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# Facing the challenges of science communication 2.0: quality, credibility and expertise

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## Abstract

What are the key challenges for science communication in the age of digital media? Are they entirely new or rather occurring in a different communicative context of longstanding issues pertaining to the credibility and reliability of information and the role of experts? Mystification for propaganda, also involving scientific content and scientists themselves, has certainly not been introduced with the internet. In a context of 'crisis of mediators', the quality of public communication of science is – even more than in the past – highly dependent on the quality of research produced and published in specialised contexts. New research is increasingly pushed in real time into the public domain without being 'filtered', as was the case in the past decades, by professional mediators and popularisers. This inevitably connects science communication at large with trends causing major concerns in the world of research policy and academic publishing: e.g. a significant rise in retractions, the emergence of 'predatory journals', and lack of and failure in replicating studies. The contemporary communicative landscape clearly places new and greater responsibility on researchers and their institutions, who are increasingly active in communication to the 'end-user' and not always prepared to deal with the dynamics and potential risks of such engagement. More in general, we could see in this landscape relevant challenges for science in society research and opportunities to rethink some of the key concepts in this area.



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# Table of contents

## 1. Challenges in science communication

Recently, wide-ranging discussions about so-called post-truth have significantly involved science-related issues and science communication.

The theme of credibility and reliability of information is obviously central for science communication and public understanding of science. However, some themes deserve more attention in this context. We live in a communication environment that is radically different from the past, and nevertheless we paradoxically continue to invoke traditional forms of certifying the trustworthiness of information. In the age of 'science communication 1.0', if we wish to call it that, the reputation of the source or journal brand was enough to reassure us (for good or for ill) of the credibility of content. 'I read it in the newspaper; it was on TV news', were expressions often used to close a discussion. Nowadays, such guarantees seem no longer viable.

The internet hosts a deluge of citations dubiously attributed to famous thinkers and scientists in an attempt to cling to their authority and prestige. Some time ago, the magazine *New Scientist* collected a long series of quotes attributed to Einstein (including one highly widespread on the disappearance of bees) never actually said or written by the famous physicist.[1] 'A scientist said it', is increasingly and confusingly used as a synonym for 'scientific.'

The quality of information has a cost – in science communication as in other domains – and we cannot expect such quality from social media networks whose core business is not about informing or publishing and, furthermore, when people are not willing to spend a few euros/dollars to read a newspaper or magazine. To make an analogy with gastronomy, it is like, when accustomed to stuffing ourselves at a cheap, all-inclusive buffet, we would suddenly expect to find *haute cuisine* delicacies there. Even if such delicacies were there, it is doubtful that we would be able to distinguish them from the rest.

Mystification for propaganda, also involving well established scientists, is certainly not a novelty introduced by the internet. In 1914, some of the greatest German scientists of the time, including seven Nobel laureates, signed and disseminated the so-called manifesto of 93. The manifesto denied a series of facts (including the invasion of neutral Belgium by Germany!) for the sole purpose of supporting their own Nation's stance.[2]

The quality of public communication of science is – even more than in the past – highly dependent on the quality of research produced and published in specialised contexts. In the context that I have described elsewhere as a 'crisis of mediators', new research is increasingly pushed in real time into the public domain without being 'filtered', as was the case in the past decades, by professional mediators and popularisers. This inevitably connects science communication at large with trends causing major concerns in the world of research policy and academic publishing: a significant rise in the number of retracted papers (an estimated 1,000% in the last 10 years, rising from 30 cases in 2002 to more than 600 only in Medline, 2016); the emergence of 'predatory journals' available to publish any content regardless of its quality; and lack of and failure in replicating studies and experiments.[3] The now fully discredited study on the link between vaccines and autism was at the time published by the prestigious medical journal *The Lancet*; and the same holds for other studies later proven to be false (or even fraudulent) after their appearance in significant journals.

