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RESEARCH ARTICLE

The Conspiracy Theory/Vaccine Hesitancy nexus as rhetorical boundary work. A critical analysis of the production of scientific ignorance in literature reviews

Nicola Stocco
University of Padova

ABSTRACT: With the Covid-19 outbreak the request for useful knowledge to inform policy measures rapidly escalated. On the verge of infodemics, vaccine hesitancy and conspiracy theories have been individuated as major threats to society which need rapid responses. In this context of uncertainty, literature reviews are a great way to retrieve useful knowledge from the large and dispersed amount of knowledge produced in the last two years. Nevertheless, the structural process of reviewing is not a neutral process of evidence retrieval and can lead to the deformation of initial knowledge through synthesis and simplification. Furthermore, the boundary work in the review process, if not properly critically assessed, can polarize the distinction between scientists and non-experts. Drawing from STS literature on boundary work and scientific ignorance production, this article critically analyzes 12 literature reviews regarding the nexus between conspiracy theory and vaccine hesitancy. The results highlight how the rhetorical construction of the ignorance areas leads to the neglected arguments in the form of an implicit elitist discourse which reproduce the deficit model of policy intervention through the preference for the psychological explanation. Furthermore, the uncritical assumption of the rightfulness of the evidence retrieval leads to polarization in the construction of otherness and depoliticization of agency. The implications are discussed, along with examples of more creative and emancipative reviews.

KEYWORDS: Conspiracy theory; boundary work; rhetorical analysis; depoliticization; scientific ignorance; vaccine hesitancy

Corresponding author(s): Nicola Stocco, nicola.stocco.4@phd.unipd.it

1. Introduction

Many scholars argue about the *infodemic* as an exacerbation of the characteristics of the post-truth society, in which uncertainty about social reality is enhanced by the spread of fake news and conspiracy theories. Indeed, in the pandemic situation, the spread of the virus is followed by misinformation and disinformation about Covid-19 and related issues (Pertwee et al. 2022). In this context, the nexus between vaccine hesitancy and conspiracy theory has become a central tenet of the expert discourse regarding the potential threat to public health. As a prominent example, the WHO (2019), along with UNESCO (2022), states that the danger of, respectively, vaccine hesitancy and conspiracy theory is no less than the virus itself, because of a lack of trust in the public institutions and science, political radicalization, violent extremism, and last but not least, the denial of the several policies applied by the statal and international institutions (from collective ones such as lockdowns and vaccine passports to individual behavioural safe measures).

The current policies used to face the emergency situation are informed by expert knowledge that reproduce the *deficit model* of human rationality. Its rationale has been one of the tenets of the neoliberal governance model and is grounded on the paternalistic consideration of laypeople as unable to understand expert knowledge and act rationally for their health (Dardot and Laval, 2016; Pellizzoni 2020; Pellizzoni and Biancheri 2021). The social and political outcome has been the restrictions of citizens' agency towards the criminalization of dangerous behaviours, with the consequent increase of police force deployment to enhance social control (Pellizzoni and Sena 2021).

However, both categories of *conspiracy theory* and *vaccine hesitancy* have been used as derogative terms, as well as in the public sphere as in the scientific literature (Goldenberg 2021; Thalmann 2019; Bertuzzi 2021). As Osimani, Ilardo and Castaldo, (2020) point out, the main communicative strategy used in the journalistic discourse to legitimate the adoption of policy measures has been the rhetoric of war, in which the Other is seen as an enemy to defeat. One of the rhetorical devices has been the reduction of vaccine hesitancy to a manifestation of conspiracy beliefs, legitimizing the overlapping of the two categories and closing the room for every possible critical debate.

While this rhetorical usage is recognizable in the public discourse by its direct political aims, the scientific discrediting of the categories is subtly implied in the taken-for-granted assumption of the expert discourse itself. The main issue that will be addressed in this article is the construction of Otherness implied in the boundary work of the scientists (Gieryn 1983). This epistemic process could lead to the proliferation of neglected areas of inquiry. These areas of ignorance (Proctor and Schiebinger 2008) are the direct expressions of the power that the scientist holds over the definitions of the *regimes of truth* (Lorenzini 2016) by which the scientific inquiry is legitimated, and in which the public policies are planned and managed.

The problems inside the scientific discourse arise when the rhetorical reduction of ignorance permits overcoming the critical literature about vaccine hesitancy and conspiracy theory, adopting a personological paradigm based on the pathologization of individual rationality (cf. Sutton and Douglas 2022).

Using a theoretical lens mainly based on the Science and Technology Studies (STS) literature, in particular building on boundary work literature and ignorance studies, this article will critically assess the rhetorical use of the nexus between conspiracy theory and vaccine hesitancy in the scientific literature produced in the verge of the ongoing pandemic situation.

In the following section, I set out more specifically the theoretical basis mentioned above, highlighting the reference literature and connecting it with the objects of research. In section 3 I expose the methodology and in section 4 I report the results related to the current literature available. Lastly, in section 5 I set the concluding remarks, along with the limits of this research and the possibility for future improvements.

2. Theoretical Framework

The rationale of this article relies on a socio-constructivist approach to the scientific discourse. Used widely in the STS (cf. Latour 1987; Latour 2004), it conceives scientific knowledge as a social construction based on

rhetorical claims that actively shape facts and evidence in a negotiated dialogical process. Further development shifts the focus of inquiry from scientific knowledge to scientific ignorance. However, as the STS literature has highlighted, the production of expert knowledge does not follow a linear way. Despite the common perception of neutrality of science (typical of positivist epistemology) that from good evidence derives good policies, the epistemic dynamics in the production of expert knowledge are the results of conflicts, neglected issues, and power relations, to name only a few examples. The elements of this epistemic dynamics of production of both knowledge and ignorance are deeply entrenched. Thus, this subdivision has to be intended only as an analytical division, not as a depiction of separate layers of social reality, but instead as different moments of the complexity of the epistemic dynamics. In the next sections, the theoretical framework will be unravelled, starting from the objects of the nexus, and following with the presentation of STS literature on boundary work and scientific ignorance

2.1 - Defining the objects of research: conspiracy theory and vaccine hesitancy

In this section, I delineate some features useful to collocate the object of research in the wider context of their conceptual development. The main paradigms, approaches, and critical stances will be portrayed to give a glimpse of the basis on which the conspiracy theory/vaccine hesitancy nexus stands out.

