Rethinking the Nexus between Science, Politics and Society in the Age of the SARS-CoV-2 Pandemic

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Abstract: This crossing boundaries section addresses the substantial aspects at stake in reshaping the nexus between science, politics and society triggered by the Covid-19 pandemic. In this regard, three main dimensions are explored: first, the emerging forms of science-related populism and how political narratives challenge and dispute prevailing scientific knowledge; second, the platformization of science communication and the active role of users and communities in consuming and spreading online misinformation; third, the role of lay expertise in contesting the epistemic authority of science during the health emergency. The authors explore the related topics by mobilizing different theoretical frameworks from STS studies, media studies and legal science, also moving from empirical to theoretical level in order to challenge the "surface" of a multilayered phenomenon.

Keywords: science-related populism; lay expertise; online communities; pandemic; public controversies.

T/S TECNOSCIENZA
Italian Journal of Science & Technology Studies

On Populism, Infodemic and Lay Expertise. Linking the Surface, the Layer and the Substrate in Mistrusting Scientific Practice

Paolo Bory and Stefano Crabu

One of the most pervasive claims circulating in the public sphere following the spread of the SARS-CoV-2 virus is that the uncertainty arising from pandemic governance and related science-based decision-making dramatically enhanced mistrust and public suspicion towards scientific communities, experts and public institutions. Despite this claim seeming to be an indisputable feature of these (post) pandemic times, an historical perspective allows to easily recognise its conceptual and analytical fallacy. In this respect, the contestations of the monopoly of science and scientific institutions, especially those mobilised by the so-called "non-scientific" or "pseudoscientific" movements and communities, are not a direct or contingent effect boosted by the troubles and anxieties enacted by the SARS-CoV-2. Rather, these forms of mistrust of science can be located within a longstanding process involving different agents and technological entities, such as political and scientific institutions, media and digital platforms, science policies and citizenship-making practices collectively engaged in co-producing the mutual configuration between (scientific) expertise, democracy and society at large.

A second relevant claim, enacted both in the public and academic debates, is that the pandemic should not be framed just as a "tragic" event, but also as an opportunity to better understand and "fix" the problems and shortcomings concerning public health policies, the structure of science journalism and science communication and, more in general, the delicate relationship between science, innovation and society. Notably, such an opportunity may request novel public responsibilities for social scientists, and especially STS scholars; but it can also drive them towards renewed forms of disciplinary fragmentation and solipsism. The main risk, in fact, is to polarise and oversimplify – for example, by adopting a monodisciplinary or autoreferential perspective – such a complex and multi-layered field of enquiry. In this regard, umbrella terms such as "populism", "infodemic", "post-factual society", "fake news" or "conspiracy theory" may represent a double-edged sword; they can be adopted to weave a critical debate, but also to (re)produce and reinforce a deterministic narrative portraying a mono-casual, unidirectional relationship between those who detain the political and communicative power and a passive societal landscape which is supposed to be prone and fully committed to faith in scientific rationalism (on this point see Pellizzoni 2019; Lynch 2020).

This Crossing Boundaries section (CB) aims to weave a dialogue between three scholars from different disciplinary backgrounds – legal science (Marta Tomasi), media studies (Simone Tosoni) and STS (Barbara

Morsello), respectively – with the aim to address three key issues characterising the reshuffling of the nexus between science, innovation and society during the pandemic crisis. In order to provide an introductory compass for diving into the magma of this CB without the risk of being liquefied, we mobilise three analogies borrowed from geology: the surface, the layer and the substrate. In geology, a comprehensive understanding of the surface (e.g., the growth and the flourishing of a specific plant) cannot be separated from what is happening in the layers and the substrates beneath it. At the same time, the surface (e.g., a natural phenomenon or an artificial intervention on the terrain) can penetrate deeply into the substrate, contributing to the creation of a specific, yet hidden, underground eco-system. Similarly, the three contributions in this section relate to three interconnected phenomena that influence each other: i) the spread of science-related populism; ii) the circulation on social media platforms of counter-knowledge and facts rooted outside the prevailing scientific paradigms, and; iii) the emergence of new forms of lay expertise.

The first contribution, authored by Marta Tomasi, deals with a quite visible and debated phenomenon – the surface – influencing public discourse on science: the emergence of the so-called *science-related populism* (see Crabu and Magaudda 2020; Mede and Schäfer 2020). By putting political populism and science-related populism side by side, Tomasi shows how the mutual relationship of these two phenomena impact the public's trust in scientific institutions. At the same time, Tomasi argues, the spread of populism and mistrust in science during the pandemic is also due to the false steps of public and political actors: hesitancies and frictions between governments, political leaders and regulatory agencies on how – and by which means – to stop the virus have also fuelled generalised scepticism and mistrust in science. Furthermore, one of the most interesting insights provided by Tomasi lies in the underestimated relationship between technocratic and populist solutions. As Tomasi puts it, populism and technocracy share an anti-democratic strain, since they both promote a form of unilateral solutionism: the will of the people, on the one hand, and the "one correct one-size-fits-all policy" solution on the other.

The second article by Simone Tosoni focuses on the key role that digital media, the layer, play in the practices contesting the monopoly of science. As is well known, social media can be used to spread "misinformation", also profiting from the cracks dug by populist leaders in the castle walls of science. According to Tosoni, this media layer – which clearly connects the surface (populist narratives) with the substrate (the publics) – is currently explored from a deterministic angle, bringing back an outdated paradigm in media and communication research. In this regard, Tosoni argues, the current return of a "strong media effect paradigm" goes hand in hand with a sort of emulation by media studies scholarships of the very same methods, research objects and theoretical stances coming from quantitative epidemiological studies: in particular, the theoretical overlap of the pandemic with the infodemic risks to homogenise and banalise the "audience". Such

oversimplification disregards the ways in which different communities and individuals can appropriate, deploy and integrate social media sources and content related to the allegedly biased institutional science during the pandemic crisis. Tosoni's research on the No-5G Italian scene is a clear example of how mistrust in science can be reliant on different sources, narratives, and, last but not least, practices.

The last phenomenon under scrutiny brings us to the final contribution of this section by Barbara Morsello, who addresses a less visible and hard to grasp phenomenon which underpins the legitimacy crisis of science: i.e., the way in which the "substrate", the lay people, may contextualise and activate different knowledge, objects, repertoires and practices juxtaposing the validity of personal experience with stabilised scientific research and methods. In addressing the creation and sharing of knowledge and experimental practices by lay people to contrast vaccination, Morsello sheds light on a missing link for a comprehensive understanding of the current mistrust in science: the way in which mistrust can grow from below, especially in combination with social media platforms. In this context, the complexity lying behind the forms of resistance to scientific "regime of truth" – like in the vaccine case portrayed by Morsello – can only be disentangled through a deeper analysis of the symbolic, relational and technological means adopted to build up and legitimise the so-called "lay expertise".

Although exploring only a small part of a vast area, this CB is a promising venue for opening and soliciting an inter-disciplinary approach to studying the science-society nexus, and to reconsider the very *socio*-technical process and arrangement through which science produces knowledge and can shape institutions, cultural beliefs and collective imaginaries on which its epistemic, cultural and moral authority, also in relation to the politics, is grounded. This analytical sensitivity is urgent for capturing the current cultural and socio-technical processes at stake in redefining the meaning and practices of scientific and technical expertise and authority, with particular attention on how the pluralisation and democratisation of digital communication tools enable people to shape, share and trust alternative forms of knowledge and expertise for organising everyday life. Thus, this CB solicits the opening of analytical strategies that avoid the application of the same demarcation criteria of institutional scientific rationality to distinguish different forms of knowledge and expertise. Indeed, such a position may reproduce mainstream accusations of irrationality without elucidating the existing social links between science and other competing forms of knowledge and expertise, also neglecting the cultural and material (i.e., technological) conditions behind the emergence of an antagonistic relationship between science and other concerned groups of people questioning its legitimacy.

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Populism, Politics, and Science in the Midst of the Pandemic

Marta Tomasi

Introduction: Trust and the Pandemic

The CoViD-19 pandemic played a central role in bringing forgotten issues to light and raising the collective awareness of others. First, the spread of the virus has brought back into the spotlight public health issues that, at least in a certain part of the world, have been only marginally addressed by the political agendas. Consequently, the attention that has been paid in the last decades to affirming the value of individual self-determination in health has been supplemented with the awareness of the extent to which personal choices made in this area can affect common living. Second, the containment strategies implemented have highlighted how policy decisions increasingly need to be based on a sound scientific foundation. The events of the last months (since January 2020) – which are now turning into years – have demonstrated the importance of both society and regulatory institutions being in tune with science. As both these relationships are based on trust, it is interesting to reflect on how the rhetoric of populism – which makes the very idea of 'trust' one if its favourite targets – impacts on them.

Moving from a legal perspective, thus, this paper investigates the concept of science-related populism, relating it to political populism. The two phenomena not only share some basic foundations, such as distrust and conflict around sovereignty, but are dynamics that thrive on mutual connections. The recent pandemic, which called for a rediscovery of the value

of relationships in the field of health, the centrality of public policies, and the importance of their close connection with scientific reality, serves as a case study to explore the dynamics of this relationship. The overall aim is to affirm the profoundly democratic root that must govern the 'political power-science-citizenship' circuits.

Trust and Sovereignty as Constitutive Elements of Populism

It can be said that the ability to control epidemics strongly relies on public compliance with government decisions and scientific advice and that the chance to modify citizens' behaviours, even before coercion, depends upon trust. The clearest and most up-to-date example of this order of precedence is to be found in policies that – before imposing an obligation to vaccinate – proceed with information, education and persuasion of the population, only to move on to more coercive strategies when immunization rates are low.[1] The willingness of individuals to act to promote outcomes that benefit the greater societal good is intuitively strongly determined by their attitude towards (and level of confidence in) institutions and the *res publica*.