Some cases bear particular interest for the field of science communication. In 2016, the journal *Science* published a paper by scientists from the University of Uppsala, Sweden, according to which exposure to high concentrations of polystyrene would make some fish larvae 'preferring to eat plastic rather than their natural prey'. The paper's conclusions obviously appealed to multiple media frames and they suddenly made headlines globally. 'Fish eat plastic like teens eat fast food, researchers say' summarised BBC News. The paper was retracted by the journal in May 2017, following accusations of data fabrication. However, further reports revealed that the journal had earlier dismissed strong criticism on the paper and its empirical basis submitted by a non-academic, amateur scientist member of the American Association for the Advancement of Science (AAAS). This led a science journalist to raise the questions: 'Does citizen science count for nothing in academia? Are amateur scientists expected only to unquestioningly applaud and assist their academic role models, while keeping their scientific criticisms to themselves?' (Schneider, 2017).

[1] 'Einstein said: I didn't say that', *New Scientist*, 8 October 2014, www.newscientist.com

[2] An English translation of the Manifesto can be read at https://wwi.lib.byu.edu/index.php/Manifesto_of_the_Ninety-Three_German_Intellectuals

[3] Data from Retractionwatch.com. See also Steen et al. (2013) and Ioannidis (2005). A list of predatory journals is available at https://beallslist.weebly.com/

Rather than joining complaint and despair for an alleged decay of the quality of science communication, we could see in this landscape relevant challenges and opportunities for our research and discussions. Some points for discussion and further research follow.

## 2. Quality and responsibility

At least since the early 1990s, we have begun to recognise the fluidity and continuous nature of science communication rather than its segregate, compartmental division between specialist and popular domains.

Today, with scientists publicly debating in real time through their Twitter accounts and blogs and users being able to access new research in real time, science communication (as well as the distinction between experts and non-experts) has never been so fluid and porous. This opens new opportunities for scientists' visibility, as well as risks of pushing rushed conclusions and even fraudulent content into the public discussion. But, it also paves the way for a new circularity, opening the scientific debate to the input and scrutiny of quasi-experts, amateurs, citizen scientists and eventually foreshadowing a new role of former mediators, e.g. investigative science journalism.

Historically, discussion on science communication largely started in the post-war decades as the scrutiny of the quality of science journalism and popularisation; one could provocatively ask if contemporary discussion on science communication could foster a 'scrutiny of the quality of science communication at large', including that produced by the specialists. For scholars in our field, this also implies rethinking the very meaning of key terms like 'quality' and 'accuracy'. Accuracy of science communication was traditionally defined as adherence to the specialist message, but is this still the case? Was the BBC headline 'accurately' reporting on the fish-eating plastic study published by *Science*? We probably need a new notion of accuracy; we certainly need a broader notion of quality, encompassing not only accuracy but openness to scrutiny and dialogue, independence and fairness.

The contemporary communication landscape clearly places new and greater responsibility on researchers and their institutions, who are increasingly active in communication to the 'end-user' and not always prepared to deal with the dynamics and potential risks of such engagement. During the heated debate about vaccination that ensued in Italy in 2016, an immunologist who had heavily and generously committed to engage in discussion through his own Facebook page eventually decided to abruptly cancel all comments by claiming 'Here only those who have studied can comment, not the common citizen. Science is not democratic'.

Such communicative landscape also places much greater responsibility on the users of information and their selection and evaluation of content and its reliability. This poses an obvious question of competence. It also demands greater attention, by science communication studies, not only to the production and access, but also to the diversity in use of the content. The circulation of information in social media, for example, serves a variety of 'uses and gratifications' – to recall a classic concept in media theory[4] – that range from information to entertainment, to the digital surrogate of bar chat. Much has been discussed about how to limit the circulation of (even censoring) certain content. Very little discussion has been made about how social media content is selected and evaluated on the basis of context and individual needs (e.g. 'I want to relax for a few minutes or indulge in loose chat/gossip, I read and comment without much thought'; totally different from: 'I have to vaccinate my child, I ask my doctor for accurate information').

