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Knowledge Brokers in Crisis: Public Communication of Science During the COVID-19 Pandemic

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ABSTRACT

Knowledge brokers are among the main channels of communication between scientists and the public and a key element to establishing a relation of trust between the two. But translating knowledge from the scientific community to a wider audience presents several difficulties, which can be accentuated in times of crisis. In this paper we study some of the problems that knowledge brokers face when communicating in times of crisis. During the first wave of the COVID-19 pandemic, we collected interviews with Italian experts that played a major role as knowledge brokers in the local media. We asked them questions about five main topics: the features and role of science communicators; the use of language in communicating science; the importance of the relation of trust with the public; the peculiarity of communicating in a context of emergency; the problem of disagreement among experts, and its public perception and communication. The goal of this paper is to understand, through the words of knowledge brokers themselves, what they consider as best practices (and obstacles) to create trust between scientists and the public. Our empirical work can inform normative accounts of what knowledge brokering should be about.



KEYWORDS

Knowledge brokers; science communication; Covid-19; Italy

1. Background

When the COVID-19 pandemic started spreading in Italy, it forced the country to an unexpected and sudden lockdown. Citizens were not aware of what was happening, and looked for answers on TV, radio, newspapers, and social media. In this context, scientists had a central role in conveying information to the public and policymakers, taking on the role of *knowledge brokers*. Knowledge brokers are people ‘whose job it is to move knowledge around and create connections between researchers and their various audiences’ (Meyer 2010, 119). In this paper we are interested in what knowledge brokers’ think are the best (and worst) practices, in times of crisis. We aim to answer that question through in-depth interviews.

Knowledge brokers face the complex task of transferring complex scientific information to broad, unspecialized audiences of laypeople, with implications for the public understanding of science and its social consequences (Ziman 1991; Miller 2001; Erduran 2020). Since the SARS-CoV-2 was a new virus, and there was scant information and little expertise about it, it was therefore even more difficult for scientists to explain to laypeople what was happening, as compared to normal

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circumstances: they had to describe a reality that was changing daily, and translate fast-evolving knowledge about the virus (Heath and O'Hair 2020).

In this context, even though Italian official channels provided data about the local evolution of the pandemic (e.g. daily communiques from the Civil Protection Department and the Italian National Institute of Health), most COVID-related information was conveyed to generalist media through interviews and debates involving scientific experts. This article focuses on that specific type of scientific communication. Such interest comes from the fact that talk shows, TV news, and newspapers started hosting primarily COVID-related debates, since extreme uncertainty and the disruption of normal life fueled demand for information, predictions, and possible future scenarios. TV and newspapers reports had thus an even greater resonance, also thanks to social media sharing, which boosted and amplified the messages (Lovari 2020). Moreover, scientific experts did not always agree with each other, thus creating at times a confused jumble of opinions.

The COVID-19 pandemic has been a natural experiment to study scientific communication in times of crisis. In this paper we present an interview-based qualitative study, which took place in Italy, one of the worst-hit countries during the early waves of the pandemic. The planning and collection of data started in June 2020, and we conducted in-depth semi-structured interviews with experts that had an important role as communicators with the public in Italy. Our goal was to identify different communication strategies from experts to laypeople and to understand potential links between such strategies and public trust in experts, also by asking knowledge brokers themselves what they believe to be important social determinants of trust within the practice of science communication. In the paper we highlight the most common difficulties reported by our interviewees, focusing on the communicative strategies that they adopted to build a relation of trust with the public in a problematic context such as the context of emergency.

Recent research has focused on the relation between communicating scientific disagreement and uncertainty to the lay public, and trust in science (Lewandowsky, Gignac, and Vaughan 2013; John 2018; Chinn, Lane, and Hart 2018; Kreps and Kriner 2020). Our paper investigates knowledge brokers' attitudes towards this issue and analyzes potential solutions – emerging both from interviews and scientific literature – to improve public trust in science. Based on our interviews, we find that the most relevant point of agreement, among the experts we interviewed, is the need to improve the dialogue between society and science through a form of mediation. Three possibilities are suggested, and their pros and cons analyzed: the idea of a 'control room' for science communication, and two normative ideals of knowledge brokers as 'super experts' and as 'specialized mediators'. According to the interviewees, adopting one of these strategies would help the lay public to understand disagreement as a natural way of implementation in science, and foster reciprocal trust between science and society.