From this perspective, the populist discourse – which describes society as a fundamental struggle between an allegedly virtuous people (a popular majority having a common will)[2] and elites (conceived as a social minority having decisional power),[3] who are portrayed negatively (Rooduijn 2019) – can clearly play a crucial role in the current situation. This statement requires some clarification.

Populism is difficult to capture in a single, uniform definition. Nonetheless, trust is commonly considered one of the critical targets of this phenomenon, and its opposite, distrust, is surely one of the elements common to all tendencies that can be framed under a general notion of populism.[4] More precisely, a focus on the social practices to weaken and dismantle trust, as well as the notion of distrust, certainly characterise the best-known conception of populism – that of political populism – but also some of its more specific and less conceptualised declinations, such as science-related populism (often referred to also as scientific populism). While the former is a tendence that has spread widely, especially in the last decades, so much so that some authors have conceptualised an 'age of populism' (Smith 2018), the latter is a trend that has emerged more recently and consolidated its features during the pandemic.

Looking at these phenomena from the point of view of trust, it can be observed that political populism often aims at weakening trust in political institutions and tends to undermine citizens' confidence that their governments are competent and reliable. Generally indispensable to state legitimacy, trust is critical in promoting respect for the rule of law.

Likewise, the erosion of trust also belongs to scientific or science-related populism, which often opposes the people and scientific experts, seen as representative of the societal establishment (Mede and Schäfer 2020), and addresses people's confidence in science and in scientific research processes, findings and evaluation mechanisms. Science, based on a method aimed at departing from the common sense, is the perfect target for all the theories that mythicise precisely the value of common experience.

The symmetries between the two phenomena are not limited to trust and the clash between the people and the elite. They also encompass the closely related notion of sovereignty,[5] generally conceived as supreme authority in politics and collective decision-making (Philpott 2003).

According to political populism, politics should be an unmediated expression of the popular will, as the mechanism of democratic representation is an illegitimate claim to sovereignty (Mede and Schäfer 2020, 477).

Science-related populism sees scientific elites as illegitimately detaining sovereignty with regard to 'decisions about what is being, or should be, researched when, how, and by whom'[6] and the definition of 'what constitutes "true" knowledge'.[7] The criticism takes different forms: in some cases, it does not address science itself, but the dominant scientific authority, which is seen as corrupt, working 'behind closed doors' and therefore deserving of replacement with alternative authorities and counter-knowledge. In other cases, condemnation is directed at the scientific method, which is contrary to the 'participatory turn', defined as 'a general shift of preference from representative democracy to more direct forms of participation' in the context of science (Blühdorn 2014, 407). In more radical scenarios, critics strike at scientific epistemology as such, asserting that it should be replaced with people's common sense, personal experiences and emotional sentiments. The difference between sovereignty claims in political and scientific populism is that the former are related to making political decisions, while the latter deal with the epistemic authority of knowledge generation. In light of recent events, the pressing question becomes: What happens when the two realms merge and scientific considerations come to represent the primary basis for political decision-making and regulations? An intersection between the two phenomena looms on the horizon.

Scientific and Political Populism Interrelated

Scientific populism and political populism not only share some basic foundations (such as distrust and conflict around sovereignty) but are dynamics that thrive on mutual relations.

Some earlier findings have already indicated that positions against institutional science can be associated with political populism. For example, in one study, a strong relationship was discovered between populist

sentiment and mistrust towards intellectuals and experts, a tendency of populist party supporters to have lower trust in universities was observed, and the fact that many voters of populist US candidates would rather 'trust in the wisdom of ordinary people than the opinions of experts and intellectuals' was highlighted (Mede and Schäfer 2020, 474).

One of the fields in which this interrelationship has become particularly evident is vaccinations, which are often at the crossroads of science, individual choice, and political decisions. The phenomenon of vaccination opposition or hesitancy is as old as vaccines themselves and has manifested itself throughout history, with greater or lesser evidence depending on the time and circumstances.[8] More recent analyses, however, show that it is possible to identify a link between this manifestation of distrust toward science and political preferences. In particular, according to a study published in the *European Journal of Public Health* (Kennedy 2019), there is a substantial correlation between the increase in European populism and levels of mistrust in science and vaccine resistance. A highly significant positive association was found between the percentage of people who voted for a populist party and the percentage who believed that vaccines were not important or effective. Although the author of the study argues that further empirical investigations are needed, 'it seems likely that scientific populism is driven by similar feelings to political populism, for example, a profound distrust of elites and experts by disenfranchised and marginalised parts of the population' (see Kennedy 2019, 513).

Under this perspective, the current pandemic may serve as a case study for exploring the dynamics of this relationship. Since the protection of public health in a pandemic relies on citizens' trust in government decisions and on political leaders' trust in the findings of the scientific community, the consolidation of the logic of populism can produce significant consequences. This point is all the more salient because, at the juncture we are experiencing, this erosion of trust – and where and when it occurs – can immediately put many lives at risk.

The Pandemic Between Political and Scientific Populism

The CoViD-19 health emergency and the need to develop effective strategies to contain it have consolidated a very close link between science and politics. Scientific data and the consideration of the epidemiological situation, which changes every day, have been positioned as the basis for the limitation of people's rights (Crabu et al. 2021). Similarly, scientific evaluations represented the guiding light in the development and distribution of vaccines against CoViD-19.

In reality, the regulatory approaches varied substantially, and while some countries strongly relied on science and scientific expertise as integral components of their decision-making processes, others leant towards more politicized models (Heims and Slobodan 2021). In this regard, some

crucial questions read: What was the impact of the health emergency on populist trends? Did it reinforce trust in the scientific realm, or did distrust take over? What was the role of politics?

The pandemic, in its first phase (since its onset and until the approval of the first vaccines in December 2020), dealt some significant blows to populist logics and some of their underlying principles. First, discourses and approaches aimed at disparaging scientific recommendations and supporting forms of pseudoscience have proved to be unsuccessful. Recent memory recalls Donald Trump's propaganda regarding controversial treatments against CoViD-19, such as hydroxychloroquine; Boris Johnson's initial recourse to herd immunity mechanisms in March 2020; Andrés Manuel López Obrador's refusal to wear a mask in the name of freedom; and Jair Bolsonaro's scepticism in calling CoViD-19 a 'small flu' and his dismissal of the whole pandemic as 'hysteria' (Eisenhammer and Spring 2020). The virus often served as a reality check; in fact, according to a report by the Associated Press, the countries that top the rankings of CoViD-19 deaths globally are not necessarily the poorest, the richest or even the most densely populated, but those lead by populist leaders (Daniszewski 2020).

Second, the need for shared public emergency management has also challenged nationalist approaches – typical of populism – and rehabilitated multilateralism and global cooperation (Apuzzo and Kirkpatrick 2020), reinforcing a vision of health as a global public good.

On both fronts, however, the months following the first approval of Covid vaccines showed a significant change of course. After joint efforts to develop the first doses, the saga of their procurement and distribution saw, on the one hand, the re-emergence of nationalist-oriented visions and, on the other hand, the surfacing of a science with little cohesion or consensus.

The initial shortage of vaccines led to the resurgence of vaccine nationalism,[9] aimed at capturing the largest number of doses available through the instruments of advance negotiation and purchase agreements and the blocking of exports to favour domestic demand, in the view that each country should be solely responsible for its own population (Katz et al. 2021). Examples include the deals struck by wealthy countries to buy more than two billion doses of coronavirus vaccines as early as the summer of 2020[10] or the numerous attempts – successful or failed – at bilateral negotiations between member states and non-European pharmaceutical companies or exporters[11] outside the common EU negotiation and purchasing mechanism. Nationalist attitudes were fuelled by the fact that the European Union's effort at joint procurement and distribution of the vaccines proved to be, particularly in its first months, 'a very European disaster' (Krugman 2021) or 'a breathtakingly reckless gamble that didn't come off' (Bickerton 2021) – an excessively slow action, tainted by technocracy. The EU's mishandling of vaccine procurement and rollouts risked undermining the appetite for further political integration, opening the way for new pockets of populism.[12]

These developments have affected not only national states but also the

European Union institutions, which, while committed to solidarity in the COVAX project, have intervened with significant restrictions on vaccine exports[13], somehow manifesting the kind of economic nationalism that the European project is meant to curb.

In the vaccine distribution phase, an uncertain and incohesive approach – also due to the urgency of the situation – affected the image of science (fuelling doubts over the incidence of the market logics that permeate the field of health) and, consequently, the level of trust placed in it.

In this sense, there has been little mutual recognition of and support for vaccine approvals by regulators. For instance, EU lawmakers warned against the 'hasty' approval of the Covid vaccines after the UK authorised the Pfizer vaccine for general use; yet, after only 3 weeks, the European Medicines Agency (EMA) came to the exact same conclusion. The events surrounding the AstraZeneca vaccine, however, are even more significant. The vaccine, which was approved for use in adults by the EMA in January 2021, subsequently became subject to a number of restrictions in member states, which varied significantly over time.[14] These variations symbolize the possible short-circuits between politics and science, being only partly explainable on the basis of two arguments: first, in the moment of constructing scientific certainty, recourse to a precautionary principle plays a crucial role; second, it is necessary to recognise how the risk-benefit assessment of a single vaccine can vary as certain external factors change, such as the availability of other vaccines and the concrete current epidemiological situation.

Beyond this, in the present case, decisions seem to have been sometimes made on the basis of weak and unverified elements (which were quickly refuted) or relying on mainly 'political' motives. In this sense, it is significant to consider the position of the director general of the Italian Medicine Agency (AIFA) who explicitly declared that the vaccine was deemed 'safe', but in need of further data collection, and that the suspension implemented in March had a 'political' nature and was determined by the attitude of other states (Germany and France *in primis*). In this case, with the aim of maintaining a 'common European front' (even at the cost of misalignment with the indications provided by the EU central regulatory authority as well as the WHO), national regulatory authorities took responsibility for seeking further advice from the scientific community, thus reserving for themselves - in the final instance - the decision-making agency in the field of public health. Although it is clear that every decision, even in these areas, has an intrinsic political dimension, in a time of vaccine scepticism, frictions and hesitancies in the relationship between political leaders and supranational and international regulatory agencies inevitably risk undermining trust in science.

