Editorial

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Credibility, expertise and the challenges of science communication 2.0

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

The issue 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. '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, accustomed to stuffing ourselves at a cheap, all-inclusive buffet, we would suddenly expect to find there haute cuisine delicacies. 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 Belgium by Germany!) for the sole purpose of supporting their own Nation's stance.

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 specialized 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 popularizers. 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 1000% 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. 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 important journals. One of the latest cases bears particular interest for our field. In 2016, *Science* published a paper by scientists from Uppsala University, 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', summarized 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 American Association for the Advancement of Science (AAAS). This led a science journalist to raise the following 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).

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.

At least since the early 1990s, we have begun to recognize *the fluidity and continuous nature of science communication* rather than its segregate, compartmental division between specialist and popular domains. With scientists publicly debating in real time through Twitter and blogs and citizens 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 into the public discussion rushed conclusions and even fraudulent content. But it also paves the way for a new circularity, opening the scientific debate to the input and scrutiny of quasi-experts, amateurs and citizen scientists, and eventually foreshadowing a potential new role of former mediators, for example, investigative science journalism.

Historically, reflection on science communication largely started in the post-war decades as the scrutiny of the quality of science journalism and popularization; one could provocatively ask whether contemporary reflection on science communication could foster a *scrutiny of the quality of science communication at large*, including that produced by the specialists. For 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 also 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 that ensued about vaccination 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 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 – 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 has been discussed about how to select and evaluate information 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 declining trust in science per se, mistrust of scientists and their expertise, and even anti-science attitudes.

As far as we can tell from empirical research in the field and with possible regional variations, this seems generally not the case.

However, this should not preclude reflection on what is certainly an open – and perhaps 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 which had already in 1906 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 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: 587–588).

We know from several historical, social and public perception studies that much has been changing, both in science and in society and at the intersection of the two. It is increasingly important for our field to raise the question of 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 and purposes (or even tastes) of relevant actors (Bucchi, 2009; Bucchi and Trench, 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 thereby encourages superficial, horizontal criticism by users, just like in travel or food users reviews (see, for example, Scharrer et al., 2017, in this issue)?

Finally, the question of *democracy* is often implied in discussions about the quality of communication and public debate. Should anybody, regardless of their preparation, have a say when it

comes to 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 one hand, it would be easy to agree that science is not democratic. It would be silly, for example, 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.

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 our field to display its relevance and contribute to an informed and democratic discussion.

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