2. Knowledge Brokers During Covid-19

The COVID-19 pandemic was not only a challenge in terms of laboratory science, but also a test for scientists as communicators. While the scientific challenge of developing screening protocols, treatments and vaccines played out in plain sight in the media, the less obvious trial was the one that several scientists had to face outside their laboratories: communicating with the public to keep the population updated about the new situation they were living in, and about the attempts to fight the pandemic and the progress of the scientific efforts. This role was sometimes voluntary, as physicians and scientists felt the need to explain the situation to the public and give advice; sometimes it was pushed by the media, looking for news and scoops, and policy makers, looking for authoritative and trustworthy voices to reassure people and foster compliance with the restrictions that were put into place as part of non-pharmacological interventions to contain the pandemic.

Many experts were thus exposed to non-experts and their judgment and found themselves in a new role. The role of a *knowledge broker* is very different from the role of a *bench scientist*,¹ namely, a scientist who speaks to their peers. In the latter role, one can speak to a public that

has at least a level of interactional expertise in the field (Evans and Collins 2010), with a general background knowledge about scientific methodology, possible biases, and sources of knowledge. In communicating within the boundaries of one's peer community there are usually limited social implications or consequences, because the goal of communication is primarily scientific inquiry and does not involve other desirable consequences in terms of public behavior or policy.

To the contrary, a knowledge broker must communicate to a public of non-experts, and this implies that they must be aware of the context in which they are communicating. Moreover, knowledge brokers 'must be ethically, socially and intellectually responsible for the advice they give' (Thompson 2020; see also Pielke 2007), and their role is crucial to establishing credibility and trust towards the scientific community (Robeson et al. 2008; Meyer 2010). Nonetheless, not every scientist that played this role during the COVID-19 outbreak was ready for that.

The aim of our study was to investigate whether communication is perceived as important for establishing trustworthiness in expert-to-public communication. To do this, we conducted seven in-depth interviews with some researchers and front-line physicians who had an important role as communicators with the public in Italian media during the first wave of COVID-19 pandemic.

3. Methodology

We ran in-depth semi-structured interviews with seven Italian experts: three physicians, two virologists, a biologist, and a science journalist. Four of the interviewees were male and three were female. The interviews ran for ca. 30 to 40 minutes each, and focused around 5 topics: i) the role and features of a science communicator, ii) the role of language in communication, iii) the role of trust in the relationship with the public, iv) the specificity of the emergency context, and v) the problem of communicating disagreement within the scientific community to the lay public.

Semi-structured in-depth interviews are a consolidated qualitative research method that allows to 'gather subjective information about a particular topic or experience' (DeJonckheere and Vaughn 2019) and 'to uncover [the interviewees'] lived world prior to scientific explanations' (Kvale 1996). We chose this method to investigate experts' communicative strategies because, first, its flexible structure allows the full exploration of interviewees' thoughts; second, because the use of key-questions gives the opportunity to focus on the relevant topics of interest (Mason 1994), such as, in this case, how to foster public trust. The benefits of this tool are worth the effort in terms of information gained (Newcomer, Hatry, and Wholey 2015).

As common practice in interview-based studies, we anonymized the interviews to guarantee both the privacy of interviewees and to make sure they could speak openly. Finally, we analyzed the interviewees' responses with a qualitative method, labeling contents according to the semi-structured interview topics. Even though there isn't a single established standard in qualitative research, we have reported in the body of the paper only translated sections from the interviews, while indicating the original quotations in the footnotes.

4. Qualitative Analysis of the Interviews

The analysis that follows is split along the topical lines listed above. Each topic included a list of questions that the interviewees were prompted to answer. Experts are identified in the order they were interviewed, from #1 to #7.

4.1. *The Science Communicator*

While we were interested in the role of knowledge brokers, we avoided using that technical term in the interviews. The closest common concept we came up with was ‘science communicator’. While we are aware that there might be important differences between knowledge brokers and science communicators – the former having a broader role in mediating between science and society – we judge that the answers we received cover a relatively large part of the role of knowledge brokers. This is because both the understanding of the term ‘science communicator’ and the expertise of the people we interviewed, cover a wide range of aspects of knowledge brokering.

We asked the interviewees to explain who science communicators are, their characteristics, and whether they think there are any differences between the role of science communicators and that of bench scientists. To illustrate the broad understanding of the term, interviewee #1 reported that ‘science communicators’ ought to be understood as a term encompassing several meanings: ‘the popularizer of science, [...] the university/lab press officer, [...] and] the scientific journalist. These are three distinct roles’.² The other six interviewees did not make such analytic distinction, often using these different specifications interchangeably. All the interviewees agreed that science communicators are interpreters; meaning that they must ‘translate technical knowledge into ready-for-use information’,³ to make it comprehensible to the public. A knowledge broker is not an authority (cf. interviewee #1), but an expert who presents science in an accessible, understandable, clear, and simple way, avoiding technical language. This manner of communication is important for ‘reducing the gap between science and the community’,⁴ a gap that still runs deep, according to interviewee #1, in Italian society.