The complex and sometimes controversial intertwining of science and politics, at times spectacularised in the public media arena, has generated a climate of general mistrust, fuelled populist impulses and anti-vaccination positions. The agency YouGov said it had already found in late February

that Europeans were more hesitant about the AstraZeneca vaccine than they were about the Pfizer and Moderna vaccines and that the clot concerns had further damaged public perceptions.[15] More in general, according to a report released by Eurofound on 13 May 2021, over a quarter (27%) of adults in the European Union were unlikely to get vaccinated against CoViD-19.[16]

The literature has demonstrated that trust in science serves as a key psychological factor underpinning vaccine acceptance (Larson et al. 2018), but less attention has been paid to societal-level scientific trust, which, in turn, can be positively associated with vaccination uptake. Moving from the assumption that trust is facilitated in trusting environments, some studies have demonstrated how individuals acquire informal impressions of how science is valued or contested through cultural and political debate and media representation (Sturgis et al. 2021). Institutional behaviour is therefore a crucial element in shaping individual assessments of the trustworthiness of science.

These last examples may in part be caused by mixed messages from scientists, which are more frequent in crisis periods when the pressure to produce results quickly is particularly intense; they do not concern governments that can be directly qualified as populist (at least for the most part). At the same time, public scientific controversies over vaccines can solicit mechanisms of distrust towards science that risk producing fertile ground for the affirmation of logics that can be traced back to the rhetoric typical of the populist phenomenon.

This can happen because, above all, populism is built as much on impatience with the rules and norms of common life – and similarly, with the rigorous times and methods of science[17] – as on the need for authoritarian approaches supposed to dominate chaos and overcome moments of uncertainty.[18]

Conclusions: A Democratic Toolkit to Counter Populist Drifts

By bringing science and politics closer together, the pandemic has shown some of the distortions that emerge from the spread of distrust promoted by populist rhetoric.

On the one hand, populist-oriented governments can disparage scientific recommendations, and on the other hand, segments of the public may believe that the advice of scientific experts is being manipulated to advance political gains. Perhaps more surprisingly, there is also a third response that is relevant in this context. It can be observed that, far from being at odds with one another, populism and technocracy may be considered two sides of the same coin. The two phenomena, in fact, share a deeply anti-democratic strain. As political scientist Jan-Werner Müller has pointed out,

'populism holds that there is only one authentic will of the people', whereas 'technocracy holds that there is only one correct policy solution' (Müller 2016); both represent a form of critique of party democracy itself (Bickerton and Invernizzi-Accetti 2015). Brought to its logical conclusion, technocracy breeds with populist logics, giving birth to what has been referred to as techno-populism (Bickerton and Invernizzi-Accetti 2021). Some of the shortcomings that occurred during the pandemic and that have been described above exemplify a crisis in decision-making that is both technocratic and populist.

Thus, looking closer, populism – both in its political and scientific forms – does not necessarily disregard science itself, but populist discourses often end up eroding the methods of its production and the roots of its legitimation and authority. Bridging the gap between governments, scientists and citizens and rebuilding trust – one of the hardest values to be generated – require a method that not only ensures and relies on independency and accuracy, but also promotes transparency, open communication and debate. Politicians and experts should work together to identify sources of bias and set them to rest, stimulate trustworthy information flows and establish effective accountability mechanisms. Needless to say, the fulfilment of these objectives is highly dependent on responsible support and cooperation by the media and journalism (not only scientific). Furthermore, not all critiques of science can be qualified as scientific populism, and some degree of scepticism is healthy because it encourages debate and contributes to change and improvements. Science – which is depicted as monistic, unitary and absolute in the populist narrative more than anywhere else – does not equal scientism or the idolatry of science, and its methods are actually diverse and multiple. As Naomi Oreskes puts it, 'in diversity there is epistemic strength', and 'objectivity is likely to be maximized when there are recognized and robust avenues for criticism, such as peer review, when the community is open, non-defensive, and responsive to criticism, and when the community is sufficiently diverse that a broad range of views can be developed, heard, appropriately considered' (Oreskes 2019, 53).

To act as an antidote to the ever-present risk of radicalization of the contrasts and oppositions promoted by the populist rhetoric (Collins and Evans 2019), politics and science, rather than providing superior truths, should both draw on the toolbox of democratic values, preserving and celebrating freedom, equality, pluralism and solidarity – all of which entail respect for the other (Collins 2019).

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Misinformation, Social Media and the Pandemic Crisis: Challenging the Return to a Powerful Media Effects Paradigm

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Introduction

In 2018, The *American Journal of Bioethics* published a comment by Emilio Mordini (2018) from the Haifa University Health and Risk Communication Center, discussing the proposal of Dr Edwards et al. that was advanced in that same issue (Edwards et al. 2018) to deal with the Ebola virus, aiming at reaching 'interspecies herd immunity' through animal and human vaccination. Pondering the practical and ethical implications of this strategy, one of Mordini's main concerns was the risk that 'testing a new vaccine on apes in the wild' could generate 'an epidemic even worse than Ebola: an epidemic of mistrust and fake news' (Mordini 2018, p. 56). The medical communities dealing with the virus were, in fact, seriously worried by the possible interferences with their work caused by the irrational behaviour promoted by a 'myriad of conspiracy theories about Western governments, "Big Pharma" secret plans, mysterious and clandestine experiments on apes, top-secret labs in Africa, escaped engineered viruses, bioweapons, and so on' (Mordini 2018, 56). Since the very beginning of the Ebola outbreak, medical and public health journals devoted systematic attention to the role of social media platforms in spreading misinformation (Pathak et al. 2015; Fung et al. 2016) – in the present paper used 'as an umbrella term to include all forms of false information related to health' (Wang et al. 2019) – as a precondition for mitigating its undesirable effects.

This 'epidemic' approach to social media communication is typical of the way in which the relationship between social media platforms, scientific (mis-)information and consequences of people's behaviour for public health policies has been framed in medical and public health journals, especially regarding epidemic outbreaks (Wang et al. 2019) and resistance to vaccination (Evrony and Caplan 2017; Ortiz et al. 2019). Actually, it participates in a broader revival of the behaviouralist 'powerful media effects' paradigm (Anderson 2021), adapted for a networked environment that has gained momentum in the wider field of media studies with the debate on post-truth (Waisbord 2018) and fake news (Tandoc 2019) – especially after the moral panic following the Cambridge Analytica scandal (Carlson 2020; Bratich 2020). Chris Anderson (2021) observes how this now dominant paradigm adopts elements derived from two incompatible approaches in the tradition of the studies of 'media effects' (for an overview, see Nabi and Oliver 2009). From the so-called 'strong effects' theory,[19] it derives a conceptualisation of media effects that disregards 'what stands between media

and the individual decision act' (51) and conceives messages as unidirectional vectors of persuasion that transform people's behaviour in a direct and somehow mechanistic way, creating 'widespread, irrational social effects' (52). At the same time, it derives from Katz and Lazarsfeld's 'limited effects' theory attention to the mediating role of social relationships, understanding social media 'as a web of nodal social linkages whose media messages effect individual behaviour through a cascade of networked ties' (52). For Anderson, this hybridisation between incompatible paradigms has been fostered by its close resonance with the algorithmic epistemology underlying current data science, informing the logics of functioning of social media platforms, the data sets that can be derived from them, the methodologies to analyse them and ultimately (and un-self-reflexively), media studies theory, itself. Meanwhile, it would be promoted to a dominant role by the structural determinants represented by the strategies of key funding agencies (like the European Research Council), aiming at funding research efforts immediately spendable to contain the unwanted effects of fake news and misinformation.

As expected by Anderson, the current COVID-19 pandemic crisis and the warnings by the World Health Organization about the risks of an ongoing *infodemic* (an information overload making medical information and misinformation hard to distinguish) have promoted a further upsurge of research conducted within this paradigm, making it the dominant one in the field of science communication studies. It is, therefore, urgent to explore its internal articulations to investigate its eventual blind spots in addressing the topic of misinformation in the current phase of platformisation of science communication. In what follows, I will proceed in two steps: I will first draw on systematic and scoping reviews of pre- and post-COVID-19 medical, public health and science communication empirical research or on exemplary studies published in leading journals of the same fields to sketch a map of the paradigm and of its continuities before and after the present pandemic crisis. I will then draw on different approaches within the media studies tradition – mainly, audience studies – to highlight what seem to be the main limitations of the currently dominant epidemic paradigm.

The 'Epidemic' Paradigm: Virology, Immunology, Epidemiology of Social Media Misinformation (and its Remedies)

Significantly, Anderson titles his insightful discussion of the current trends in media studies 'Fake News Is Not a Virus' and mentions the 'epidemiological notions of media transmission' that inform Facebook's logics. Actually, the epidemic metaphor can be pushed further. In the current literature feeding into the powerful media effects paradigm, in fact, it is possible to recognise three main branches of research – virologic, immunologic

and epidemiologic – that approach social media misinformation, all of them ultimately aiming at the containment of its circulation and the mitigation of its effects.