Vaccine hesitancy

The concept of vaccine hesitancy indicates the wide range of behaviour that surrounds the skeptical attitude toward vaccination. But despite the phenomenon is old as the vaccination itself, it has a recent history as a concept. A turning point in the institutionalization of the concept must be noted in the special issue of Vaccine (volume 33, number 34, 2015), where a group of authors provided one of the most used definitions of the phenomenon: "Vaccine hesitancy refers to delay in acceptance or refusal of vaccination despite the availability of vaccination services. Vaccine hesitancy is complex and context-specific, varying across time, place, and vaccines. It is influenced by factors such as complacency, convenience, and confidence." (MacDonald 2015, p.4163). In 2019, WHO enhance its statement by acknowledging this phenomenon as one of the greatest threats to world health.

This definition is tight enough to indicate the subjects of matter, but at the same time, it is enough open to leave room for further exploration of related components. Cervia (2021), points out that the construction of the concept after this definition has led to a hypostatization of vaccine hesitancy as a phenomenon involving only the receivers of the public policy, erasing the responsibility of the other actors like health care staff and public institutions. In this space for novel research, the boundaries of scientific and medical knowledge are easily blurred by personal commitment, prejudice, beliefs, and ideology. The common tropes involving these contested boundaries can be summarized as the elitist discourse, the lack of trust in expertise, and pseudoscience (Goldenberg 2021).

The elitist discourse against vaccine hesitancy is widely accepted in the public sphere as well as legitimated by expert literature, reproducing an old-fashioned class hatred using depreciative terminology to designate ignorance, scientific illiteracy, and irrationality. This kind of narrative which individualizes the responsibility of the behaviour is useful to frame the issue as a war between us and them, where the Others are the enemies. The use of these war metaphors is therefore useful to legitimate the deficit model policies even in a flawed representation of social reality (Lello 2020; Goldenberg 2021).

The lack of trust in expert knowledge relates to the representation of the war rhetoric, by which the contestations of scientific and institutional authority are seen as a sign of a lack of rationality, cognitive bias, or scientific illiteracy. Therefore, this narrative fails to acknowledge the change that expert knowledge has been through in the last decades. The reference to "post-truth" highlights the shift of the societal role of expertise to a more porosity between episteme and doxa (Pellizzoni 2021). As Goldenberg (2021) highlights, the traditional boundaries of expertise are being challenged and redrawn by the growing demand of public participation.

The pseudoscience trope refers to the distance from scientific knowledge and is used mainly to demarcate the line of expertise from fake claims. This narrative reproduces the positivistic vision of neutral scientific knowledge through the rigid distinction between episteme and doxa (Pellizzoni 2021). It is also the main argument related to beliefs in conspiracy theories, which find its cornerstone in the Wakefield controversy. Wakefield and colleagues published a study in a legitimate scientific journal with suit-up data to endorse the causal relation between MMR vaccination and autism, fuelling the related conspiracy theory (Goldenberg 2021). Despite the nexus between vaccine hesitancy and conspiracy theory being based on true facts, it is not a necessary relation and does not cover the entire range of possible explanations.

As we will see in the next paragraphs, the discourse on vaccine hesitancy resembles in its constituency a boundary work on the definition of expert knowledge.

Conspiracy theory

The literature on conspiracy theory has furnished the scientific discourse with a lot of definitions. As we will see, the struggle to reach a definition is still a matter of debate, but we can set some common phenomenological characteristics: the conspiracies are always active, the enemies are never sleeping; the enemies are part of a restricted group that has a malevolent plan against a specific group which is the victim of the plot; since the plan is hidden, every aspect of the reality can be part of the plan; there is no coincidence, everything is a sign that confirms the conspiracy theory (Fuchs, 2021; Butter and Knight 2020). Despite these phenomenological common tropes, some questions about their nature remain open: are conspiracy theories an inherent part of the human mind, or are they expressions of a specific historical period? Are the conspiracy theories evidence of structural epistemological fallacy or are they dependent on factors like cultural context and social function?

These questions are the results of the peculiar epistemological paradigm and scientific disciplines that have tried to respond. The effort to understand the inner characteristics of a conspiracy theory starts with the work of Popper (1966) and Hofstadter (2012 [1967]). Firstly, Popper refers to conspiracy theory as the consequence of the decaying of the societal role and significance of religion in western societies. His arguments rely on the clear distinction between what is scientific and what is not, *de facto* using the concept of conspiracy theory to demarcate the boundaries between scientific, rational knowledge and non-science, irrational knowledge. Secondly, it is thanks to the work of Hofstadter that the mainstream paradigm in the conceptualization of conspiracy theories has been called the "pathologizing paradigm". In his analysis he traced a continuity between paranoid personality disorder and the beliefs in conspiracy theory, connecting individual pathology to a collective set of beliefs. Both acknowledge conspiracy theories as an epistemological fallacy, as a demonstration of the irrationality of the believers (Butter and Knight 2020). This continuity in the individual explanation has been taken over by psychology and psychiatry which had stabilized the paradigm with sound statistical evidence of the mental and social deviance of the believers (Raab 2018). This kind of explanation has been later acknowledged with the term *generalist*, and became the mainstream typology of explanation, in expert and scientific discourse as well as in common sense (Dentith 2018).