In addition to clarity of expression, there are two characteristics of science communicators that emerge from the interviews: humility and empathy. Interviewee #1 suggested that science communicators should ‘explain [the matter] like you would explain it to your grandmother’,⁵ and stressed the importance of humility in communication. According to #1 ‘there is nothing that cannot be explained’,⁶ and the successful communicator always needs to take into consideration both the context and the target audience they are addressing. Being mindful of the audience allows one to empathize with the people they are speaking to, metaphorically ‘looking at them in the eyes’⁷ and making them aware that ‘you are speaking for them, and not for yourself’.⁸ We identified two different approaches when relating to an audience: four interviewees out of seven favored consistency in style of communication, favoring the same style both when speaking to a public of experts and one of non-experts. But the remaining three interviewees claimed that an expert communicator should choose an appropriate communicative mode, depending on context and audience.

Especially in times of crisis, scientists are often expected to play the role of knowledge brokers. Interviewee #5 outlined different ways in which the distinct roles may play out within the same person: a knowledge broker may be a good communicator and have a solid scientific background, or they may be a good communicator but not have a solid background as a scientist. Someone with a very good scientific background might find themselves in the role of knowledge broker but might be a bad communicator; this latter possibility is problematic, because bad communicative skills do not suit the role of a knowledge broker. As interviewee #2 states, the problem is that ‘great knowledge brokers could potentially be terrible scientists’,⁹ and vice versa. A different perspective is offered by interviewee #7, who claimed that they never met a very good scientist who was not also a very good knowledge broker, adding that an expert in their own field also is a good science communicator.

4.2. *Language*

We asked the interviewees whether they found differences in their way of speaking with a public of peers rather than with a public of non-experts, and we invited them to indicate the three main characteristics that they believe the language of a public communicator of science should have. As

we highlighted in the previous paragraph, three out of seven interviewees found differences in their way of speaking with a public of experts and of non-experts. Interviewee #3 said that a layperson listening to scientists speaking among each other is akin to sitting in a cockpit and listening to the pilot speaking to the co-pilot: what they say is incomprehensible unless they translate it into common language.

We summarized what our interviewees thought of as the main characteristics of good science communication. While there were differences in their accounts, we surprisingly found a good amount of coherence in what they considered important. Interviewees suggested that to communicate science, one needs to give a general overview before getting into details, choosing one message at a time, recalling concepts, and using anecdotes to render the narrative captivating. A good knowledge broker always uses data and should be able to translate it for the public. Scientific communicators should also be particularly clear (e.g. by means of simple examples, or explanations) and to do this they must have clear ideas about what they want to explain.

Regarding the three main characteristics that a language of science communication should have, most of the interviewees expressed similar ideas about style. All of them agreed that emotional language is an important aspect of establishing a relation of trust with the public. Emotional language 'helps people to understand how much participation we put in [the work of doing and communicating science]¹⁰ and involves the audience in the discussion. People must be aware that scientists contribute only 'one half [of the conversation], but people in the community also play their part, and we are therefore complementary'.¹¹ However, as interviewee #6 emphasized, using emotional language does not mean that experts should exploit people's emotions and suffering for the sake of establishing a strong connection with their audience.

4.3. Trust

We asked the interviewees whether they believe that being trusted by the public is important, how they establish a trustworthy relationship with the public, and if they have specific strategies for doing so.

All the interviewees agreed that trust is essential in the communication process: 'the basis of all communication is trust',¹² said interviewee #1, claiming that the knowledge broker case is one among others, as everyone needs to be trusted when communicating. According to interviewee #5, trust is essentially linked to competence: 'competence is important, but top-down competence is not enough'.¹³ Interviewees #1 and #7 explicitly reject the idea that people should trust them only because they are experts or authoritative figures in the field; they rather emphasize the importance of content, empathy, and the effort they put in their communication as the grounds for building trust. As interviewee #1 states, people should trust them as persons, not as experts.¹⁴

We noticed that the answers about the topic of trust are very similar to the ones about language; sometimes they overlap. Interviewees suggested that experts should gain trust by using a clear language, conveying a clear message, and being consistent in their perspectives. It is useful to exercise caution in communicating uncertainty, and bold claims should be avoided. A good knowledge broker needs to have a well-balanced attitude, which conveys seriousness and reliability, and must avoid being a 'yeller' as interviewee #2 put it. Knowledge brokers ought to be honest, presenting problems in a clear and transparent manner, giving reasons for their point of view, and readily admit when they are wrong: it is better to recognize a mistake instead of communicating 'granitic certainty',¹⁵ a strategy that matches with interviewee #3's statement about not having personal interests when speaking to the public about a specific topic. Interviewee #4 summarized these features with the terms 'caution, balance, and transparency'.¹⁶ Interviewees #5 and #6 drew attention to the role of the public, which according to them must be both inquisitive and respectful.

