Trusting science in the wake of an epistemic crisis

Fidarsi della scienza all'indomani di una crisi epistemica

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ABSTRACT

This article examines the contemporary crisis of trust in science through the lens of social epistemology, arguing that current manifestations of scientific distrust are best understood as symptoms of a broader epistemic crisis rather than as simple rejection of scientific authority. Drawing on philosophical accounts of knowledge, testimony, and epistemic environments, the paper analyzes how misinformation, institutional incentives, media dynamics, and cognitive biases jointly undermine the conditions for justified belief. While empirical data suggest that explicit trust in science remains relatively high, public behavior increasingly reflects implicit distrust, particularly in contexts of uncertainty such as public health and climate change. The paper argues that traditional measures of trust fail to capture these dynamics and proposes a shift toward understanding trust as a socially embedded, context-sensitive phenomenon. By integrating insights from social epistemology, philosophy of science, and media studies, the article highlights how degraded epistemic environments impair knowledge acquisition and foster anti-scientific attitudes. It concludes that restoring trust in science requires systemic reforms in knowledge production, communication, and institutional accountability, rather than an exclusive focus on individual epistemic responsibility.

SOMMARIO

Il presente articolo analizza la crisi contemporanea della fiducia nella scienza attraverso il quadro teorico dell'epistemologia sociale, sostenendo che le attuali manifestazioni di sfiducia vadano interpretate come sintomi di una più ampia crisi epistemica, piuttosto che come un semplice rifiuto dell'autorità scientifica. A partire da un'analisi dei concetti di conoscenza, testimonianza e ambiente epistemico, il contributo esamina il ruolo congiunto di disinformazione, incentivi istituzionali, dinamiche mediatiche e bias cognitivi nell'indebolire le condizioni della giustificazione epistemica. Sebbene i dati empirici mostrino livelli relativamente elevati di fiducia esplicita nella scienza, i comportamenti pubblici rivelano forme diffuse di sfiducia implicita, soprattutto in ambiti caratterizzati da incertezza. L'articolo sostiene che gli strumenti tradizionali di misurazione della fiducia siano inadeguati e propone una concezione della fiducia come fenomeno socialmente situato. Ne deriva l'esigenza di interventi sistemici sui processi di produzione, comunicazione e legittimazione del sapere scientifico.

KEYWORDS

Trust in science

Social epistemology

Epistemic crisis

Misinformation

Scientific authority

PAROLE CHIAVE

Fiducia nella scienza

Epistemologia sociale

Crisi epistemica

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1. INTRODUCTION

The availability and novelty of digital tools and the incentivized mechanisms of information spread through social media have made it easier than ever before to access data, but harder than ever before to assess its credibility. The emerging implications are profound, as could be witnessed during the Covid-19 pandemic – in which the impact of widespread dissemination of misinformation on public health was termed *infodemic* by the World Health Organization, to liken its prevalent effects to those of the pandemic itself[1]. This is further corroborated by the World Economic Forum naming "misinformation" the most severe short-term risk to humankind for the second year in a row, implicating it with modern society's most daunting dangers – from the climate crisis to public health emergencies and global conflicts[2].

In such an environment, the role of knowledge mediation becomes increasingly significant, and with it the centrality of trustworthy mediators. Problematically, by giving rise to large amounts of unverifiable information, the current climate is also responsible for undermining the trust in previously consensual sources of epistemic authority[3]. Considering the role of knowledge in guiding decision-making and behavior, the shaken foundations of its sources of legitimacy, from reason to expertise, carry substantial implications for society's well-being.

Historically, science was often seen as the primary, if not exclusive, arbiter of truth, distinguished by its methods of systematic observation, experimentation, and peer validation[4]. As such it has long served as one of the major sources of trustworthy knowledge production[5], its outcomes guiding many aspects of human existence. However, due to its strong authoritative power, its interaction with political and economic incentives and its often ungraspable and mysterious nature, science has also often elicited distrust, which has taken on various forms[6]. The latest iteration may be reflected in recent large-scale public responses such as in the Covid-19 outbreak, in which substantial portions of the public did not adhere to public health measures and directly discredited scientific epistemic authority[7]. Taken together, the need for trustworthy knowledge mediation meets the scientific institution - traditionally one of the most trusted epistemic authorities- with distrust stemming from both internal mechanisms and biases, and from an external information culture.