The central role of psychology as the discipline legitimated to produce knowledge about conspiracy theories has been tackled by the "cultural turn" in the 90s. Briefly, authors from different disciplines (sociology, history, literature, and cultural studies) challenged the assumption of the pathologizing paradigm, favoring an approach that does not blame the individual in itself, but as the response of wider systemic conditioning (Butter and Knight, 2020). For instance, historical studies have shown as conspiratory rhetoric has been used since the France Revolution in political discourse as a communicative strategy to gain consensus; cultural studies had highlighted the influence of the mass culture industry in the commodification of conspiracy and the consequent availability of conspiracy explanation to common sense (Thalmann 2019; Butter and Knight 2020).

Furthermore, the philosophical debate had developed a critical vision contrasting the generalist, namely the *particularist* approach (cf. Hagen 2022). This approach drops the epistemological fallacy assumption to embrace a social epistemology; briefly, it sustains that truth is not determined by logical premises. Rather, truth has a social scope, is negotiated in the social arena, derives from peculiar historical and cultural

conditions, and is ultimately an explanation of social reality. Thus, the concept of conspiracy theory needs to be detached from rigid logical distinction and to be approached from a more situated point of view (Dentith 2018). From here it derives the call of many critical scholars (Boullier, Kotras, and Siles 2021; Dentith 2018) for a closer look at conspiracy believers and to treat conspiracy theory as a serious thing, by first abandoning the true/false dichotomy based on logical premises, as proposed by the generalists.

This context leads toward the shift in the epistemic consideration of conspiracy theory as an inner character of an irrational mind, to the conspiracy theory as a dialogical product. Following the particularist approach, this shift points to a revaluation of the social reality as it is experienced in everyday life. Drawing from critical accounts like the semiotic approach (Leone 2016), such as the socio-cultural approach (Harambam et al. 2022), we can see conspiracy theory as a rhetorical device that establishes truths, like a contemporary mythology. For instance, the semiotic approach rejects considering conspiracy theory from an elitist point of view, with an a priori assumption about what is wrong and what is right, but it focuses on "the discursive conditions that encourage the proliferation of such conspiratorial or anti–conspiratorial thinking, and simultaneously also the more difficult purpose of suggesting how to reframe conflict in a different discursive framework, one that does not simply create rhetorical conflict but casts the basis for social action." (Leone 2016, p.15). Referring to the conspiracy theory/vaccine hesitancy nexus, Leone claims that "the problem of conspiracy theories on vaccines, from a semiotic point of view, lies not in their supposed logical or scientific fallacy, but in the fact that they are a means to voice a social preoccupation that would, otherwise, remain unexpressed, that is, anguish toward the increasing deconstruction of scientific and also medical knowledge in the new digital arenas. Semioticians and other social scholars should, therefore, operate not for the debunking of such supposed conspiracy theories, but for the creation of a collective space in which the evident confusion of present-day digital scientific communication could be raised as a problem, discussed, and possibly redirected toward more convenient solutions." (Leone 2016, p. 15).

In this article, this critical particularist approach will be the base to conceptualize the conspiracy theory. Furthermore, one of the scopes is to assess the use of psychological explanations in the scientific discourse, along with the pathologizing paradigm.

2.2 - Boundary work and literature reviews

As the STS literature highlight, the concept of boundary work has been used to indicate the demarcation between science and non-science. In his pioneering conceptualization, Gieryn (1983, 1999) uses a cartographical approach to highlight the negotiations of scientific edges and authority over a research field. This implies a "science war" by which scientists "conquest and defend" territories of their competencies, to affirm their epistemic authority over other fields of knowledge like politics, journalism, and pseudoscience: "The history of science is a "border war" since the boundaries with "other" intellectual activities were neither stable nor permanently settled" (Haraway 1985, p.29).

In a synthetic definition, "boundary work is about an ideological style found in scientists' attempt to create a public image for science by contrasting it favourably to other intellectual or technical activities in order to advance their interests or to resolve their inner strains" (Gómez-Morales 2007). Further advancements point out the fundamental role of rhetoric, as this statement from Holmquest summarizes "the demarcation of science from non-science is a rhetorical problem" (1990, p. 251). It is a matter of how arguments shape the objects of research rather than a literary style.

Boundary work literature focuses on the edge between scientists and non-scientists. In fact, a lot of studies have been conducted looking at the communication between science and other fields of expertise, and between science and the wider public, non-experts. Looking at the topics of this article, the literature offers some insights. For instance, Fonseca, Ribeiro, and Nascimento (2022) have conceptualized the boundary work as strategic rhetorical use of ignorance to legitimate an "alternative" view of science. In this case, the boundary work has been politically directed to favor the position of Bolsonaro, by a communicative mobilization in which the uncomfortable knowledge has been silenced and rejected in a systematic manner.

Conspiracy theory as boundary work has been addressed by a few scholars (Harambam and Aupers 2015, Harambam 2020). But despite the lack of literature engaging both boundary work and conspiracy theory, both concepts have common roots, starting with Popper. His argument on the demarcation of science from non-science has been the basis for both concepts. As we have already seen, conspiracy theorists are the epitome of "irrationality", the non-science by default. Thus, the boundary work in a conspiracy theory regards precisely the definition of the Otherness: the construction of an epistemic alterity that can be the bases of the definition of what science is by contrast to what is not.

However, this study will take a different route, looking at the formal communication inside the scientific community by taking the research articles as the material of the study (Gross et al. 2002; Carro 2021). In particular, I will focus on review articles, due to their role in the legitimation of certain kinds of evidence as scientific knowledge.

A critical stance has been conducted in the reviewing process. In particular, Hammersley (2013) criticizes the systematic review process due to its commitment to the positivistic view of scientific knowledge, which takes for granted the role of evidence as a linear progressive process. Moreover, McMahan and McFarland (2021) show "creative destruction" as a set of processes that involves the literature reviews in the synthetization and simplification operated in the definition of a field of studies. "By curating the published research in an area, reviews highlight certain connections between publications while obscuring others, dramatically simplifying a domain of knowledge. They focus scholarly attention on a few key publications and the relations between them at the expense of the broad majority of the research in a domain. Upon inclusion in a review article, the seminal research in a domain is apt to become forgotten, replaced by work that drew connections between existing ideas rather than generating new ones." (McMahan and McFarland 2021, p.371)

Here I use *evidence digestion* as a broad term to refer to this set of criticism. Furthermore, from this criticism, we can consider the review article as an object used by scientists to affirm their epistemic authority by portraying a specific set of ideologies, paradigms, and areas of inquiry as legitimate space for scientific knowledge. Therefore, the effort of this article is to analyze the boundary work in the process of evidence digestion as strictly connected with the production of structural ignorance. The following section will delineate this peculiar way of scientific ignorance starting from the ignorance studies literature.