4.4. The Emergency Context

We asked the interviewees whether they found any differences in knowledge brokers' communicative strategies in times of crises as opposed to business-as-usual science communication, and, if so, which ones. We further enquired, based on their experiences, whether the COVID-19 pandemic highlighted any critical aspects of the scientific community, and, if so, which ones.

Interviewees expressed the idea that COVID-19 pandemic gave scientists an unprecedented visibility due to the scale of the phenomenon. This allowed them to have a huge presence in the media, quantitatively speaking, but it also meant they had much more responsibility. At the same time, the media frequently dissected each expert statement, looking for clues and answers to questions that often science did not possess. This often led to misinterpretations and speculation and, when that happened, much-debated mistakes and about-turns tarnished the reputation of science and expertise in the eyes of the public.

While some of the interviewees stated that the COVID-19 outbreak highlighted the problem of disagreement within the scientific community (interviewees #3 and #4), most of the experts we interviewed claimed that at least part of the problem lies outside the scientific community, ascribing confusion in relaying information to journalists and the media. Interviewee #1 stressed the lack of scientific *journalists* in the Italian landscape, namely, professionals who can translate scientific information to make it understandable to the public without generating confusion: 'we need people to give answers',¹⁷ said interviewee #5. Interviewee #7 said that he lived under a lot of pressure from journalists, always looking for new information as different news outlets were competing for scoops. Interviewee #6 said the main problem related to the context of emergency was not disagreement ('we never agree'¹⁸) but that the media emphasized different scientific perspectives in adversarial tones. 'We photographed the situation as it was unfolding in real time',¹⁹ said interviewee #5. As interviewee #6 explained, the media highlighted the simplistic narrative that expert judgments disagreed with each other; however, in science, disagreement almost always conceals a rather complex epistemic situation. Interviewee #6 explained that within the scientific community there are many different points of view and specializations, and that is why different experts convey different messages. The presence of several perspectives on the same issue and within the same debate is a peculiar phenomenon which took place during the Covid-19 crisis, and almost all the interviewees recognized this phenomenon as a potential generator of confusion among the public. Interviewee #1 said that 'in the face of a complex matter like the pandemic, [...] the points of view of virologists, immunologists, epidemiologists, infectious diseases specialists, economists, politicians, bioethicists [...] are all at stake'.²⁰ Interviewee #5 claimed that the 'experts who have mostly spoken [in public] are clinicians, so they look at the sick person in the hospital; or immunologists, who look at the immune response; or epidemiologists [...]. A lot of experts didn't understand the size of the problem'.²¹

4.5. Disagreement

We asked the interviewees if they believe that it is appropriate to show to the public that there is disagreement within the scientific community. How does the display of discordant opinions in science affect the relationship of trust between science and the public?

All the interviewees agreed that the public needs to learn that 'science is not an absolute, but relative truth',²² that is, a type of knowledge in continuous evolution which is built on disagreement. However, such disagreement should be filtered for the public to understand it. This filtering mechanism could be part of the role of knowledge brokers. Interviewees #3 and #5, however, also warned against 'washing one's dirty linen in public',²³ meaning that disagreement is the core of the scientific community, but it is counterproductive to display it to the public. On the other hand, according to interviewee #5, a knowledge broker must be honest even when the available data is incomplete or discordant. But the confusion generated during the first wave of COVID-19 in Italy was

very much dependent on the lack of a common science basis and the failure of scientists to coordinate their public interventions.

On this topic we will now mention an important suggestion that came from the interviews, namely the idea of a 'control room' in time-of-crisis communication. None of the interviewees gave a direct answer about the possible correlation between a lack of public trust and the perception of disagreement among experts; however, all of them viewed publicly-perceived disagreement as a problem, despite recognizing that within the scientific community disagreement is not only inevitable but also fruitful. The general take is that in normal circumstances, disagreement must be explained to a public of non-experts. It seems indeed reasonable to think that understanding the process of creating knowledge (and sometimes a consensus) in science, through debate, confrontation and disagreement, ought to be part of a science literacy project.