Virology of Social Media Misinformation

Virology as a scientific discipline focuses on the structure of viruses, their classification, and the mechanisms they employ to infect host cells. A first branch of studies on social media misinformation assumes a virological perspective and draws on (mainly quantitative) textual analysis to classify the textual units circulating in social media spreading misinformation and to identify their recurring structural features: their contents, the rhetorical strategies adopted, the language used, their formats and visual formatting, and the use of images and other multimedia resources. This branch of research also aims to shed light on the capacity of these structural features to generate the effects of persuasion. Kapantai and colleagues (2021) have, for example, recently drawn on a systematic review to propose a complete (while potentially open) taxonomy of online misinformation, including 11 typologies (from hoaxes to clickbait): Medical and public health misinformation could possibly fall under several categories, but it would be mainly ascribable to *pseudoscience* ('information that misrepresents real scientific studies with dubious or false claims') (Kapantai et al. 2021). In this way, the authors intend to support multidisciplinary research, tackling the specificities of each category to design 'actions and tools to fight disinformation' (1326). Other approaches focus deeper on messages delivering misinformation on a specific topic. Wawrzuta et al. (2021), for example, address antivaccine messages, warning that 'reading antivaccination webpages for even approximately 5–10 minutes negatively affects the perception of the risk related to vaccination' (2), which emerged from a large-scale experimental study by Betsch et al. (2010). To 'help suppress vaccine hesitancy' (10), they propose a systematic review of empirical studies published between 2015 and 2019: In line with 'previous research examining antivaccine website content' (9), they ascertain that antivaccine social media messages not only 'contain false information about vaccines' (8), but they also feature images, celebrities and a plain and emotional style that makes them more popular than pro-vaccine messages. In light of these recurring characteristics, the authors recommend further research to create 'effective tools to automatically detect fake news' (10). Specific aspects of the textual units have also been scrutinised to ascertain their effects on perceptions of the message, users' engagement, or the message's efficacy to correct misinformation. It is the case, for example, of the use of humour (Vraga et al. 2019; Yeo et al. 2020), aggression (Chu et al. 2021) or fear-arousing sensationalism (Ali et al. 2019).

Finally, other authors have moved their attention from messages to users' comments to experimentally test their effects on the perceived credibility of the commented-upon scientific claim (Flemming et al. 2017; Petit

et al. 2021; Gierth and Bromme 2021). Gierth and Bromme (2021) have, for example demonstrated relevant effects on the perceived credibility of scientific claims and users' agreement, in particular of comments 'using thematic complexity as an anti-science argument' (242) or – for topics like vaccines and homeopathy – moving accusations of partisanship.

The main purpose of a virology of social media communication of this sort is to develop automatic detection systems of misinformation to monitor the ongoing communicative trends on platforms (see Lugea 2021; on vaccines, see Karafillakis et al. 2021), to flag – or delete – suspicious content, as in the containment strategies adopted by Facebook (Iosifidis and Nicoli 2020) or to prepare ad hoc strategies of debunking.

Immunology of Social Media Misinformation

In biology, immunology studies organisms' immune systems and the factors that make them vulnerable or resistant to pathogens. A second branch of studies of social media misinformation assumes an immunological perspective and draws mainly on psychology and social psychology to identify the individual factors that make people more vulnerable – or more resistant – to believing and to reposting unreliable pieces of information.

At the beginning of the pandemic outbreak, for example the *Royal Society Open Science* published a multi-country comparative survey (Roozenbeek et al. 2020) investigating the main factors fostering a belief in misinformation about COVID-19: making 'getting information from social media' resulted one of the key predictors. Drawing on previous literature, they also aimed at probing the role of age, gender, education, numeracy skills, political orientation, self-identification as a member of a minority and trust in scientists and the government. A systematic review by Pian, Chi and Ma (2021) added to these individual factors the lack of health and eHealth literacy and psychological states (like anxiety, fear and depression). In a sort of vicious circle, these last factors are affected by misinformation consumption, and at the same time, they affect the intensity of reposting 'rumours'. Other studies (Wang et al. 2019) investigate the role of information processing skills and information verification strategies, cognitive processes (including the lack of reasoning: See Bronstein 2019; Pennycook and Rand 2019), epistemic beliefs, previous beliefs, information literacy, critical thinking and reliance on emotions, finding for each of them positive or negative correlations with misinformation acceptance and reposting.

Motivations for sharing misinformation are investigated in a similar way. Apuke and Bahiyah (2021), for example adopt a uses and gratification approach[20] to demonstrate through a survey that altruistic motivation is the main predictor for sharing fake news related to COVID-19, together with information sharing, information seeking, socialisation and passing time (some of the main motivations investigated in the tradition of the

approach). Experimental approaches are also commonly adopted: Williams Kirkpatrick (2021), for example demonstrates the role played by psychological proximity and perceived threat on sharing misinformation, as well as the mitigating role of personal knowledge about the specific scientific issue at stake.

The main purpose of this immunologic branch of research on social media misinformation is to strengthen the factors of people's resistance to the effects of exposure, in particular through ad-hoc literacy programmes that could fill their 'deficit' (Sturgis and Allum 2004; Bucchi 2008) in scientific knowledge, media literacy and epistemic competences, to help them to better benefit from scientific or medical information in social media, without the risk of engaging in irrational and harmful behaviour due to exposure to misinformation.

Epidemiology of Social Media Misinformation

Epidemiology studies the patterns of the distribution and circulation of a disease in a population and the factors determining them. The third branch of studies of social media misinformation moves its focus from individual factors and behaviours to the network effects emerging from the interplay between users' behaviour, social network structures and platforms' algorithms. Basically, it draws on social network analysis and data science to identify the logics and patterns of the diffusion of misinformation among interconnected users. At its simplest level, this implies the quantitative assessment of the typologies of misinformation circulating on social media platforms. A recent systematic review by Suarez-Lledo and Alvarez-Galvez (2021) of articles published in English before the COVID-19 pandemic outbreak has, for example classified the main health-related topics affected by misinformation for different typologies of social media platforms (social networking, microblogging and media sharing platforms), finding out that 'health misinformation on social media is generally linked to the following six topical domains: vaccines, diets and eating disorders, drugs and new tobacco products, pandemics and communicable diseases, noncommunicable diseases and medical treatments and health interventions' (10). The authors highlight how 'health misinformation prevalence for each topic [varies] depending on platform characteristics' (10), with 'the prevalence of health misinformation (…) on Twitter and on issues related to smoking products and drugs' (11).

Several studies aim at mapping the infodemic in a more fine-grained way, for example though sentiment analysis (as systematically reviewed in Alamoodi 2021) or by addressing its spatio–temporal dynamics using stigmatised and official terms in search engines (in particular, using Google Trends). Hu et al. (2020), for example monitored the use of stigmatised monikers against China in 60 'countries and territories' from December 30, 2019, until July 15, 2020. Rovetta and Bhagavathula (2020) applied a similar 'Infodemiological' study to Italy, finding out that 'misinformation was

widely circulated in the Campania region and racism-related information in Umbria and Basilicata' (6). Cinelli et al. (2020) adopted a properly epidemiological approach to calculate the R_0 for 'mainstream social media' (Twitter, Instagram, YouTube) and less regulated platforms (Reddit and Gab), with $R_0 >1$ revealing the risk of an infodemic. They find out that 'despite the differences among platforms, (…) they all display a rather similar distribution of the users' activity characterised by a long tail' (2) and that 'information deriving from sources marked either as reliable or questionable do not present significant differences in their spreading patterns [that would rather depend] by the interaction paradigm imposed by the specific social media or/and by the specific interaction patterns of groups of users engaged with the topic' (6). Finally, the authors admit some relevant differences between the analysed data and the progress of real-world epidemics (like, for example R_0 values out of scale and abrupt jumps in the number of 'infected' subjects) that would suggest caution in the application of epidemic models to 'social contagion phenomena'.

These results are in contrast with other studies reporting differences in spreading patterns between information and misinformation: For Pulido et al. (2020), for example during the pandemic crisis, 'false information' on Twitter would have been tweeted more but re-retweeted less than science-based information. Similarly, Vicario et al. (2016) have compared the 'anatomy of cascade' (number of reposts during the overall lifetime of propagation) for 'scientific' and 'cospirationist' content on Facebook, finding that 'viral patterns related to contents belonging to different narratives differ' (558). In fact, both types of content have 'a first peak at ∼1–2 h and a second at ∼20 h, indicating that the temporal sharing patterns are similar' (556). Conversely, they present specific cascade signatures, suggesting that "science news (…) reach[es] a higher level of diffusion quickly, and a longer lifetime does not correspond to a higher level of interest. Conversely, conspiracy rumours are assimilated more slowly and show a positive relation between lifetime and size' (p. 558).

In any case, the authors demonstrate that the 'homogeneity [of networks of friends] is the primary driver of content diffusion' (558), with both kinds of content spreading within homogenous, secluded and polarised clusters of users: It is the phenomenon of so-called 'echo chambers', the object of another large – and still not completely conclusive – number of studies (systematically reviewed in Terren et al. 2021). This last line of enquiry, which investigates the networks of misinformation propagation at a structural level, is complemented by studies on 'vital nodes' (Zhao 2020) and 'superspreaders' (Yang 2021). Regarding this last topic, a growing number of studies are focusing on the role played by non-human agents, like bots and scripts, in the propagation of misinformation (Broniatowski et al. 2018), and on automatic procedures for their individuation and containment (systematically reviewed in Orabi 2020). The declared main purpose of this epidemiological approach to misinformation in social media communication is once again practical, consisting of the attempt to better

monitor the progress of misinformation spreading and to better focus on intervention (and moderation) strategies.

To conclude this overview, the practical aims of all three lines of research just reviewed are supported and sustained by other lines of research that intend to ascertain the real-world effects of exposure to misinformation – for COVID-19-related misinformation, public psychological issues, trust loss, inappropriate protective measures and panic buying behaviour – as emerging from the systematic review by Pian et al. (2020). Research also seeks to measure the actual effectiveness of different remedies, like for example, social rating (Kim et al. 2019), social media interventions for the ex-post correction of misinformation (Walther et al. 2020), 'psychological inoculation (or *prebunking*) as an efficient vehicle for conferring large-scale psychological resistance against fake news' (van der Linden et al. 2020, 1) or the use of deep learning and machine learning tools for the automatic detection of misinformation (Varma et al. 2021).