2.3 - Scientific ignorance and the production of evidence

Scientific ignorance is generally conceived as the background that allows to do scientific knowledge claims: the rhetorical space necessary to produce knowledge (Stocking and Holstein 1993); or in Pinto's words: "a state of non-knowledge resulting from scientific research" (2019, p.199). The rationale is to consider ignorance not only as a fuzzy lack of knowledge but as a structured epistemic environment, in a dialectical relation with knowledge (Pinto 2019). Different research tradition has focused on the production of ignorance in a scientific context, such as undone science and agnotology (Oreskes and Conway 2010; Wehling 2021; Croissant 2018; Gross and McGoey 2015). As agnotology scholars highlight, scientific ignorance can be an active or a passive process. The active process regards the systematic production of an absence, through the distraction and distortion of public attention; the passive process regards the bona fide neglect of arguments, knowledge gaps, and involuntary choices (Proctor and Galison 2021).

The studies on ignorance take their route from the concerns of Smithson (1990) about the acceleration in the production of scientific knowledge, which sets "a turnover on what constitutes established scientific knowledge or truth" (p.134). Systematic review relies on the implicit assumption that more knowledge = less ignorance. But, as Beck (1999) highlight, this statement could be easily the opposite: more knowledge = more ignorance. As a notable example, systematic reviews were created to overcome the increasing amount of knowledge, and thus evidence, produced to rightfully inform Evidence-Based Medicine. While the retrieval of evidence is a necessity, it must follow a critical stance in order to become aware of its inner wrongness.

The process of hypertrophic production of scientific knowledge has been acknowledged and criticized by Kirchherr (2022). He argues about the outcome of the "publish or perish" paradigm which leads to the proliferation of predatory and pay-for-publish journals. The consequences are well described by the term

bullshit articles, by which the authors refer to the redundant, unnecessary, and lacking in creativity and significance articles that have been legitimated as scientific knowledge.

In the pandemic situation, the canonical peer-review system requires time that is not available, so the production of scientific knowledge has been pushed through pre-print databases and submitted through fast-track peer-review, as the bioscience exemplified (Flier 2020). The lack of criticism and the acceleration of the process of scientific knowledge production becomes an account of distrust in the eyes of the frightened non-expert public (Fortaleza 2021). The black box of science has been opened and had shown its constitutive uncertainty, enhanced by the emergency has prompted misinterpretation and lay speculation on the mechanisms of scientific knowledge production. Events like the retraction of articles have been seen as proof of the intentional manipulation of data, rather than understanding it as a moment of the process of knowledge-making (Jamieson 2021).

Some scholars have previously engaged in the study of scientific ignorance in the covid-19 pandemic situation: Fortaleza (2020) describes some agnotological strategies that are deliberately designed to distract and others that (unintentionally) lead to conclusions not supported by research findings. Fearnley (2022) analyzed the process of virology theorizing in the case of Covid-19 and proposed that ignorance that led to the delay in virus detection resides on the scale of zoonotic emergence of the virus, that in virology is restricted to the molecular dimension. So, it needs an update from upper-scale disciplines like ecology, migratory studies of bats, supply chains, and farming systems in China. Furthermore, Boullier, Kotras, and Siles (2021) consider either conspiracy theory from an agnotology standpoint to give back the epistemic dignity to the category. They propose three gnoseological actions: suspension of normativity that implies the use of the term in a pejorative way; studying boundary work in the making; situating the digital dimension at the core of the analysis.

Despite the process of communication involves necessarily two actors, the studies on this topic have mostly taken into account the public as the only one responsible for the spread of fake news, infodemics, and so on. This article follows the few research that critically assess the responsibilities of the scientific discourse and its systematic errors.

For these reasons, it is fundamental to critically assess how scientists shape scientific discourse with ignorance and knowledge claims while addressing the problematic relation between conspiracy theory and vaccine hesitancy. The focus will be on the passive process of creation of ignorance, as an unintended product of intentional actions. Therefore a presumption of *bona fide* is implied. Indeed, this unintentional process is based on rhetorical constructions of the conditions of truth in which the scientific evidence is identified. The narrow aim is to try to understand if these rhetorical constructions lead to neglect or obliteration of some parts of the research areas.

3. Methodology

As specified above, due to the great production of evidence, the selected object of inquiry has been the review of literature instead of research articles. This choice has been made because of the structural peculiarity that a review of literature provides, namely: the aggregation of evidence inside a specific paradigm; the default work of the researchers in examining the literature's gaps and unknown; the addition of knowledge through the synthesis work; the possibilities that can be reached with the application of this new knowledge. This article will take as the object of inquiry reviews of literature that engaged with both conspiracy theory and vaccine hesitancy, because of their pejorative epistemological status, and societal relevance. As Kourany and Carrier (2020) point out, scientific ignorance can be detected in the first place as a discrepancy between epistemic value (knowledge-oriented claims) and non-epistemic value (sociopolitical claims). The debate regards their recognizability as separated entities are still ongoing (Kourany and Carrier 2020). Anyway, this separation could be useful as heuristical tool for an analytical purpose, rather than an ontological statement. The reviews are characterized by a merge of epistemic claims and non-epistemic claims. Their scope is literally the translation of scientific evidence to a synthesis that is usable for policymakers (Ghirotto, 2021). This process involves inevitably the use of rhetorical simplifications which I refer to as evidence digestion.