However, in a context of emergency, trying to explain scientific disagreement need not be a priority: when people's feelings are running high, disagreement can add fuel to the sentiment of confusion among laypeople. Most interviewees suggested personal solutions to reconcile discordant views in public communication. One of the proposed solutions is to convey information from the scientific community to the public by speaking with a 'single voice'²⁴: interviewee #5 points out 'that some coordination figures would be needed'.²⁵ According to interviewee #2 'we lacked an authoritative official speaker. [...] a communicative reference point, an organization ... not in order to drop a veil in front of the truth, but to have a control room for science communication'.²⁶

Interviewee #1 emphasizes that 'unfortunately, especially in Italy [...] the role of scientific journalists who should have, let's say, taken care of the communication on these topics, has been lacking'.²⁷ The picture that emerged from interviewee #1 is that in Italy there is a strong need for professional science journalism, as journalists could be the ones to pass on to the public easy-to-understand information, starting from reliable data, and explaining the differences between experts' points of view, while keeping the community updated on facts and figures. It should be left for future work to study whether this lesson is generalizable outside the Italian territory, and to further explore the role (or lack thereof) of science journalism in science communication and crisis management.

5. Additional Highlights from the Interviews

We cluster three additional topics that we consider worthy of further investigation: a) the experts' lack of communication training; b) the experts' constraints imposed by their institutions; c) the ideal of epistemic humility. While we did not ask directly about these topics in our interviews, we identify them as salient, because several of our interviewees mentioned them in their extensive answers.

Interviewees #1, #3, and #6 felt the need to stress that many knowledge brokers are self-taught communicators (#3 and #6 speaking in first person): this means that scientific experts commonly do not have much, if any, education about public communication and instead build communicative skills and strategies entirely by themselves through experience. As we already highlighted, lay people often lack scientific literacy, and form their beliefs on more or less official information channels, often through social media or the TV. Interviewee #5 went on to say that 'we need transversal competence'²⁸ that goes in two directions, from the experts to the public, and back. In the first place, knowledge brokers must be educated to speak to the public; but this is not sufficient, because the public must also be educated to understand what they read, and to distinguish reliable information from scientific disinformation. Nurturing a two-way relation between the experts and the public, according to our interviewees, would improve the quality of the dialogue and make it easier for the public to understand experts; and, to paraphrase, to trust the trustworthy. One of the goals of two-way communication would be to enable the public to place trust where it should be placed, rather than misplace trust on disinformation and pseudo-experts (Panizza et al. 2022).

With respect to the second point of this section, we gather from our interviews that knowledge brokers are not always free to say what they want, as they often belong to institutions that impose limits on what they are allowed to say publicly. Interviewee #4 said that a knowledge broker has to

'find a way to speak in between the lines as far as it is possible',²⁹ suggesting that even if there are institutionally established limits of expression. The expert has to convey to the public information that is as transparent and honest as possible. Interviewee #5 also said that they 'learned to "slalom" through words',³⁰ meaning that they were measuring their words and the amount of transparency in communication to protect themselves. The same interviewee highlighted the fact that experts' freedom of expression is not only limited by their institution's gag orders, but also by their personal efforts not to be sued for what they say.

The topic of epistemic humility deserves some final notes. Erik Angner has recently written that 'frequent expressions of supreme confidence might seem odd in light of our obvious and inevitable ignorance about a new threat' (Angner 2020): this highlights the importance of being humble, especially in a context such as the COVID-19 crisis, in which much of the knowledge about the virus is still developing. Our interviewees all agreed about the necessity to convey information carefully, always keeping in consideration that they were trying to capture the best picture of the situation they had 'step by step', as interviewee #6 emphasized. Indeed, even in a non-crisis situation, it is never productive to communicate with overconfidence: from medicine (Simpkin and Armstrong 2019) to climate (Patt and Dessai 2005), uncertainty is always present and must be taken into account in communication. In the COVID-19 context, especially during the first wave of contagions, in late winter and spring of 2020, it was particularly true that 'our knowledge is always provisional and incomplete – and that it might require revision in light of new evidence' (Angner 2020).

In direct relation to the importance of being non-assertive, interviewees also stressed out the need to be reassuring, and to give people hope: 'we shouldn't worry the public excessively' stated interviewee #6.³¹ Interviewee #1 went even further stating that they feel the need to be a reassuring person as part of their role as a knowledge broker. It seems, however, that it might require some work to reconcile epistemic humility and communicating reassuringly, because the essential uncertainty of science and people's need to feel supported by comforting information can often be at odds. More work on this aspect of science communication would likely enlighten this apparently paradoxical connection.

