per attendee, magnitudes lower than the estimated average footprint of 1.5 tonnes CO<sub>2</sub> per person in 2019<sup>4,5</sup>. Assuming similar CO<sub>2</sub> use by neuroscientists and astrophysicists<sup>5</sup>, a virtual conference comparable to SfN (with ~35,000 attendees) would produce approximately 11.5 tonnes CO<sub>2</sub>, rather than the estimated 52,500 tonnes for the in-person experience (equivalent to that produced by nearly 450,000 EU citizens in the same 5-day time period (see Related links). As such, every online conference represents a big win towards reducing our carbon emissions.

### Challenges

Could we do without in-person events entirely? Many would argue ‘no’. Intuition and experience tell us that communication online and in-person differs dramatically. Unlike the many advantages, the disadvantages cannot be articulated easily and are often paraphrased as, “One cannot sit down and have a drink with someone online!” Perhaps what is relatively lacking in online science communication is the non-verbal communication, and the subtle elements of trust, rapport and nuanced conduct that make for successful collaborations and partnerships. These aspects are sometimes associated with what has been dubbed the language of ‘night science’: the fast and informal, stripped-down counterpart to the rigorous ‘day science’ language of a public presentation or a scientific publication<sup>9</sup>. Blunt audiovisual streams cannot convey the contextual cues, subtleties and nuances that forge connections and allow for civilized scientific discord among friends.

This blunting likely affects disproportionately those scientists who might benefit from ‘night science’ most: early career researchers (ECRs), who need informal advice, feedback and exposure, and who are just beginning to build the personal networks they will rely on for decades. Many online events thus far predominantly feature senior members of the community and have done less to provide opportunities for ECRs to present their work publicly and properly engage with their peers. However, online event organizers have recognized this issue and incorporate ECR events into their programmes. For example, Neuromatch 3.0 is hosting more than 800 talks by ECRs alongside its keynote lectures, and COSYNE 2021 will rely solely on submitted contributions, without invited talks. How to provide a platform for ‘online night science’, on the other hand, remains an open question.

### An addition, not a substitute

When the pandemic is tamed and travel becomes possible again, should we return to our old ways?

The climate emergency will be ever more pressing, and online events have much to offer. It is within reach that — even after the pandemic — all lectures could be

streamed online, curated and saved, and possibly transcribed and authenticated with a digital object identifier (DOI) to incorporate the spoken word into the permanent record of science. The *Journal of Visualized Experiments (JoVe)* has long advocated for this, but only as a consequence of COVID-19 have we gained the momentum to bring this idea into the mainstream (for example, at [JRNL club](#) and [TIB AV Portal](#)).

However, if accessible online science communication is to become more established, we still have a lot to learn, ranging from quality and version control to the technical aspects of searching and delivering appropriate content, guaranteeing financial long-term sustainability and overcoming lingering institutional protectionism.

Surely, the most successful implementations of online communication will embrace hybrid formats, for example through parallel in-person satellite events and presentations that transcend the traditional boundaries set by posters, talks and papers. We expect that online formats will not replace in-person events (or vice versa), but rather that they will provide a valuable, cheap and accessible mode of scientific communication when in-person nuance is not strictly necessary.

Hopefully, the positive consequences of this otherwise tragic pandemic will shine on. May we remember this time also as paving the way to a more equitable and green future for the global neuroscience community.

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### Competing interests

P. A. B and T. P. V. are involved in Neuromatch and World Wide Neuro.

### RELATED LINKS

EEA, Greenhouse gas emissions per capita: [https://ec.europa.eu/eurostat/databrowser/view/t2020\\_rd300/default/table?lang=en](https://ec.europa.eu/eurostat/databrowser/view/t2020_rd300/default/table?lang=en)

Green Seminar Series: [www.greenseminars.ch](http://www.greenseminars.ch)

JRNL Club: [jrnlclub.org](http://jrnlclub.org)

SfN Global Connectome: [www.sfn.org/meetings/virtual-events/sfn-global-connectome-a-virtual-event](http://www.sfn.org/meetings/virtual-events/sfn-global-connectome-a-virtual-event)

Society for Neuroscience Annual Meeting Statistics 1971–2011: [www.sfn.org/sfn/amstats/amstatsgraph.html](http://www.sfn.org/sfn/amstats/amstatsgraph.html)

The History And Origins Of Conference Industry: <https://www.ukessays.com/essays/tourism/the-history-and-origins-of-conference-industry-tourism-essay.php>

TIB AV Portal: [av.tib.eu](http://av.tib.eu)

World Wide Neuro: [www.worldwideneuro.com](http://www.worldwideneuro.com)