In this article, scientific ignorance is operationalized as an umbrella concept (Gross 2007). It considers the different ways in which ignorance can be conceived as a rhetorical process in the formal scientific discourse: collective memory, disciplinary common sense, neglect, absence, manipulation, gaps, limitation, and another form of scientific ignorance.

To fulfil the aim of this article I use these 4 general research questions as a guide:

1- How are scientific ignorance and knowledge advancement built?
2- How is depicted the conspiracy theory/vaccine hesitancy nexus?
3- Which are the neglected arguments implied in the nexus' rhetoric?
4- How is boundary work performed?

The research query has been launched on the 14th of April 2022, on the Scopus database with the following query:

TITLE-ABS-KEY (conspira*) AND (covid* OR "coronavirus" OR "SARS-CoV-2")
AND (PUBYEAR > 2019) AND (vaccine*)

The search has been limited to: English language and article review type, and results in 38 articles. Of this group, the reviews that consider only one aspect (conspiracy theory or vaccine hesitancy) have been deleted. Even articles that do not deal with Covid-19 have been deleted. After this selection, 16 reviews have been chosen for full-text reading. In this last phase, 4 articles have been excluded due to irrelevance.

The articles have been analyzed with Atlas.ti (v.9), which had permitted a grounded account retrieval of themes and topics. I followed an iterative process for the analysis, which merges *top-down* elements from literature and *bottom-up* elements retrieved by the analysis itself.

4. Analysis and discussion

In this section, I present the analysis of the reviews for each of the research questions that I delineate in the methodology section. Every subsection is followed by a brief discussion of the elements that characterize the scientific discourse and their relevance in light of the theoretical literature discussed in section 2.

In Appendix A, Tab. 1, I summarized the list of literature reviews identified with their relevant element identified in the *top-down* selection. Here I present the results of the iterative process.

4.1 The dynamic of scientific ignorance

Gross (2007) specified a comprehensive taxonomy to indicate the production of ignorance, which proposes an epistemic dynamic that involves several actors (scientists, policymakers, and non-experts). Thus, to remain anchored on the production of scientific ignorance, I follow Stocking and Holstein (1993) in their definitions of the known and the unknown in the formal discourse of scientific articles, namely the *certain area* (CA) and the *uncharted area* (UA). The former is identified by the definitions, citations of other research or authors, and introductory statements of what is already known. The latter is the construction of the researchers regarding the claims of errors in existing knowledge, and it is generally composed of limitations, gaps, and caveats. These areas are composed of the realms of *known-knowledge* and *unknown-knowledge* respectively. It is part of the so-called positive ignorance or the part of the unknown necessary to make knowledge claims (Janich and Simmerling 2015; Stocking and Holstein 1993).

In the context of the literature review, the two different areas can be summarized as the following:

- CA, the Certain Area (introductory statement + aim + added knowledge)

Introductory statements about known-knowledge have been made through a variety of arguments: the state of the emergency and the relative role of science; the statistically assessed correlation between conspiracy theory and vaccine hesitancy; the direct causal relation between conspiracy theory and vaccine hesitancy; the role of misinformation in causing vaccine hesitancy; the relation between conspiracy theory and misinformation; conspiracy theory and health problem; vaccine as the only solution.

The aim is the part of the review that signs the route of the research. At one time it sets the antecedents and the directions that the results can take. It mostly refers to: the mapping of literature; identifying elements and factors involving conspiracy theory or vaccine hesitancy. More specific aims can be found in Appendix A - tab 1.

Additions of knowledge are considered as a real gain that the reviewers are trying to reach, in order to inform further research. Anyway, not all the reviews scrutinized explicitly the addition of knowledge. The others are: a new disciplinary alliance towards sentiment analysis; a confirmation of the rising anti-vaccination movement; confirmations of context-dependency and time-sensitivity of conspiracy theory; confirmations that vaccine hesitancy is influenced by specific socio-demographic factors and health care providers; the correlation between more cultural context and less tendency to believes in conspiracy theory.

- UA, the Uncharted Area (knowledge gaps + limitations + future insights and implications)

As the statement of knowledge gaps from previous literature, it has been found: the lack of vaccine acceptance rates in comparison between countries; the lack of studies that address mental illness and vaccine hesitancy; lack of aggregated evidence for barriers and facilitators to vaccine hesitancy; lack of sentiment analysis in vaccine hesitancy across various scientific domains.

Limitations regards: the little number of articles scrutinized; bias in the choice of articles, due to the limited number of databases; lack of interpersonal evidence on vaccine hesitancy; lack of experimental studies that loosen the causal relation between vaccine hesitancy and conspiracy theory; biases in the recruitment method used in articles; only English articles bias; too broad inclusion criteria and lack of assessment of literature.

A general trend of recommendation is to follow the evidence as proposed in the review. Other recommendations are often indistinguishable from future insights for further research: studies in minority groups; more specific narrative interventions; a more ethical engagement of studies in vaccine hesitancy; to consider conspiracy theory more context-dependent; the shift of arguments towards climate change; generalizability of research; addressing mental health professional role in vaccine hesitancy of patients; additional research on different factors that influence vaccine hesitancy; development of vaccine hesitancy awareness policy; multi-lingual comparative study; development of a universal codebook to assess vaccine hesitancy sentiment analysis; development of tools to automatically detect fake news. The role of health care providers and other professionals is one of the most cited implications. Others regard: the way in which policy can be implemented; the use of evidence to design new policy; new trans-disciplinary research design indications; development of communication strategies between citizenships and institutions.