6. Discussion

Overall, our qualitative analysis suggested the need to reduce the gap between science and society and the need to foster a two-way trusting relationship.

All the participants in our study reckon that scientific communication during the COVID-19 pandemic has not been optimal. They often connect this fact not only to the contingency of the emergency, but also to structural problems pertaining to scientific culture and science communication in Italy. Our interviewees acknowledge a number of factors that this crisis highlighted: i) the presence of disagreement and conflicts among experts in public communication, and how this might have fostered confusion, uncertainty, and lack of confidence in experts among laypeople; ii) the fact that this disagreement might have been at least in part only apparent, since the same problems were often addressed by different scientific disciplines and points of view that were not incompatible, given the state of science; and iii) the fact that such an apparent conflict has been excessively emphasized by the media through oversimplification, the search for polarization/politicization of opinions, and an inability to ask the right kind of questions to experts.

This latter problem also illuminates two structural and cultural problems which more than one interviewee underlined, namely: a) the lack of a specialized figure able to communicate to the public appropriately and effectively; b) the fact that people seem to expect clear and unquestionable truths from experts, whereas science essentially proceeds by trials and errors, often revising its outputs in light of new evidence and research. In the following sections, we single out a few interventions that the interviewees suggested for dealing with the aforementioned problems, and systematize three potential strategies.

6.1. The 'Super Experts'

According to the experts we interviewed, it would be helpful to push high-skilled scientists and physicians to communicate more to the public, and to reduce the gap between complex scientific topics and society by enhancing scientific dissemination and education. Although all the interviewees highlight the fact that all knowledge brokers should have solid scientific competence and in-depth knowledge of the relevant scientific literature, two of them suggested a stronger, internal correlation between scientific expertise and good communication. They suggested that very high levels of scientific competence might be sufficient to be a good knowledge broker, if paired with a bit of natural propensity to communicative practice. In this view, specialized communicative skills are almost irrelevant, or at least subordinated: 'those [scientists] who are really good [in their field] also know how to communicate'.³² According to this 'super-expert' model, a good scientist is, as such, also a good communicator. This idea suggests that the experts themselves should make a greater effort to reduce the gap between the science and the public. This idea is partly contrasted with the idea that bench scientists and knowledge brokers are cut from a different cloth, and hence their roles and fields of specialization ought to differ, an idea we find in some of our interviews and explore in the next section.

6.2. A Specialized Mediator

Unlike the two interviewees we mentioned in the previous section, some of our interviewees stress the idea that science brokering requires specific communicative skills and expertise beyond those of a bench scientist. These skills go beyond the specialized knowledge pertaining to scientific issues. The interviewees observe the lack of, and invoke the need for, a specialized mediating figure – not necessarily a super-expert, but rather similar to a scientific journalist – who clarifies the state of the science beyond apparently conflicting views and tries to create a synthesis, by taking perspectives and approaches from different scientific fields in order to address societal problems. This view doesn't necessarily suggest that we should close the door to the public exposure of popular experts in specific fields. To the contrary, such a mediating figure might be able to ask the right questions to the experts, avoiding eliciting comments and opinions which fall outside their field of competence. In this respect, further investigation might be helpful when comparing potential correlations between the presence of said mediation figures (e.g. specialized scientific journalists) and both scientific literacy and the quality of scientific communication during the COVID-19 pandemic in different countries or contexts.

6.3. Interlude: Long- and Short-Term Strategies

Before moving on to the next topic, we note here that the strategies suggested so far aim at addressing some of the structural problems of the relationship between science, the scientific community, and laypeople in setting long-term objectives such as nurturing trust in science. To achieve these goals, it may be necessary to promote a solid, but slow, science literacy project. While these strategies look convincing to address some of the structural problems with science communication, many of our respondents acknowledged that more needs to be done in emergency contexts. In a context of emergency it might be necessary to deviate completely from an established long-term strategy. For instance, promoting transparency in communicating scientific disagreement to increase trust in science could have positive consequences in the long run; but voicing disagreement openly might produce negative short-term consequences, specifically in a context like the COVID-19 pandemic, even decreasing the level of trust in science when measured during crisis. This in turn may have a role in reducing the level of compliance with official recommendations, leading to increased risk-taking behavior, higher levels of contagion, and overload of the health systems. Therefore, many interviewees acknowledge the fact that emergency scenarios may require specific, *ad-hoc* communicative strategies that are separate and distinct from business-as-usual science communication.