Discussions of post-truth and quality of science communication are often, more or less explicitly, coupled with speculations about substantially declining trust in science per se, mistrust in scientists and their expertise, and even anti-science attitudes. From empirical research, and with possible regional variations, this seems generally not the case.[5]

## 3. The decline of science's cultural authority

Beyond speculations about alleged generalised decline of trust in science, there is indeed an open – and largely neglected question – for our field. That is, to put it inevitably in general and sketchy terms, the decline of science's cultural authority. By science's cultural authority I refer to the process that had already in 1,906 attracted the attention of economist and sociologist Thorstein Veblen, leading him to notice that 'On any large question which is to be disposed of for good and all the final appeal is by

[4] See Katz E, Blumler JG and Gurevitch M, 1973. Uses and gratifications research. The Public Opinion Quarterly, 37, 509–523.

[5] For Europe, see for instance: Special Eurobarometer 401 on responsible research and innovation, science and technology, coordinated by the European Commission, ec.europa.eu

common consent taken to the scientist'; to define science's role as 'Quasi lignum vitae in paradiso Dei, et quasi lucerna fulgoris in domo Domini', like the tree of life in God's paradise, and like a lamp of splendour in the house of the Lord; and eventually to ask: 'How has this cult of science arisen?' (Veblen, 1906).

We know from several historical, social and public perception studies that much has been changing in science, in society and at the intersection of the two.[6] It is increasingly important for research on science in society to raise which communicative processes may have contributed to changes in the cultural and social status of science.

For instance, what is the impact of the longstanding and persisting emphasis on science as producer of technology and welfare, as a toolbox whose input is investments and output is solution of practical problems. This notion has dominated, during the past decades, the rhetoric of research policy and innovation in Europe (also by subsuming most of social and political discussion under the handy, policy friendly label of 'Responsible Research and Innovation'). Could this have played a role in publicly and culturally defining science as a practical toolbox (or even as a supermarket!), something that then can be challenged or even discarded when its answers/solutions do not match the needs, expectations, purposes (or even tastes) of relevant participants (Bucchi, 2009; Bucchi and Trench, 2014, 2016)? To a certain extent, this, rather than a plain anti-science frame, could help us interpret contemporary public debates like those on vaccination.

And what is the long-term impact of the fashionable wave of pop formats for presenting science to the public: competitions among young scientists, *Famelab*, 3-minute pitches and so on? Could this have contributed to shaping an image of science as 'easy' and quick to make as well as to understand, that undermines all the uncertainty, the patience and hard labour and therefore encourages superficial, horizontal criticism by users, just like in travel or food users reviews (see for example Scharrer et al., 2016)?

## 4. Democracy and the discussion about science in society

Finally, democracy is often implied in discussions about the quality of communication and public debate. Should anybody, regardless of their preparation, have a say on science communication? Or as the Italian immunologist put it, only those who have studied can comment, because 'science is not democratic'?

This is probably a theme for political discussion at least as much as a theme for scholarly reflection. On the one hand, it would be easy to agree that science is not democratic. It would be silly to vote by majority on the validity of the laws of gravitation. Furthermore, we have clear historical evidence that the quality of research performance is not necessarily linked to democratic regimes: classic examples include Nazi Germany medical research or space research in the Soviet Union.

In democratic societies, however, the discussion about science in society should certainly be democratic. As we know from a large body of literature in our field, this includes not only discussion of potential implications of research applications, but also open and engaging discussion of the priorities of research funding and of the very aims and research agenda.[7]

It is quite an ambitious task, and one that largely remains unfulfilled in most societies and research policy contexts. But again, it is an opportunity for research on science in society to display its relevance and contribute to an informed and democratic discussion.

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[6] For an overview of these transformations, see Bucchi and Trench (2014).
[7] See examples: Wynne (1995); Bucchi and Neresini (2002, 2004); Bauer et al. (2007).

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## Abbreviation

AAAS American Association for the Advancement of Science