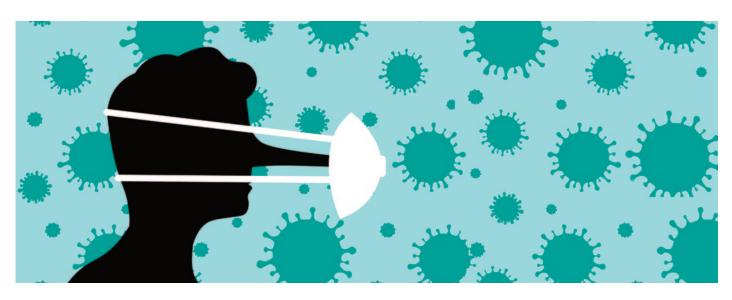# Social media, communication challenges, and the role of a scientific writer in standing up for science

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Abstract

Social media and other communication technologies are great tools to raise awareness regarding public health challenges and measures to overcome them. At the same time, these modern technologies are used to spread misinformation and conspiracy theories on topics that include vaccines, genetically modified organisms, climate change, and most recently, the COVID-19 pandemic. The resulting *infodemic* makes it challenging for the lay audience to separate scientific facts from misinformation. This article invites the scientific writer to consider approaches used in public speaking and teaching to craft scientific articles and blogs that can be understood by non-expert readers.

Modern communication technologies, including social media, are great tools for delivering timely scientific and healthcare information. However, these unregulated tools can also be used to spread science-related misinformation and conspiracy theories. The overabundance of information available online makes it difficult for the lay person to separate facts from fiction, and the COVID-19 pandemic has thrown this challenge into sharp relief.

The term *infodemic*[1,2] was coined to emphasise the impact of science and health misinformation on undermining the management of public health challenges (including disease outbreaks), trust in scientific research and knowledge, policy-making, and the evolution of public debate and narrative.[3] For example, in the Ebola disease outbreak in West Africa in 2013–2016, people who believed in the misinformation that virus transmission was airborne or mosquito-borne were more likely to have used unsafe burial practices.[4] Studies on global trends in vaccine confidence showed wide heterogeneity in responses between countries.[5,6] A survey designed by the Wellcome Trust and conducted by Gallup Poll between April and December 2018 showed that people living in high-income countries had the lowest confidence in vaccines.[7] According to this survey, in France, about 33% of people believe that vaccination is not safe and

over 55% of people believe that science and technology would reduce the number of jobs available.

The COVID-19 crisis has spawned a full-fledged misinformation campaign across all social media platforms (including Facebook, Twitter, Instagram, and YouTube) and news channels, amplifying rumours regarding health conspiracies, fictitious medical cures, and unsubstantiated claims regarding the origin of the virus, seriously undermining the efforts of public health authorities in managing the pandemic.[8,9,10,11] In fact, recent studies suggest that fake news may spread faster and wider than scientifically sound information. So profound is the impact of misinformation that models developed to forecast the spread of virus now take into account the behavioural response of the public concerning health interventions and public health policy.[12]

"We're not just fighting an epidemic; we're fighting an infodemic", stated the WHO Director-General Tedros Adhanom Ghebreyesus at the Munich Security Conference in February 2020.[13] Once COVID-19 was declared a Public Health Emergency of International Concern, the WHO launched its WHO Information Network for Epidemics (EPI-WIN), as part of its infodemic management strategy, to share scientifically reliable information online with the

public.[14] The EPI-WIN has since been actively disseminating research updates and public health recommendations. The WHO is also partnering with NewsGuard (an online platform that rates the credibility of news and health information on websites)[15,16] and Wikipedia[17] to track and counteract COVID-19 misinformation.

For a non-expert reader, despite an abundance of online information resources, the biggest challenge is deciding which health information is the most reliable. Often, science journalists without a science background tend to sensationalise scientific breakthroughs to capture the audience's attention, a tactic that could potentially lead to the spread of misinformation. In contrast, most scientific literature written by researchers is dense, with excessive use of scientific jargon that makes it less accessible to the non-expert. Here are a few points a scientific writer should consider while writing a scientific article or blog, to improve its readability.[18]

Be clear on the five Ws: who, what, why, where, and when

Richard Feynman is widely considered to be one of the most important physicists of all time. He pioneered the field of quantum electrodynamics, and his work to advance our understanding of the interaction between light and matter earned him the 1965 Nobel Prize in Physics. Feynman was also a brilliant and eloquent speaker, with an exceptional ability to synthesise and explain complex scientific concepts to students with no prior knowledge of deep science topics.[19,20]

The Feynman technique can be used to create scientific content that resonates with its readership. Just like someone preparing a speech or lecture, a scientific writer needs to know and understand their target audience. As a scientific writer, your goal is to make science accessible to your target audience. Consider the following questions while crafting the outline for your article or science blog:

1. **Who**: Is involved? Will benefit or be harmed? Is the audience?

2. **What**: Is your topic about? Is the impact you are aiming for? Is the objective – is it to inform, persuade, or explain? Are the goals for this project? Are the strengths and weaknesses of this research?