6.4. A “Control Room” for Communicating Science

In relation to the context of emergency and the need for a specialized mediator, more than one interviewee expressed the need to speak with a single voice, more or less explicitly alluding to the idea of a ‘control room’ for science communication in times of crisis. As we mentioned above, disagreement plays a fundamental role in the proceeding of science, and in ordinary times it seems important to foster scientific literacy to make people aware of its pivotal role. However, the public display of disagreement and conflicting opinions during crises may produce confusion or socially undesirable outcomes, due, for instance, to the perception of non-experts who often expect clear and unequivocal answers from science, specifically when sensitive health and potentially life-threatening issues are at stake. For these reasons, some of our interviewees expressed the need for a ‘single voice’ in communicating science during the COVID-19 crisis. This idea might entail regulating experts’ communication and telling them what and how they can communicate publicly.

Even though not in the pervasive and strong sense sometimes suggested by our interviewees, some forms of control on public communication have already been present in Italy at the time of the interviews. For instance, as interviewee #3 points out, physicians’ deontological code ‘prohibits expressing negative judgments about a colleague in public.’³³ The interviewee was referring to the fact that many Italian experts and communicators during the pandemic were publicly contradicting each other, at times even with personal attacks; something that, according to the interviewee, is prohibited by medical deontology. Despite the presence of a deontological code, the Italian public debate has instead been marred by extensive mutual critique, and at times even heated exchanges among experts. Interviewee #4 also reported that on several occasions some communicators have been strongly constrained in their freedom of speech (‘we have a contract that states that we can only speak if our administration gives us permission to do so’³⁴), since they often belong to institutions which impose clear limits on what they can say.³⁵ Nonetheless, none of these institutional constraints has the function of managing and monitoring individual experts’ public interventions with the aim of providing clearer, more unified, scientific communication to the public.

Imposing a greater control on science communication appears reasonable among the interviewees, especially compared to the completely unmonitored transmission of uncertainty and conflicting opinions that took place during the COVID-19 pandemic. This idea aims at avoiding confusion, fostering trust, and boosting levels of compliance with recommendations, with consequent positive effects on the course of the pandemic. We believe that careful reflection and further empirical investigations are necessary to assess whether this strategy presents more risks than benefits: for instance, silencing minority opinions that disagree with the control room may feed conspiracy theories, which in turn might lead to even worse consequences in terms of trust in science.

With respect to the issue of trust, we suspect that a control room would likely be trusted if already present when the crisis strikes, and if it enjoys both the support of the public (including media and policy-makers) and a relatively strong consensus of the scientific community. Differently, if a control room is set up in a haste, once the crisis has already struck, it is likely that the presence of such a structure will possibly even weaken public trust. This speaks in favor of several calls that were made in the decades prior to the COVID-19 pandemic to establish a mechanism of crisis intervention in case a pandemic were to occur (see Institute of Medicine 2006: recommendations 6 and 7). In Italy, attempts to establish a single authoritative voice regarding pandemic-related communication were regularly met with skepticism and little public support, often resulting in cacophonous communication, and ultimately reducing public trust in science.

7. Conclusion

In the context of a pandemic, when information changes rapidly, it is essential to convey clear and reliable public communication. The analysis of the interviews we collected provides some lessons, as well as opens several questions that ought to be explored further.

The two strongest recommendations that were received by the experts we interviewed were: i) educating scientific journalists and all scientists who act as knowledge brokers, as essential to standard and crisis communication; and ii) educate citizens to improve science and media literacy, also through a type of education that reveals the internal mechanism of knowledge production in science.

In general, we asked our selected pool of experts several questions about the relation of trust between science and the public, and the lesson we draw is that most strategies at the foundation of that relation are communicative strategies that focus on ethical requirements from knowledge brokers. The interviews we conducted point in the direction of trust being more a matter of communication and emotional connection, and only to some extent secondarily a matter of credentials and certifications. Competence in science alone may not be enough to raise the level of trust, but competence in communication can. This point warrants further investigation. According to the experts we interviewed, their role as epistemic authority is in the background of their communicative work, but is never the sole reason why a scientist is trusted, and often not even the primary reason. One telling testimony came from interviewee #1: 'I don't think people trust me because I'm particularly expert [in my field]. I think they trust me because they can see the effort I make to be objective, to stick to data, to be honest and also to admit it when I make a mistake'.³⁶ Our study suggests that a strategy of trust should aim at improving the educational system by integrating specific science communication and science ethics modules, addressed to both the speakers – the expert knowledge brokers –, and the listeners – the public.