However, before addressing the causes of this phenomenon, it is important to note that whether there really is a significant decline in public trust in science is in itself a matter of ongoing debate. While discussions of vaccine hesitancy and climate action point to meaningful resistance to scientific findings[8], and popular media features numerous voices representing anti-scientific approaches[9], when studied directly, this distrust does not appear to represent a widespread phenomenon[10]. In a recent global survey across 68 countries which included over 71000 participants, for instance, Cologna and colleagues[11] demonstrated that trust in scientists is fairly high among different social groups and in all countries tested, with slight variations correlated with certain demographic features.

This raises the question: if comprehensive surveys indicate that science still holds a position of epistemic authority, why do public reactions suggest otherwise? One response considered here is that explicit trust may not be an appropriate marker for capturing the public sentiment towards science, which may be the case if such distrust is not explicit or not absolute, and if participants are unaware of their distrust[12]. This calls for a reassessment of the notion of trust in science, from its epistemic roots to its tools of measurement, in order to properly determine more relevant terms and procedures for assessing public attitudes, as well as its sources and barriers. Moreover, it stems from an understanding that so long as distrust is not clearly identified, it is also more difficult to contest.

In this paper antiscientific behavior is considered a marker of a profound epistemic crisis[13], marked by the proliferation of unreliable information, an eroded notion of objective truth and a diminishing trust in authority[14]. From this perspective, the epistemic crisis is the deterioration of established conditions for attaining knowledge, which leaves the public unable to establish the necessary foundations for developing implicit trust in scientific authorities, ultimately driving observable patterns of public behavior. Furthermore, trust is treated not as a static and unwavering concept but one constantly evolving and highly intertwined with societal dynamics[15].

This work draws on recent accounts incorporating theories from social epistemology into comprehensive frameworks for understanding recent events implicating the relationship between science, information and society. In her work, philosopher Leni Watson has, for instance, suggested the term *epistemic rights* for referring to "goods such as information, knowledge and truth"[16]. She discusses the need for acknowledging and protecting this right, particularly given the potential risks involved in its violation, which she exemplifies with the case of Purdue Pharma and its role in the U.S. opioid crisis. This particular case involves actions which indicate malintent and corrupt incentives, however it opens the door to considering epistemic harms in less overt situations, namely unintentional violations of epistemic rights, as will be considered here. It is also an important example of framing the power of epistemic authorities and the dangers of misplaced trust in legal terms.

Following, this paper suggests an account of implicit distrust in science which is founded on such recent social epistemic discourse, and which ties together traditional views of knowledge acquisition with its modern situated perspective. In this view, current perceptions of scientific knowledge shift between apparent trust and entrenched skepticism and manifest in modern displays of confused knowledge rejection. While scientific distrust is largely here considered rational and justified, its harmful behavioral outcomes are suggested to be avoidable if properly addressed by relevant institutions. This awareness is crucial for future accounts of scientific knowledge production – from the standards of construction to dissemination and regulation. It highlights that the responsibility for establishing effective mediation of knowledge rests largely in the hands of the scientific institutions which must justify and maintain their privileged epistemic position.

2. EPISTEMIC FOUNDATIONS OF TRUST

To elucidate the processes driving current public understanding of information and knowledge formation, a brief reminder of the classic notions of the conditions for knowledge acquisition are considered. The traditional epistemic conception of knowledge as justified true belief (JTB) has been foundational since Plato's *Theaetetus*, where knowledge was analyzed as a belief that is both true and supported by appropriate justification. The familiar classic modelling holds that for a subject S to know a proposition p, three conditions must be met: p is true, S believes p, and S is justified in believing p. For centuries, this framework shaped philosophical inquiry into the nature of knowledge and the conditions for attaining it. While this model has been repeatedly challenged since its inception, leading to attempts to refine or replace the JTB account with additional conditions, it still holds as an important and relevant position against which to evaluate conditions of knowledge formation.

Beyond these analytic origins, epistemology has evolved to incorporate social and contextual factors into the understanding of knowledge. The rise of social epistemology recognizes that knowledge is not solely an individual cognitive achievement but is deeply embedded in social practices, institutions, and interactions. Thinkers like Alvin Goldman[17] and Helen Longino[18] emphasize how trust, testimony, and communal validation shape what counts as knowledge, highlighting the role of social processes in justification and truth claims. The integration of social epistemic factors and the concurrent pluralization of truth notions have transformed epistemology from a primarily individualistic and static account into a dynamic, socially embedded, and context-sensitive discipline[19]. This shift acknowledges that knowledge production depends on collective epistemic environments which include scientific communities, as well as cultural norms.