Beyond the Strong Effect Paradigm, Once Again

The key methodological choices of research within the epidemic paradigm have not gone without criticism. The most relevant ones regard the construction of the research object, the delimitation of the research field and the individuation of causal links. Regarding the construction of the research object, several authors have indicated how the fundamental distinction between 'true' and 'fake' news – or 'information' and 'misinformation' – that represents the methodological linchpin of each of the three strands of research just reviewed is hardly tenable (Venturini 2019; Krämer 2021). The problem here is clarifying on what kind of epistemic authority the researchers ground this preliminary operation and pondering in a self-reflexive way its political implications: questions rarely addressed in actual empirical studies. Clearly, the problem of 'telling the true from false' is particularly evident in the case of public scientific controversies (Friedman et al. 1999) and with infodemic outbursts, when conflicting opinions from the scientific community are overexposed, when the statute of truth for a claim can change over time and when, by definition, information and misinformation are hard to distinguish even for experts.

Regarding the delimitation of the research field, most of these studies focus on a single platform, or at best assume a comparative perspective. Some attempts at trans-media epidemiologies of misinformation have been undertaken (see, for example Gunaratne et al. 2019, and Kearney et al. 2020, on the relationship between social media disinformation and the release of controversial documentaries like *Vaxxed* and *Plandemic,* respectively). Nonetheless, research on the epidemic paradigm seems quite far from addressing the present interconnected information ecosystem.

Finally, regarding the third criticality – the individuation of causal links – the authors of the already-mentioned multi-country survey on COVID

misinformation published by *Royal Society Open Science* (Roozenbeek et al. 2020) admit in a footnote how they could not disentangle the causal direction of effects in this study. Both options are plausible, i.e., belief in COVID-19 misinformation could reduce willingness to get vaccinated, and prior vaccine hesitancy could increase belief in misinformation. (…) A supplementary linear regression with misinformation as the dependent variable and with the question "Would you get vaccinated against COVID-19" as an independent variable (…) shows that being willing to get vaccinated against the virus is a significant predictor of lower susceptibility to misinformation in three out of four countries (Spain being the exception)" (Roozenbeek et al. 2020, 12).

Actually, this does not seem to be the case of this study only, even if the directionality of the identified casual links is very rarely questioned.
Yet, the problem with the epidemic paradigm is not as much about its internal flaws and therefore its ability to provide *answers*. Indeed, with any paradigm, it is more about the formulation of the *questions* it allows – or does not allow. In these final remarks, then, it is not my intention to retrace the critics moved since the early seventies to the behavioural/epidemic paradigm in a debate that is now part of media studies canon. Rather, I will point out what I believe are key overlooked *questions* to interrogate the topic of 'misinformation' in the current platformisation phase of the media system (Van Dick et al. 2018). In particular, I will discuss those inspired by another paradigm: the one represented by the long thread of research originating from Stuart Hall's encoding/decoding model of communication (1973), proceeding with reception studies and then with the ethnographic tradition of audience research (see Moores 1993), with Roger Silverstone's domestication theory (Silverstone et al. 1992) and its adaptations to the new media system (Bakardjieva 2005), up to the 'practice turn' in media studies (Couldry 2004) and the related invitation to decentre media studies (Morley 2009). This different paradigm, in fact, elects as its main research interest exactly what stands between 'media and the individual decision act' (Anderson 2021, 51) and it is therefore neglected by the epidemic paradigm: Basically, social actors' interpretation of media messages as a situated practice of meaning making (Anderson 2020) and the broader social practices in which media-related activities participate (Tosoni and Turrini 2018). This does not mean that, in this paradigm, possible 'effects' deriving from 'exposure' to misinformation are denied entirely. Rather, it means acknowledging an active role for social actors in their relationship with media and media content. This active role must be properly investigated to understand the phenomenon of production, circulation and acceptance of misinformation (like any other kind of media content). To keep the discussion less abstract, I will draw on an ongoing research on the circulation of knowledge refused by the scientific community regarding the harmful effects of 5G technology to propose illustrative examples of the main research questions originating from this approach.

Questioning Engagement with 5G Refused Knowledge on Social Media from an Interpretive and Practice-centred Perspective

The object of the research from which we are deriving our example is people's engagement with *knowledge refused by the scientific community* (from now on, RK: refused knowledge) regarding 5G technology. Actually, RK and *misinformation* – the umbrella term we adopted in this paper to refer to all forms of false information – cannot be regarded as synonyms. On the one hand, in fact, the second term is somewhat narrower than the first, referring specifically to claims that fall under the epistemic authority of one (or more than one) specialised scientific community and that have been discarded or disregarded by that same community: for example, claims about the existence of the non-thermal harmful effects of 5G electromagnetic waves. On the other hand, as anticipated, the term *misinformation* implies an attribution of truth from the researcher that the term RK does not require. In a way that is more compatible with the principle of symmetry of the sociology of scientific knowledge (Bloor 1976), the researcher simply highlights the refusal of the scientific community to accept a claim as true – or even as worth falsification. While this distinction is methodologically very relevant for research on 5G, it is hardly pertinent in the discussion that follows. This discussion, in fact, intends simply to highlight the different sets of questions that arise when people's engagement with controversial information on social media is interrogated from an interpretive and practice-centred perspective. These questions can be grouped into at least five distinct yet interrelated areas of investigation.

First, people engaged with 5G-related content do not access it by just logging into their favourite social network account and finding it in their feeds, as selected by algorithms. They may actively look for it, subscribe to the pages and channels of the influencers they acknowledge as alternative knowledge authorities, join groups discussing the specific topics of their interest or focus on a plurality of controversial issues. Similarly, they can regularly access 'hostile' spaces to protest, defend their opinions or simply be informed of 'mainstream' positions. Moreover, they do not necessarily access RK on a single social media platform. When engaging with RK, they can also be pointed to a network of debating spaces on other platforms and instant chat applications, like groups on WhatsApp and – especially after the recent intensification of content moderation activities by the mainstream platforms – Telegram. In these spaces, they can receive hints about resources outside the web, like in the case of documentaries or TV programmes, or in real life, such as meetings, conferences and other pubic encounters. In summary, people engaged with RK carve out and assemble from the mediascape a 'media territory' (Tosoni and Tarantino 2013; Tosoni and Ciancia 2017) and eventually integrate it with offline participation to remain engaged with the RK topic(s) of their interest. Such a space is by far more complex and dynamic than the one defined by the circulation of a single piece of misinformation, as traced by the epidemiology of

misinformation. This suggests questions about how media territories are articulated, how they are actively and collectively assembled by social actors, how and why they evolve in time and how people individually navigate within them. Defining the borders of the observation field, questions about RK-related media territories are of pivotal relevance for any other enquiry about social media engagement with RK.

Second, media territories are of key relevance to tackle the actual interpretation of specific RK-related pieces of information (Scheufele and Krause 2019), which is by far more elaborate than their mere 'acceptance' or 'refusal'. Online spaces, in fact, participate in a relevant way in the sociocultural context of the situated practice of meaning making. Within media territories, these messages are selected, circulated and discussed collectively in a confrontational or collaborative way. The most active and persistent groups may work for all intents as gatekeepers and 'interpretative communities' (Fish 1980), not only accepting and refusing single pieces of information, but also negotiating their meaning and assembling them into broader narratives, adopting specific epistemologies. For example, in line with what has been observed by Gagliardone et al. (2021), for conspiracy theories, the narratives regarding the harmful effects of 5G morphed in time depending on sociopolitical contingencies in broader context. Before the pandemic crisis, groups discussing 5G-related RK strictly focused on 5G technology (thanks also to moderators of WhatsApp chats and Facebook groups) and grounded their claims on studies published in regular scientific journals (and yet received with scepticism by the larger part of the scientific community). After the pandemic crisis, these same groups adopted a scientific–populist rhetoric (Mede and Schafer 2020) and a populist epistemology (Saurette and Gunster 2011) to collectively produce more syncretic – and sometimes conspirationist – narratives, holding together 5G technology, vaccines and the pandemic crisis as parts of a global transhumanist plan. Similarly relevant are the actual production and assemblage of these narratives and broader worldviews. In other research on techno-paganism online (Tosoni 2011), I observed how some online subcultures assemble their belief system through cooperative practices lacking any form of central authority and closely mirroring the typical production procedures of Linux and other open-source software, including calls for comments and episodes of forking. This invites researchers to formulate questions on the interpretation and negotiation of meaning of RK-related media messages, their encapsulation in broader narratives and their relationship with the socio-political context, their underlying epistemology and actual practices of production.

Third, people's engagement with 5G–RK-related media content is not limited to their interpretation or to their use as resources to produce broader narratives and worldviews. Actually, it may also include a wide range of media-related activities that cannot be simply reduced to reposting or commenting. They may, for example include translating content from other languages, digitally subbing videos, resuming information from many

sources in a new text, printing and distributing it offline or rewriting text using periphrasis and typographical camouflage (i.e. typing 'c0v1D' instead of 'COVID') to elude systems of automatic content recognition commonly used by social media platforms for content moderation (and by researchers adopting the epidemic paradigm for data mining). These practices of circumvention of gatekeeping by social media platforms includes, among other things, archiving contents that risk being deleted by platforms in online repositories and cloud accounts. Notably, these archives helped form a sort of 'canon' of 5G–related RK- resources crucial to producing broader narratives. Some groups have also used these archives to quickly socialise new members or as resources to quote in case of conflictual debates (online or offline) with 5G enthusiasts. Moreover, for many users, and activists in particular, these activities are seen as part of broader practices of engagement that cross the boundaries between online and offline. These may include leafleting, collecting signatures, public speeches, legal assistance and other activities of lobbying and pressure on local administrations or central governments. This invites researchers to formulate questions about the plurality of users' activities related to RK contents and messages, as well as about the inclusion of these activities into broader social practices, online or offline.