4.2 The conspiracy theory/vaccine hesitancy nexus

The nexus between conspiracy theory and vaccine hesitancy stands out in different ways, following the principal focus of the review: i) (VH/ct) the majority of the reviews (6/12) put the focus on vaccine hesitancy, leaving the conspiracy theory a vicarious object which is still considered as one of the major causes, or at least a factor which is correlated with vaccination intention; ii) (CT/vh) 3 out of 12 reviews have conspiracy theory (in different declination like irrational beliefs, conspiracy beliefs, conspiracism) as the main object of inquiry, while leaving vaccine hesitancy in the background as one of the possible consequences; iii) (VH/CT) only 1 article engages both conspiracy theory and vaccine hesitancy within the same focus; iv) (vh/ct) 2 articles do not have a real focus on one of the two categories, but anyway they cite them and offer an external context in which read the relation between the terms of the nexus.

Despite these different focuses, it is mostly acknowledged as a given and non-problematic knowledge. The position of the nexus is not always clear: sometimes is claimed as a matter of fact, and so belonging to the certain area (CA), sometimes is shifting towards the uncharted area, in which it becomes a matter of clarification of the relationship. This difference does not interfere with the implied epistemic status of the nexus itself, which in any case it does not need any real critical consideration. In some cases, the relation is more than just a correlation, and it reaches the causation, provided by statistical consistency. Besides the soundness of statistical inference, the rhetorical space for another kind of evidence becomes saturated. In this way, the possibility of a disconnected relationship between the two elements is out of reach from this kind of scientific discourse. The problem here is not that this evidence produced is flawed, but that it closes the rhetorical space to other dynamical accounts of the conspiracy beliefs. The questions that could arise from this kind of explanatory relation neglect the agency of the believers and his profound reasons bound within his lived experience.

The common trope that characterizes the nexus refers to the state of emergency, infodemic situations (misinformation, disinformation, fake news), trust (about institutions, experts or professionals), and deviations from rationality. It further refers to knowledge in which the correlations between conspiracy theory and vaccine hesitancy are well established and do not need any critical consideration.

Definitions delimit the state of knowledge of the objects of research and stand on a reference paradigm. Indeed, definitions of conspiracy theory have not been used as widely as I expected, only 3 articles (van Mulukom et al. 2022; Magarini et al. 2021, Lazić and Žeželj 2021) out of 12 propose an explicit definition. Mostly resides in the works of Douglas and collaborators (2017, 2019): "[Conspiracy theories are] attempts to explain the ultimate causes of significant social and political events and circumstances with claims of secret plots by two or more powerful actors". Notably, Lazić and Žeželj (2021), propose their definition of conspiracy theory based on a narrative memetic account. As regards vaccine hesitancy, only 4 articles use an explicit definition (Roy et al. 2022, Magarini et al. 2021, French et al. 2020, Wawrzuta 2021), based on a loose account of the WHO statement of dangerousness (2019).

To portray the scientific arguments, the evidence retrieved can be summarized in: best practices for vaccinations; factors that impede vaccination; social media communications; factors involving conspiracy beliefs spreading; vaccine acceptance rates. Notably, they are all referring to the possibility of intervention in the wider population treated as a passive population of deviant individuals. Thus, the rhetorical significance of the nexus is to legitimize the knowledge that reifies deviant subjects in modules of intervention for policymakers and institutions. In the next section, the underlying paradigm, ideologies, and related consequences will be discussed.

4.3 The neglected arguments

To assess the neglected argument in the production of scientific ignorance, I rely on the work of Billig (2015). He states that in a scientific context, the rhetorical process of collective memory could lead to a shared common sense inside the disciplinary context which conveys the neglect of some meanings and leaves others as taken-for-granted knowledge.

The first relevant theme to point out is the preference for psychological explanation. Except for Lazić and Žeželj (2021) every article analyzed uses a psychological account in order to explain conspiracy theory beliefs and vaccine hesitancy, sometimes as a lateral issue, other times as the main argument. The implication of such a presentation regards the reductions of the range of possible different disciplinary accounts as explanations in the definition of what is considered evidence. Furthermore, no reference to the ongoing debate in philosophy regarding the definitions of conspiracy theory (cf. Dentith 2018; Hagen 2022) has been found. This uncritical presentation takes for granted a singular reference, namely the pathologizing paradigm, along with the generalist approach, that can be acknowledged by the reader as scientific knowledge. Another side effect is that other accounts of psychological explanations such as critical social psychology and cultural psychology account, (e.g. Gergen 1973, Cole 1998) are thus expunged from the discourse in favor of the socio-cognitive master frame. The problem emerges in the presentation of conspiracy theory and/or vaccine hesitancy as a

deviation from rationality. The mainstream explanation that lies in cognitive psychology assesses the account that there is a wrong way to think about the world, namely the one that is not inside the statistical normalcy. The implicit assumption here regards the impossibility of a structured thinking process for the ones who are outside the rational lines, drawn by the vaccine hesitation and/or the beliefs in conspiracy theory. Thus, the only solution is to find an adequate policy to guide these deficitary individuals towards the right choice, without room for personal meanings or social expressions.

A way to operationalize this problem is to look at 'antecedents and consequences', (or 'cause and effects'). The uncritical acceptance of this kind of process could leads towards a reification of the concepts of conspiracy theory and vaccine hesitancy. They become mere variables or factors used to connect a causal mechanism, oversimplifying the complexity at stakes. It does not offer any true explicative response other than socio-demographic correlations and the request for further research on other socio-demographic factors that can further confirm what is already known: that there is a clear distinction between "us", rational scientists, and "them", irrational others. In a nutshell, the boundary work process circularly looks for evidence that makes the mechanism work, leading toward a recursive process of explication in which cause and effect are interchangeable factors.

Moreover, this reification process leads easily toward the erasure of human agency from the scientific discourse, reproducing the ideological standpoint of neoliberal rationality (Dardot and Laval 2016). The scientific discourse deriving from these reviews tends to neglect the political elements. To be clear, not the right-wing or left-wing preference, but depoliticization, as the limited or not recognized possibility for the social action of people (Fawcett et al. 2017). All these elements contribute to the limitation of agency in terms of epistemic possibility: it regards the capacity for the participation in knowledge production agenda (Lello 2020; Hess 2016). If politics are erased from the discourse, we will not be able to distinguish the political use of conspiracy theory from the genuine possibility of doubt arising from the grassroots. It is crucial nowadays to be able to distinguish the political astroturfing claims that push toward conspiracy theory, especially for the vaccine hesitancy issues. In this regard, the ideological standpoint (Fuchs 2021), based on the "poor cognitive mapping" (Jameson 1988) offers a good insight on the systemic responsibilities in the formation of conspiracy theory, and to understand its relations with vaccine hesitancy. Reframing what Feola (2020) points out regarding transition studies, there is a lack of problematization of capitalism in the literature regarding the nexus conspiracy theory/vaccine hesitancy.