3. **When**: Does this take place? What impact does the timing have on your topic?

4. **Where**: Is the location important? If yes, in what context?

5. **Why**: Are you writing this article? Why is the topic important? Why is it relevant to the reader?

The Feynman technique encourages writing as if you are teaching a child. Avoid making it the reader's responsibility to understand you. Focus on fewer points and develop them with supporting facts and illustrations to help the reader understand, and keep scientific jargon to a minimum. It has been said that if you can't explain it to a 6-year-old, you don't understand it yourself.

Keep it simple

There are 1.8 billion websites, 5.6 billion Google searches, and 500 million Tweets sent out every day. Over 55% of readers spend fifteen seconds or less on a piece of online content. Web readers have short attention spans and can easily get lost in the details.[21]

Make your text scannable, as the average reader will not remember all the details. Develop a strong framework that helps the reader make sense of the content and remember relevant points. Use the "inverted pyramid" model of online content writing to place the most important content – the who, what, when, where, and why – at the top of the page and develop the details with clear, well-written text in later

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sections. For a more scientific audience, your aim should be to convey the content with clarity and consistency rather than showing off your writing ability. Simple writing will produce clear, strong, and coherent papers, and enhance their readability.

Writing that has the feel of speech makes the reader more engaged, and solid scientific information builds trust with the audience. Take the example of Dr Anthony Fauci, director of the US National Institute of Allergy and Infectious Diseases (NIAID). His media interviews during the COVID-19 pandemic have followed a simple, consistent structure focusing on *what we know*, *what we don't know*, and *what we should do*;[22] his message is not lost in trying to convey as much data as possible. Instead, Dr Fauci focuses on key data and what steps we need to take based on the latest research in a way that inspires public trust in science.

Posing a question and developing the article to unpack and discuss it is another way to engage the reader. Consider this cycle when writing or editing your work: organise, simplify, and tell a great story that leaves the reader feeling enlightened and curious to know more. Now that most scientific content is available online, the benefits of writing simply also include improved credibility, better search

engine optimisation (SEO), and better readability on mobile devices. The latter is important as reading comprehension is reduced for the content presented on a mobile screen.[23]

Taking a stand – or not

In general, the role of a scientific writer is in communicating about science rather than speaking up for it. However, advocating and gaining public support for science is critical, and effective scientific communication may also entail science advocacy.[24,25,26,27] In an unprecedented first, last year, reputed scientific journals, including the *New England Journal of Medicine (NEJM),*[28,29] *Nature,*[30] *Science,*[31] and the *Scientific American,*[32] publicly condemned the Trump administration's response to handling the COVID-19 pandemic. While the *NEJM* (in an editorial signed by 34 editors) and *Science* discussed the mishandling of the COVID-19 response in the US, editors of *Nature* and the *Scientific American* endorsed Joe Biden for president.

The COVID-19 crisis has made it clear that the role of a scientific expert is open to public debate and criticism. Dr Fauci's approach of sharing accurate information and openness in discussing gaps in scientific knowledge humanises science and creates public trust in scientific research that is resilient to misinformation and political fact-spinning. Debates on topics such as climate change, vaccinations, and genetically modified organisms (GMOs) must be focused, relevant, and convincing to withstand public scrutiny and influence political decision-making.[33,34] The use of patients' perspectives, patient advocacy groups, carers, and physicians in communicating health information that is based on lived experience can be a valuable resource in engaging public interest and tackling misinformation.[35,36]

Social media are changing the ways in which people communicate with each other. At the same time, they are powerful tools that can be leveraged to inform and educate the public on health research and policy, and place medical professionals and healthcare systems in a better position to respond to public health emergencies.[37]
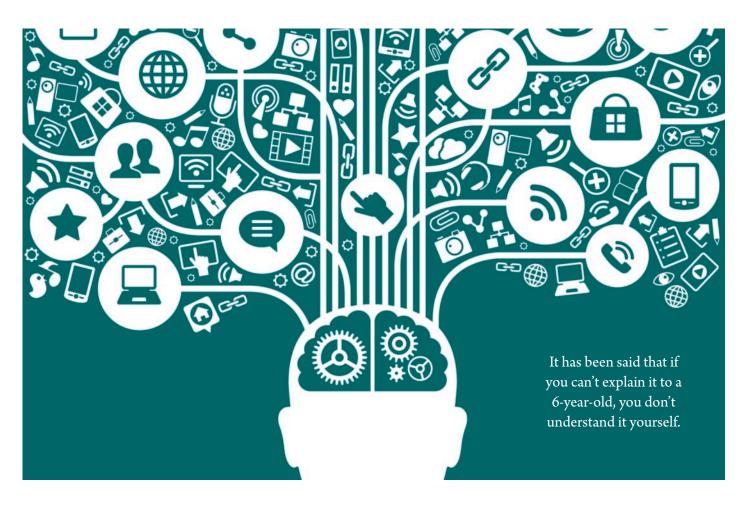
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Disclosures and conflicts of interest

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