Notes

1. While the name is taken from its usual meaning – (i.e. a scientist who works in a laboratory) – we here use the term in a much broader sense, as we define it in this section.
2. "il divulgatore, [...] il comunicatore scientifico, [...] e] il giornalista scientifico. Sono tre ruoli diversi". Interviewee #1.
3. "[...] tradurre un bagaglio tecnico in nozioni pratiche". Interviewee #3.
4. "[...] ridurre il gap tra la scienza e la comunità". Interviewee #6.
5. "Raccontalo come se lo raccontassi a tua nonna". Interviewee #1.
6. "Non c'è niente che non possa essere spiegato". Interviewee #3.
7. "Bisogna guardare negli occhi i destinatari del messaggio". Interviewee #5.
8. "Stai parlando per il pubblico e non per te stesso". Interviewee #7.
9. "[...] ottimi comunicatori, ma pessimi scienziati". Interviewee #2.
10. "Serve alla gente per capire quanta partecipazione ci mettiamo". Interviewee #4.
11. "Noi facciamo un pezzo, però le persone della comunità ne fanno altri e siamo quindi complementari". Interviewee #6.
12. "Alla base di qualunque comunicazione è necessaria la fiducia". Interviewee #1.
13. "La competenza è importante, ma la competenza verticale non basta". Interviewee #5.
14. "Credo che sia importante che si fidino di me, punto!". Interviewee #1.
15. "... piuttosto che la granitica certezza". Interviewee #1.
16. "Prudenza, equilibrio, trasparenza". Interviewee #4.
17. "Ci vogliono delle persone che danno delle risposte". Interviewee #5.
18. "Noi non siamo mai d'accordo". Interviewee #6.
19. "In itinere vi abbiamo fotografato la situazione com'era". Interviewee #5.
20. e.g.: "Davanti a una materia complessa come la pandemia [...] ci sono in gioco i punti di vista del virologo, dell'immunologo, dell'epidemiologo, dell'infettivologo, dell'economista, del politico, bioeticista, del giurista [...] e così via". Interviewee #1.
21. "[...] esperti che hanno parlato sono dei clinici, quindi guardano il malato in ospedale; o degli immunologi, che guardano la risposta immunitaria; o degli epidemiologi [...]. Molti esperti non hanno capito la portata del problema". Interviewee #5.
22. "La scienza è una verità relativa e non assoluta". Interviewee #5.
23. "I panni sporchi si lavano in famiglia". Interviewee #3 and #5.
24. "[...] una voce sola". Interviewee #7.
25. "[...] credo bisognerebbe avere delle figure di coordinamento". Interviewee #5.

26. "Forse è mancato uno speaker ufficiale autorevole. [...] Un riferimento comunicativo, un'organizzazione ... non dico per costruire una velina della verità, ma una 'cabina di regia' in merito alla comunicazione". Interviewee #2.
27. "Purtroppo, soprattutto in Italia, secondo me è molto mancato il ruolo dei giornalisti scientifici che avrebbero dovuto, diciamo, governare la comunicazione su questi argomenti". Interviewee #1.
28. "Ci serve una competenza trasversale". Interviewee #5.
29. "[...] muoversi nelle pieghe dell'intervista per quel che si riesce a fare". Interviewee #4.
30. "Ho imparato a fare slalom tra le parole". Interviewee #5.
31. "[...] non bisogna per me preoccupare il pubblico più di tanto". Interviewee #6.
32. "[...] quelli [gli scienziati] che sono davvero bravi sanno anche comunicare". Interviewee #7.
33. "[III] codice deontologico medico [...] vieta di esprimere giudizi negativi su un collega in pubblico". Interviewee #3.
34. "Durante il COVID abbiamo avuto delle fortissime limitazioni su che cosa si poteva dire, e che cosa non si poteva dire, quindi io dovevo chiedere *cosa posso dire oggi?*". Interviewee #4.
35. "[...] abbiamo un contratto che prevede che possiamo parlare solo se la nostra amministrazione ci dà il permesso" Interviewee #4.
36. "[...] io non credo che le persone abbiano fiducia di me perché sono particolarmente esperta. Credo che abbiano fiducia di me perché vedono il mio sforzo di essere obiettiva, il mio sforzo di attenermi ai dati, il mio sforzo di essere onesta e anche il riconoscimento di quando sbaglio". Interviewee #1.

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Data Availability Statement

The datasets generated during and/or analysed during the current study are not publicly available due to privacy reasons, in order to protect the participant's identities according to the informed consent related to the interviews. Anonymised transcripts of the interviews are available upon request to the corresponding author.

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