4.4 Boundary work and the construction of otherness

A core feature of the literature review as boundary work products regards the inner potential to portray evidence digestion as a non-problematic process. If not explicitly stated, the canonical review structure impedes the possibility of a critical stance toward the object of inquiry, implying from its premises a boundary between the researchers and the Others. Thus, a discussion on this theme is necessary. A large part of the reviews taken into account in this article presents a reproduction of the standard operating procedure without a critical stance. An interesting feature regards the knowledge that is claimed to be added by reviewers. In many cases, it resolves in the "reinvention of the wheel", with some claims that are merely the repetition of the initial statement. Indeed, the literature review wasn't intended to be revolutionary in Kuhnian terms, but to permit the use of scientific knowledge in its normal state (Hammersley 2013). The term "added knowledge" refers literally to the background in which the systematic review has been conceived, namely the positivist conception of evidence as a solid production of scientific knowledge. Anyway, there are some notable exceptions.

A good way to overcome this structural limitation is the operation that Lazić and Žeželj (2021) have done in their review. They change the position of the theoretical reflection, putting it at the beginning instead of the end of the article; they criticize the conception of conspiracy theory as a reified substance and propose a different ontological status (memetic narrative). This allows them to deconstruct the conspiracy theory in a communicative process that intervenes in the definition of individual positioning towards vaccine hesitancy, recalling the semiotic approach. This change helps the reader to critically reflect on the object of the inquiry

before the analysis, rather than just choosing some relevant literature to broadly define it. As result, they propose a practical set of narrative actions that everyone can use, in order to tackle the conspiracy narrative from an intersubjective level. Furthermore, following an emancipative telos, their review considers not only the experts as the designed audience but everyone who needs their findings. Going into the details, they are the only review that critically assesses the debunking method as a factual narrative strategy to counter conspiracy theory's discourse and propose a positive strategy.

Another prominent aspect of reviews as the product of boundary work is the preferred audience implied in recommendations and implications for the future: mainly experts and professional actors. While it is a structural point of literature reviews (even more if systematic) referring to a wider public of other scientists and policymakers, it is not mandatory to inform them by assuming the correct function of the system of power and exploitation that governs the production of scientific evidence (Florio 2021). A newbie reader of these literature reviews, such as students, could take for granted the lack of criticism as a confirmation of the legitimate soundness of this one-way modality of the scientific discourse. While it is a legitimate action because the nature of scientific discourse requires a dose of boundary work (which needs to be other than mere doxa), it is a way to set a definitive limit between experts and laypeople, reducing the emancipatory possibility and further enhancing a paternalistic intervention design.

Luckily, a glimpse of a critical stance can be found in the work of Alamoodi and colleagues (2021). As they highlight, even if the literature review tends to be a systematic endeavor, the creative stance is necessary to produce a relevant synthesis of evidence: "Systematic reviews are review papers that discuss a topic of interest and identify their most remarkable findings based on the author's perspectives. Many systematic reviews share a high similarity in terms of the approach they use for describing their protocol information. However, systematic review is an art, and that art could be conveyed upon the theme authors apply in their SLR papers to present most remarkable and interesting findings in the best manner they see fit." (p.5). Furthermore, they first briefly state the potential of their article (what it can do and what it cannot do), then, they expose every section of their article highlighting the role of a systematic review and how they address the methodological problem to solve the research questions. It seems to be an unnecessary pedantry, but it has deep rhetorical implications: firstly, it shows the audience the connections between the reflective stance of the authors and the presentation of the evidence, making clear the fact that the best knowledge available is a social construction and not a neutral retrieval of evidence. Secondly, it increases the possibility of critically assessing the work done even by the less expert, opening the epistemic possibility and thus enhancing the way to an emancipative outcome of the scientific discourse.

Lastly, this kind of boundary work enforces the elitist rhetoric by the construction of a deficitary Otherness. Despite the actual existence of critical literature about the topics, the conspiracy theory/vaccine hesitancy nexus is defined by evidence that regards only the Others. This is prompted by a recrudescence in the rhetoric of war, which becomes the ordinary level of discussion in science communications with the wider public (Osimani et al. 2020; Goldenberg 2021; Martin 2015). The Other is not only the pathological individual but also an active enemy that needs to be defeated. As mentioned before, this kind of construction of the Others is useful to maintain the mainstream paradigm and to apply the deficit model in policy planning, enforcing the business-as-usual state, instead of searching for emancipatory knowledge.

5. Conclusion

In this paper, I analyzed 12 literature reviews that directly or indirectly take into account the nexus between conspiracy theory and vaccine hesitancy. The analysis has been informed by the STS literature on scientific ignorance production to explore the epistemic dynamics of the literature review, and STS literature on boundary work to assess the construction of otherness via the digestion of evidence. The results have confirmed the existence of a mainstream paradigm of reference which guides the scientific research on conspiracy theory, namely the pathologizing paradigm. While non-critically assessed, the nexus serves as a rhetorical device to reproduce the legitimation of the pathologizing paradigm, which runs on the neglected ideologies of irrationality as a common feature of both vaccine hesitancy and conspiracy theory. Thus, the explanation does

not need any other feature, like the critical stance of other disciplines and approaches. Furthermore, the uncritical execution of systematic review leads to an unintended process of polarization between the scientists and the "Others" (laypeople, non-experts), via the digestion of evidence and the production of neglected ignorance; the boundary work of scientists enforces the detachment of themselves and nearby professionals from the possible responsibilities, covered by the legitimation of scientific auras. As an implication, they provide recommendations based on the forms of the deficit model, towards the management of the vaccination program and the conspiracy beliefs as a matter of institutional policy. This process of depoliticization of the agency of the (lay)people runs against the emancipative telos of scientific inquiry.