Fourth, the reference to activists draws our attention to the limitation of conceiving users simply as differently interconnected nodes in a network. Within 5G–RK-related media territories, it is possible to recognise a constellation of social groups interacting only online – using one or more platforms – or both online and offline. These groups have their specific social structures, which include formally defined social roles – like the ones of admins and moderators – and less formalised status systems.

A high status can be, for example achieved through knowledge and titles, organisational skills, commitment or simply showing charisma in discussions. Other users may, in turn, simply 'lurk' in the conversations in a group, or the posts of a Facebook page, remaining nearly anonymous to other users. These systems of statuses and roles define an uneven distribution of power that is relevant to the already-discussed practices of meaning making and other ongoing activities. For example, after some attempts at resisting it, admins played a key role in opening their 5G-related RK groups and pages to the syncretic and populist turn, radicalising it with their own posts and comments. This implies that it is not fully possible to comprehend the practices of interpretation and meaning making of RK without conceiving users properly as social actors and questioning the role of the social structures in which they participate and of their forms of unequal distribution of power in shaping meaning-making practices and other RK-related activities.

Finally, the relationship between beliefs and behaviour also needs to be investigated beyond the individuation of causal links. Rather than being simply an 'effect' directly stemming from a belief in RK, behaviour depends on decisions taken by active social actors within specific contexts in which,

as already clarified, media territories participate. Like interpretations, in fact, behaviours can be apprehended, discussed and negotiated online. For the 5G–RK case, they can, for example consist of attempts to reduce the level of electromagnetic pollution, switching to cable connections, turning off cell phones during the night or installing electromagnetic shielding. More notably, online resources are also of key relevance to learn how to evaluate the efficacy of the adopted conduct: This can happen, for example by following the advice of other users and purchasing specific technological devices to measure the intensity of the electromagnetic field in one's own environment or learning how to read in one's own's body the worsening or the amelioration of the symptoms of the effects of those same fields (like headaches, deficits in attention or sleep disorders).

Conclusion

In this paper, I have shown how research on the circulation of health-related misinformation (see Anderson 2021, on misinformation in general) responds to a behaviouralist epidemic paradigm that in recent years has become dominant and that has gained further momentum with the ongoing pandemic crisis. The main purpose of this dominant paradigm consists of delivering information to better tune up the (algorithmic) strategies of online misinformation containment currently adopted by social media platforms (Colombo et al. 2017).

From this point of view, controversial media content is conceived as a sort of viral pathogen affecting people's behaviour, to be contained through (algorithmic) eradication and through strengthening people's resistance to the risk of contagion related to exposition. Furthermore, the epidemiological study of the diffusion patterns of this information through reposts should contribute not only to the automatic detection of 'contagion' phenomena, but also to the optimisation of intervention strategies, for example identifying super spreaders to be targeted with ad-hoc measures. In this sense, the epidemic metaphor informs both the understanding of online 'misinformation' and the actual strategies to contain it. The recourse to mainly quantitative methodologies, based on data mining and automatic and semi-automatic procedures of content analysis, contributes to further simplifying the modelling of the ongoing processes in favour of the individuation of macro phenomena and tendencies.

Consequently, the dominant paradigm ends up deploying, often in a non-self-reflexive way, an impoverished theoretical framework that hardly contributes to shedding light on people's engagement with controversial resources on social media. For this undertaking, instead, it is of pivotal relevance to adopt an active model of social actors.

As suggested by the interpretative and practice-centred paradigm within audience studies, this means conceiving social actors as negotiating their beliefs and behaviours inside specific sociocultural contexts,

including online ones. As I have tried to show, adopting this perspective brings the researcher to focus on research questions that are neglected in the dominant paradigm and that are, however, unavoidable for a better understanding of the ongoing processes of platformisation of science communication.

Admittedly, the knowledge generated by this different set of questions cannot be immediately employed to develop practical strategies for 'misinformation' containment; yet it is of pivotal relevance to improve our understanding of all the key issues of the current debate on the relationship between science and society.

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"Stop Saying you Did your Research: You are the Research!". Rethinking Lay Expertise in Online Communities

Barbara Morsello

Introduction

During my ethnographic fieldwork about vaccine (vax for short) freedom online communities, I came across the statement "You are the research!" several times. In contexts where lay expertise and knowledge-making processes are mobilized to discredit prevailing scientific regimes of truth, as in the case of vax-free communities, users show a growing need to perform their agency over health issues, overcoming institutional mediation or delegation to experts. Drawing on ethnographic research in vaccine freedom online communities, this contribution aims to offer reflections regarding the role played by lay expertise in online communities during the COVID-19 pandemic. This work is conceptually framed within the fields of science and technology studies (STS) and media studies. It aims to shape a dialogue among three research streams about 1) the emergence of alternative forms of epistemologies and experience-based knowledge-making processes, 2) online platforms and the "platformization" of health literacy and 3) the current conspiracy theories. These three research streams are considered to gain a better understanding of some aspects related to the emergence of alternative truth regimes during the SARS-CoV-2 health emergency.

Lay expertise and alternative knowledge have long been studied in STS. The role of lay expertise in knowledge-production processes is now well known, particularly in studies involving biomedicine, patienthood and health-related activism. The many ways in which lay knowledge is produced, co-constructed and disseminated, including genetic condition

(Conrad and Gabe 1999; Kerr et al. 1998, 2007; Panofsky 2011; Tutton 2007), self-tracking or Quantified Self (Heyen 2020) and daily learning about one's illness or condition (Pickersgill et al., 2015; Pols 2014), produce new forms of experiential knowledge that can become moments of claiming one's role in knowledge-production processes or recognizing individual rights (Rabeharisoa et al. 2014).

Trust in technoscience has gradually declined in most Western countries (Beck 1992; Inglehart 1997). The epistemic authority that science holds today is often contested. Other forms of knowledge and expertise are on the rise, such as alternative and complementary medicine, alternative nutritional regimes and New Age philosophies of life (Campbell 2007; Hammer 2001; Heelas 1996). However, the question is not so simple because the decline in trust does not concern technoscience as a whole but its specific areas. In addition, trust in science is a multidimensional concept because: people evaluate scientific institutions differently than they evaluate scientific principles and methods (Huber et al. 2019). Some people trust the principles and methods but not the institutions.

Although these signs of public disbelief occur with some regularity and intensity (Van Zoonen 2012), plenty of statistics about trust in science are relatively stable and high across time (Critchley 2008).

The Eurobarometer 468 survey (2017) shows that despite a significant decline in trust in public institutions, particularly governments and justice, trust in democracy and the European Union remains constant. In this regard, Coleman (2012) clarifies the distinction between primary and secondary trust by revealing the paradox of trust in the main institutions of knowledge but distrust in what they claim as true. A particularly relevant aspect for this present paper's topic concerns the complicated connection between the concepts of trust and political efficacy. Coleman (2012, 40) argues that "to experience a sense of political efficacy is to believe that a communicative relationship exists between oneself and the institutions that govern society". When low levels of trust are combined with high levels of perceived efficacy, the potential for unconventional action is a probable outcome (Gamson 1968).

People who do not trust institutions but trust themselves adopt forms of action that circumvent official pathways. Coleman et al. (2011) points out that some Internet users experience high internal effectiveness (individuals' belief in their own ability to influence the political world) using online communication as a means of influencing public opinion, but at the same time, users experience low external effectiveness (individuals' belief in political institutions' responsiveness to public pressures) in influencing their elected representatives. Under these circumstances, citizens feel that they can influence the world around them but at the same time, experience a deep sense of frustration in their inadequate ability to make a difference within the political system. Therefore, if in online spaces, users can experience their ability to make a difference by influencing public opinion, it becomes crucial to observe the online communities where users can activate

forms of citizenship and knowledge construction "from below".

Social media is a particular kind of platform, where users can meet a plurality of voices, often expressions of personal knowledge based on user experiences and opinions, which Van Zoonen (2012) calls "*I*-pistemology". However, online platforms expand the role and form of lay expertise, which interconnect with others, giving rise to forms of syncretism, new theories and communities that are increasingly capable of challenging the epistemic authority of science by proposing new regimes of truth.

Since the 2020 health emergency, this process has become increasingly evident, with a proliferation of online communities advocating alternative truths about the pandemic.

SARS-CoV-2 as a biological entity, not fully stabilized in scientific knowledge, has activated multiple narratives, forms of activism and resistance, and strong hostilities towards institutions that have tried to manage uncertainty.

Experience-based Knowledge

The SARS-CoV-2 virus has struck globally, forcing a structural revision of societies, as well as economic, health and political priorities, and introducing new practices to cope with the spread of the virus. Therefore, scientific knowledge has become part of everyday life. Today, everyone speaks easily and without claiming specific expertise about viruses, RNA, molecular swabs, epidemiological data and constitutional laws and freedoms. The use of scientific knowledge to give meaning to everyday life is translated in various practices – with the use of the mask and molecular and antigenic swabs as appropriate, the control of temperature and symptoms, and the assessment of risks related to exposure to viruses in everyday contexts. In fact, being informed daily about epidemiological trends has transformed people's routine in terms of its limits and possibilities, returning to the subject of an unprecedented responsibility, both for individuals and public health. The integration of these new practices and knowledge has required considerable effort, even on the part of laypeople, to understand what is happening from health and social perspectives and what has actually produced such a huge fracture in the structures of meaning that characterize the infrastructure of people's daily lives. At the same time, scientific disagreement and the proliferation of conflicting information have required people to become more involved in matters of public interest, where institutions are not always able to provide clear answers in a short time, since the timing of science almost never coincides with society's need for answers (Funtowicz and Ravetz 1993).