One limitation regards the lack of statistical data to evaluate the magnitudes of the nexus in the wider scientific discourse. In fact, this research is lacking generalizability, but it offers a glimpse of the rhetorical dynamics that are involving the scientific discourse. A scientometric approach can offer further insight highlighting the co-citational patterns involved in the production of knowledge and ignorance (Wyatt et al. 2016).

Finally, I argue that rediscovering the emancipatory telos of scientific inquiry by questioning its axiology dimension is a necessary path to assess conspiracy theories and vaccine hesitancy's related issues in critical opposition to the definition of the form of life provided by neoliberal capitalism. Otherwise, the production of knowledge will inevitably fall short of societal struggles by neglecting alternative paradigms to inform policy measures. Thus, a good starting point for further research could be to engage with the lived experience of the "Others" as a way to set different epistemic priorities. In this fashion, the effort to start from the grassroots to understand the social problem is one key point of Social Movement Studies (SMS) (Bertuzzi 2021; Osimani et al. 2020), such as for the undone science approach (Hess 2016; Frickel et al. 2010), which provides a bottom-up conceptual framework to merge the STS and SMS literature to update the discourse on science production including grassroots movements as legitimate epistemic actors.

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Notes on contributor

Nicola Stocco is a Ph.D. student in Social Science (UNIPD, FISPPA Department). His project regards epistemic dynamics involving expert and non-expert knowledge production in water governance. He graduated in social psychology studying the disciplinary collective memory between psychology and economic sciences. Alongside his Ph.D. project, he is interested in the history of sciences, degrowth and ecosocialist policies, and conspiracy theory studies.

Appendix A – Tab 1

ID	*Reference*	*Type of review*	*Focus*	*Scope/aim*	*Evidence retrieved*
1	Roy D.N., Biswas M., Islam E., Azam S. (2022)	Systematic review (PRISMA)	VH, ct	…to identify an up-to-date and concise assessment of potential factors influencing Covid-19 vaccine acceptance and refusal intention, and to outline the key message in order to organize these factors according to country count.	Factors that impede vaccination
2	Wawrzuta D., Jaworski M., Gotlib J., Panczyk M. (2021)	Systematic review (PRISMA)	ct, vh	…to gather, assess, and synthesize evidence related to the current state of knowledge about antivaccine social media users' web-based activities	Social media antivaccine messages
3	French J., Deshpande S., Evans W., Obregon R. (2020)	Literature review	VH,ct	…to set out in short form critical guidelines that governments and regional bodies should take to enhance the impact of a Covid-19 vaccination strategy	Best practice for vaccination
4	Magarini F.M., Pinelli M., Sinisi A., Ferrari S., De Fazio G.L., Galeazzi G.M. (2021)	Scoping review (PRISMA)	CT, vh	…to describe and comment on the dynamics and consequences of rumors and conspiracies about the pandemic.	Factors of developments and spread irrational beliefs
5	Shakeel C.S., Mujeeb A.A., Mirza M.S., Chaudhry B., Khan S.J. (2022)	Systematic review (PRISMA)	VH, ct	…to examine how and why the rates of Covid-19 vaccine acceptance and hesitancy differ across countries and continents.	Covid-19 vaccine acceptance rates
6	Payberah E., Payberah D., Sarangi A., Gude J. (2022)	Literature review	VH, ct	…to identify the prevalence and discuss factors associated with Covid-19 vaccine hesitancy among the mentally ill population.	Vaccine hesitancy causes and intervention
7	Wang Y., Liu Y. (2022)	Rapid systematic review (PRISMA)	VH,ct	…to summarize relevant multilevel determinants of Covid-19 vaccination intention and provide insights for designing and implementing targeted and holistic interventions to tackle this public health crisis in the US.	Vaccine intention
8	Ullah I., Khan K.S., Tahir M.J., Ahmed A., Harapan H. (2021)	Critical review	CT, VH	Not specified	Regarding relations between VH and CT
9	van Mulukom V., Pummerer L.J., Alper S., Bai H., Čavojová V., Farias J., Kay C.S., Lazarevic L.B., Lobato E.J.C., Marinthe G.,	Systematic review (PRISMA)	CT, vh	…to provide a comprehensive overview of the available research on Covid-19 conspiracy beliefs and to synthesise this research to make it widely accessible.	Antecedent and consequence of Covid-19 conspiracy beliefs

	Pavela Banai I., Šrol J., Žeželj I. (2022)				
10	Alamoodi A.H., Zaidan B.B., Al-Masawa M., Taresh S.M., Noman S., Ahmaro I.Y.Y., Garfan S., Chen J., Ahmed M.A., Zaidan A.A., Albahri O.S., Aickelin U., Thamir N.N., Fadhil J.A., Salahaldin A. (2021)	Systematic review (PRISMA)	VH, ct	Given the growing number of studies employing sentiment analysis tool in vaccine hesitancy assessment and in this fast-evolving field, a thorough evaluation of the existing literature must be performed. In this study, a comprehensive systematic review was conducted, in which the literature was mapped;	Sentiment analysis
11	Lazić A., Žeželj I. (2021)	Systematic review (PRISMA)	CT, vh	(a) to outline our alternative theoretical position. […] (b) to identify the additional prerequisites for a successful narrative intervention. (c) a list of specific recommendations for public pro-vaccine communicators.	Narrative intervention
12	Chowdhury N., Khalid A., Turin T.C. (2021)	Rapid integrative review	ct, vh	Enable policymakers, governments and health institutions to proactively mitigate the spread and effect of misinformation.	Best practice

Tab 1 – List of considered review with main feature