In this context of high epistemological uncertainty, of not knowing what is true or who can be trusted, people have found someone or something to blame and then have turned to themselves as alternative sources of knowing and understanding (Van Zoonen 2012). In this situation of

unstable trust in knowledge institutions, personal experience has become a resource of meaning in order to face the present. Experience-based knowledge again brings the subject to the centre, with the belief that intersubjective experiences are adequate substitutes for technical knowledge (Grundmann 2017). Observing the communities that arise around specific forms of refused knowledge,[21] as in the case of the vaccine, a technology well established in mainstream biomedicine but strongly opposed by specific communities, it might be said that from their perspective, personal experiences of the subjects can be perceived as affordable substitutes for technical knowledge (Harambam 2020). Societies are increasingly knowledge dependent, and people are increasingly accustomed to the idea of having to manage knowledge, with the aim of making decisions in a landscape of individualized risk. In online groups, one of the prevailing discursive strategies for the free choice of vaccine is the use of the experience of vaccine damage, whether personal or that of friends and/or acquaintances, which assumes greater legitimacy than the epidemiological data. The experience of pain exceeds the aseptic nature of cold scientific data.

Anti-COVID vaccines fuel a lot of counter-narratives based on the authority of personal experience. An example is the proliferation of videos where users demonstrate, by letting a coin adhere to the point of inoculation, that vaccines contain dangerous metals and that through them, a microchip is installed in the human body, with the aim of controlling citizens. The videos are available everywhere on the web and aspire to be considered evidence by most of those who support the thesis that vaccines are harmful to the population. The so-called "vaccine magnet challenge" has become viral and has travelled via transmedia, ranging from TikTok to Facebook, to end up in private user groups on telegram and WhatsApp. As of May 14, 2021, a video of the magnet challenge (Fig. 1) had been shared over 22,800 times on Facebook and had more than 20,000 views after only 25 seconds from its publication on Instagram (Reuters 2021).

Fig. 1. 20/05/21 Instagram video on magnet challenge posted
by Twoangrychefsnews and reported by Reuters Fact-Check (2021)

It is becoming increasingly difficult to follow the trajectory of such kinds of media objects, such as videos, posts, photos and so on, especially in light of the multiplication of their configurations. The first video that launched the challenge was actually born on the Instagram profile of "Keep_canada_free", where a woman first showed the strange phenomenon that would prove the theory behind post-vaccination magnetism. Several authoritative press channels, such as BBC, Forbes (2021), and so on, have committed to "disassembling" this theory. Several scientists have also committed to disseminating information materials online, through press releases, as well as videos on YouTube, with the aim of stopping the proliferation of the magnet challenge. Most of them have been deleted and are now impossible to find. However, the phenomenon whereby users provide "proof" of the microchip by chasing vaccinated people while holding a coin does not seem to have ceased.

In the realm of contested knowledge, the knowledge of laypeople competes with that of scientists for epistemic authority. They resist regimes of truth through which science has legitimate power to define, describe, explain and delimit domains of reality (Harambam et al. 2014). As Collins et al. (2020) argue, the laity possess "ubiquitous meta-expertise" that enables them to choose domains when seeking expert opinions, such as whether a vaccine is safe. However, this process of selecting domains of expertise is

not as linear as it may seem, which the COVID-19 pandemic has demonstrated.

On one hand, citizens claim greater unity of experts and sources who are considered reliable in order to delegate vaccine choice; on the other hand, they mobilize heterogeneous expertise to address the problem of choice. The vaccine is a peculiar example of biopolitics because it embodies political visions, ideas of society, the body and health and could be related to what Rose (2007, p. 3) calls the politics of "life itself"; "it is concerned with our growing capacities to control, manage, engineer, reshape, and modulate the very vital capacities of human beings as living creatures".

Online Communities and Social Media Platforms as Multipliers of Truths

During the most intense phases of the SARS-CoV-2 spread, citizens have been susceptible to contracting the disease and have had to adopt strategies to cope with the risk in everyday life. Sanitizing hands and environments, maintaining social distancing, wearing a mask and learning to recognize symptoms are just some of the practices adopted as part of a generalized risk category. Undoubtedly, in the generalized risk situation, as in the case of the pandemic, citizens have experienced different levels of perceived risk and have therefore individually employed knowledge, behaviours and practices that they considered useful for their condition and coherent with their values. An online survey conducted in Finland (Soveri et al. 2021) has shown that although individuals with less trust in official information sources have a tendency to ignore official recommendations during the COVID-19 pandemic, these same individuals use complementary and alternative medicine (CAM) to manage their level of perceived risk. Those who do not adhere to the official recommendations spread by the media, as in the case of the vax-free community, often mobilize other information resources, including alternative experts, online information, blogs and personal experiences. At the same time, users who refuse to wear a mask and be vaccinated are very careful about their health by taking massive doses of vitamin C and supplements to boost their immune system, drinking alkaline water and following specific dietary regimens

In the case of the pandemic online platforms, social media has been a resource for providing information and sometimes challenging the authority of experts by reaching a vast number of hesitant people who have turned to the web. During the COVID-19 pandemic, online users have practised bio-digital citizenship (Petryna 2002, 2004; Rose and Novas 2004) where collectivities, such as the case of vax free communities, organized against specific biomedical classifications, mobilized themselves to build citizenship through communities linked electronically by email lists and websites (Petersen et al. 2019). Many of these activists fiercely oppose the power

and claims of medical expertise that classify them as at risk of contracting the SARS-CoV-2 virus, as well as civically irresponsible for refusing vaccination. The Internet and the information society are characterized by their extensive distribution of knowledge (Jensen et al. 2012, 2), and social media platforms are privileged venues for the circulation of experience-based knowledge assembled by laypeople. People in online communities can virtually face one another, share knowledge and information, as well as create alternative truths and fight for them.

For example, the theories on the vaccine issue that circulate online arise from a more complex set of alternative forms of knowledge, which are constituted as sociotechnical assemblages in which worldviews and technical aspects related to the contested objects are connected. The anti-COVID vaccine stance has been embraced by communities contesting this type of assemblage as a metaphor for "health dictatorship" or an emblem of a health system corrupted by pharmaceutical lobbies. At the same time, immunity is an ambivalent concept for anti-vaccinists. On one hand, it evokes the natural functioning of the biological organism; on the other hand, it is associated with the biomedical manipulation of the body enabled by vaccines. These communities are engaged online to produce and disseminate as much information as possible to support their thesis that immunity is a natural process that cannot be reproduced technically, if not with negative consequences for their physiological body. Currently, the issue that should be analyzed in the production of knowledge from below is that social media platforms are never neutral spaces; they are spaces of permanent relationships over time and repositories of ready-made knowledge. Moreover, researchers cannot ignore the fact that online spaces belong to specific platforms that arbitrarily decide the ways of value production in them.

In fact, platforms comprise different actors, human and non-human, who condition, foster and influence, more or less consciously, the flow of information. As Van Dijck et al. (2018) suggest, platforms are programmable architectures designed to organize relationships between and among users. Platforms are composed of algorithms and interfaces, which are formalized by ownership relationships driven by specific business models and governed through user agreements.

The ways in which value is created in society have always been a subject of interest in order to understand how society shapes individual behaviour and vice versa. Regarding online platforms, their business models refer to the ways in which economic value is created and captured (Van Dijck et al. 2018, 10). In online platforms, value is measured in various types of currency: money, attention, data and user valuation. These economic elements, together with the technological ones, steer users' interactions and shape social norms.

This ecosystem of heterogeneous elements either encourages or discourages certain types of connections and behaviours within the platform. Perverse effects, such as echo chambers, filter bubbles or the polarization of certain content, help resonate with certain content by consolidating

worldviews among members of different communities. It is also true that during the pandemic, YouTube (among others) has altered its content moderation policies to bring to the surface more "authoritative information" while removing videos that contain "medically unsubstantiated claims" (Humbrecht 2020).

Sociotechnical mediation of information by platforms is a key element. During the pandemic, a content analysis of videos posted on YouTube, which is a major source of information about science, technology and health, especially for young people (Anderson and Jiang 2018), shows that although the most viewed videos related to COVID-19 use mostly verified sources, only a fraction of users turns to institutional channels to find useful information. In fact, the majority are videos produced by different users. In some cases, they try to advance counter-narratives of the pandemic phenomenon; in others, they disseminate truthful and verifiable information without the mediation of experts or specific expertise. However, in the cases of videos where highly politicized health news and information are minimal, their contents receive far more engagement in the form of comments than any other type of video (Marchal and Au 2020).

Conspiracy Theories as Radical Modernity

Conspiracy theories are not new phenomena, but society is in a particular moment where they manage to penetrate more environments and social circles. Postmodernity (Lyotard 1979) is characterized by particular emotions, feelings, intuitions, personal experiences, customs, metaphysics, traditions, myths, religious sentiments and trustworthy knowledge. Finding alternative explanations of reality is a quite common phenomenon in postmodern society and is part of the broader field of contested knowledge. This knowledge primarily challenges the dominant truth regime (Foucault 1977), introducing another version of reality that often criticizes hidden economic interests and programmed global inequalities. In the public sphere, particularly online and social media platforms, conspiracy theorists strive for public recognition of their ideas by sharing information widely and contesting the information provided by those who have power, such as journalists, scientists and politicians (Harambam 2020). The dissemination of conspiracy theories and the growing online communities that support an alternative regime of truth show how the construction and management of truth is not a linear process and has become problematic at some point. The epistemological solution for studying this phenomenon without adopting the dominant perspective and judging such communities as just irrational, lies in "dividing the 'truthers' and the 'post-truthers' (…) in terms of whether one plays by the rules of the current knowledge game, or one tries to change the rules of the game to one's advantage" (Fuller 2018, 53). In a sense, conspiracy represents radicalized modernity, where individuals, through their experiences and expertise, can

compete in the construction of the prevailing regimes of truth against in-stitutions. The monopoly of truth – scientific, political, economic and ed-ucational – is no longer the prerogative of institutions but of individuals who can compete and spread or share their messages and build new inter-pretations.

In an age of epistemic instability, a historical context where the truth can no longer be fully guaranteed by one epistemic authority, institution or tradition, the spread of relativism and ambiguity of knowledge and trust is quite an expectable consequence.

The epistemic authority of experience and the conspiracy milieu have a shared imperative to actively "connect the dots" (Aupers and Houtman 2006; Heelas 1996; Van Zoonen 2012) that through online platforms be-comes a collective process. The growing number of Internet platforms, where citizens offer advice (based on their own knowledge and experi-ences) on matters ranging from finance to cultural entertainment, is not quantifiable. They are asked to share their knowledge and perspectives on social reality and advise others on what to do. "In this way knowledge be-comes a capacity to act" (Grundmann 2017, 27) and to manage uncer-tainty. The COVID-19 pandemic has made communities of actors chal-lenge current regimes of truth more prominently in the public sphere as the vast space of institutional, political and especially scientific uncertainty has somehow made more attractive a perspective based on a "theory of everything", where it is possible for anyone to make sense of what is really happening, independently of one's expertise.

Conclusion

Citizenship in the contemporary era of biomedicine manifests itself in a series of struggles over individual identities, forms of collectivization, de-mands for recognition, access to knowledge and claims to expertise.

Users do so by creating new spaces of public dispute over bodily expe-riences and their ethical implications and generating new objects of con-testation and new forums for political debate, novel questions for democ-racy, and original styles of activism. The growing consumption of health news online shows that (1) users are able to choose when and where to consume news, (2) news offers are increasingly personalized, and (3) the consumption mode switches from a passive to an active one (Purcell et al., 2010). The users who support alternative knowledge on vaccines belong to a particular category because they fight for a common goal, that is, the free choice of vaccines. Therefore, they try to build online spaces to carry out their claims, weld alliances and claim expertise, activating a progressive disintermediation of the official expert in knowledge management. The ex-pert is not necessary to access knowledge, so it is possible to examine these phenomena as forms of digital biological citizenship "from below", outside the prevailing biomedical paradigm.

Social media has changed not only individuals' access to health information but also their ability to create, adapt and use information. Digital media technologies, especially social networking sites (SNSs), have greatly accelerated the proliferation of different types of knowledge by encouraging laypeople to share their personal and experiential knowledge that complements and sometimes challenges the knowledge of accredited experts (Epstein 1996; Hardey 2002; Koay and Sharp 2013; Labonté 2013).

Undoubtedly, from Web 2.0 onwards, users are more active and participatory in the creation of content. It is no coincidence that researcher speak of "user-generated content" (UGC; see Han et al., 2018) and prosumers (Ritzer and Jurgenson 2010) to refer to the new digital users who are simultaneously producers and consumers. The UGC of social media allows citizens to produce knowledge, including knowledge about their own experiences, and to advocate changes in health-related policies and practices, particularly those affecting treatment (Lupton 2013, 2014).

Despite the fact that platforms, such as Facebook, WhatsApp and WeChat, claim to have millions of active users, recent research has confirmed a paradox of participation, given that although the Web is free to use, it generates economic or social value for platform owners. Although there are positive examples, today private companies, such as Facebook, Twitter and other SNSs, actually make profits from user-generated content (written posts, videos, photos, etc.) without any expense on their part (Balbi and Magaudda 2018). Contemporary society can be interpreted as a pluralistic knowledge society where competing types of knowledge coexist. To make a brief classification, four types could be recognized, namely everyday knowledge, special knowledge based on practical experience, traditional knowledge and scientific knowledge (Harambam and Auspers 2014). Different types of knowledge compete with one another to achieve epistemic authority (from time to time) for solving specific and especially situated problems. The situational approach (Haraway 1988, 1989; Suchman 2002) can help researchers to understand the interchangeability of different types of knowledge. In everyday life, which is the primary locus where the subject employs one's knowledge to solve practical problems, scientific knowledge is configured as a resource that is sometimes difficult to use. At the same time, in an individualized society characterized by generalized uncertainty and the multiplication of forms of public participation through online platforms, it is easy to witness an election of knowledge based on personal experience as evidence to describe reality and establish new regimes of truth. Laypeople play a fundamental role in producing and disseminating knowledge in society, capable of challenging the epistemic authority of science through experiential, situated and shared knowledge. This is not yet a generalized phenomenon, but it is evident enough to require careful reflection, especially in places where it is more difficult to follow knowledge production. Today, in fact, the methodological tools used to follow online controversies are still limited, also because of the objective limits set by the platforms (Veltri 2020).

The uncertainty caused by the health emergency has put a strain on the production of ready-made knowledge, being a phase of science in action (Latour 1988). However, it has long been the case that laypeople have relied on their ability to construct ready-made knowledge under conditions of uncertainty. This is particularly evident in managing the relationship with one's body and health, where a layperson manages information through the use of online platforms as support for experiential expertise. Google and other online search engines and social media platforms have flexible authority in common (among other things), precisely because they leave more space for personal experiences. Much remains to be done to understand the role of platforms in building the expertise of laypeople, which is becoming more urgent than ever in the face of a radicalization of uncertainty related to adverse events. After all, in the face of the enormous climate, health, political and social crises, the SARS-CoV-2 outbreak will not be the last stressful event in which laypeople and society itself will be called on to mobilize reliable knowledge in order to overcome the challenges ahead.

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Acknowledgements

[1] For a summary of positions on possible alternatives, with specific reference to the pandemic context: Pennings and Symons (2021) in response to Savulescu (2020).

[2] The term 'the people' does not usually denote a concrete physical group of individuals, but rather functions as an 'empty signifier' to refer to a group having a purported moral superiority, depicted as homogeneous and thus able to express the *volonté générale*. This will is considered to be the legitimate foundation for political and societal decisions (Mudde 2004).

[3] 'The elite' is seen as the villainous antagonist of 'the people' and includes political, economic, legal, cultural and intellectual groups (Mudde 2017).

[4] According to Jan-Werner Müller, these tendencies have a 'set of distinct claims and (…) an inner logic' (Müller 2016, 10).

[5] Described as one of populism's 'core principles' (Mede and Schäfer 2020, 476).

[6] Defined as '*decision-making sovereignty',* 'the right to formulate science-related *power claims.*' (Mede and Schäfer 2020, 482).

[7] Defined as '*Truth-speaking sovereignty',* 'the right to determine valid information about the world' (Mede and Schäfer 2020, 483).

[8] Europe, for instance – even before the pandemic crisis – was affected by a relatively widespread anti-vaccine sentiment. According to a 2018 study, 59% of Western Europeans – and just 40% of Eastern Europeans – thought vaccines were safe, compared with the global average of 79% (Bickerton 2021).

[9] Similar attitudes already created problems during the H1N1 pandemic (Fidler 2010).

[10] Callaway, E. (2020), T*he unequal scramble for coronavirus vaccines — by the numbers*, in "Nature", 24 August 2020.

[11] For example, Hungary licensed Russia's Sputnik-V coronavirus vaccine, ignoring calls to stick to a common European vaccine policy. About the risks of developing a "gray market" see Stevis-Gridneff (2021).

[12] Le Pen took the chance to say that 'The European Union has failed totally', and that 'They still tell us that as 27 countries we are stronger, but that is false — the solution must come at the national level, for this issue as in many others'. Meanwhile Orban, Salvini and Morawiecki discussed the possibility of creating a new populist alliance for the EU Parliament based on the values of 'Atlanticism, freedom, family, Christianity, sovereignty and opposing anti-Semitism' (Hopkins et al 2021).

[13] See the Commission Implementing Regulation (EU) 2021/442 and 521, both of 11, March 2021, making the exportation of certain products subject to the production of an export authorisation, introducing the criteria of proportionality and reciprocity.

[14] The AstraZeneca (lately named Vaxzevria) vaccine's efficacy was questioned by some countries in people over 65, on the basis of unclear and unofficial information; its administration was later suspended (temporarily or definitively) over fears that it could cause blood-clotting problems in isolated cases and was finally recommended in some countries (Italy is an example) only for people over the age of 60.

[15] See the report at: https://yougov.co.uk/topics/international/articles-reports/2021/03/07/extent-damage-astrazeneca-vaccines-perceived-safet.

[16] Eurofound, *Living, working and COVID-19 (Update April 2021): Mental health and trust decline across EU as pandemic enters another year*, see the report at: https://www.eurofound.europa.eu/publications/report/2021/living-working-and-covid-19-update-april-2021-mental-health-and-trust-decline-across-eu-as-pandemic.

[17] In this respect, a relevant example is Florida Governor Ron DeSantis' call to not trust the elites (DeSantis 2021).

[18] Here, the most suitable example is Viktor Orban's use of the virus to increase his political manoeuvring room (Rohac 2020). On the different faces of populism during the pandemic, see: Ganesh (2021), and, on the different responses to the COVID-19 crisis given by different populist parties, see Bobba and Hubé (2021).

[19] This label was attributed by Katz and Lazarsfeld (1955) to a plurality of actually diverse (and often non-academic) hypotheses on the capacity of media to generate strong effects 'to overturn [them]' (Anderson 2021, 45).

[20] Launched by scholars like Jay G. Blumler, Michael Gurevitch, Elihu Katz and others, the uses and gratification approach is a long-lasting tradition of research within media studies: It draws on social psychology to shed light on the motivations bringing people to engage with media or to performs specific tasks with media (see, for example Blumler and Katz 1974; Katz et al. 1973). In recent years, the approach has been adapted to social media, instant messaging services and other new communication platforms (see, for example Wang et al. 2012).

[21] The term "refused knowledge" refers to knowledge that is supported by a community or a group but rejected by prevailing scientific institutions.