From a social epistemic perspective, knowledge is innately connected with the idea of testimony, as most information people acquire, on which they base their beliefs and justification, is transmitted by others and not through direct experience or appraisal of evidence[20]. In this sense, trust acts as a filtering mechanism for assessing what information to believe. Gloria Origgi identifies 7 mechanisms by which we evaluate the trustworthiness of testimony: reputation, institutional cues, message format, social consensus, corroboration, transparency, and personal interaction[21]. Hence, trust is determined by the features of testimonial interactions, which include its participants, message and context, highlighting the ways in which types of testimony impact knowledge acquisition. Moreover, trust itself, as a product of social dynamics, is not a stable concept, rather one that transforms according to continuous assessment of available relational and contextual

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features[22].

When discussing trust in science, this implies the features associated with the testifiers – scientists and perhaps scientific journalists – as well as the context in which information is delivered. In the extensive literature which studies the epistemic implications of these features, testimony has been suggested to rely more on value judgements and implicit biases than on the truth value of the scientific statement, including their assessment of demographic features of the speaker, as well as certain socio-political values nested within the scientific claim, partisan alignment, and non-doxastic reasoning[23]. A once reliable news source on environmental issues, for example, may immediately lose its credibility and thus its audiences' trust, if exposed as primarily financed by oil tycoons. This can also occur at larger scales – following repeated reports of news sources being financed by energy companies, the entire field of news reporting on environmental matters may lose its credibility.

3. SCIENCE AS ARBITER OF TRUTH

Truth is an elusive but decisive factor in all accounts of knowledge acquisition and production. Its centrality is rooted in its role as the ultimate "epistemic good" – the standard against which all belief, inquiry, and discourse are measured, and its elusiveness derives from the mediated nature of human interaction with reality. Scientific thought emerges as a primary mechanism for mediating reality, laying the foundation for systematic inquiry based on evidence rather than myth. Early scientific inquiry emphasized systematic observation and deductive reasoning, aiming to build a body of properly arranged knowledge (*epistémé*) that reflected the true order of nature[24].

This tradition valued logical inference and careful classification but was often limited by reliance on established authorities and deductive logic. Over time, scientific methods shifted from primarily deductive reasoning to inductive approaches emphasizing observation, experimentation, and hypothesis testing. The scientific revolution promoted empirical evidence as the basis for truth and reshaping societal beliefs, political power, and economic development[25]. However, this privileged position has been challenged and nuanced over time, both by internal mechanisms and by changes in the broader societal con-

text[26].

Debates about whether science moves toward truth have drawn on evolutionary theory, with some thinkers arguing that the success of science is evidence of its truth-tracking capacity[27], while others contend that scientific theories are products of social and evolutionary contingencies and may be discarded as paradigms shift[28]. This tension reflects a broader epistemic humility: scientific knowledge is robust but not infallible, and its claims to truth are always open to challenge and refinement. In the "knowledge society," science is no longer isolated from other social institutions but is tightly coupled with media, politics, and commerce. This coupling leads to a loss of distance between science and society, which historically underpinned its favored position and the trust in scientific expertise.

Furthermore, the epistemic environment, which includes the social, political, and communicative context in which science operates, has changed dramatically. Media reports prioritize sensationalism or controversy over epistemic rigor, shaping public perception of scientific findings[29]. Concurrently, internal mechanisms within the scientific community, including the widespread reproducibility crisis, flaws in the peer-review system, funding biases, and cognitive biases affecting both scientists and the public, significantly contribute to skepticism and distort knowledge formation[30].

Meanwhile, the notion of truth itself has become more pluralistic and contested, moving away from classical correspondence theories toward pragmatic, coherentist, or constructivist perspectives[31]. This evolving conception of truth challenges the idea of knowledge as a straightforward relation to an objective reality, suggesting instead that truth may be context-dependent, mediated by language, power structures, or social interests. These processes among other socio-political changes have called into question traditional epistemic hierarchies, influencing the perceived hegemony of science as the central bearer of truth.

4. DISTRUST IN SCIENCE

Concurrently and throughout history, the scientific practice has faced bouts of pseudoscience, "bad science" and fraudulent science. Scientific truth, unlike absolute or "final" truth, is provisional and subject to revision as new evidence emerges. This is often exemplified by the replacement of Newtonian mechanics with Einstein's general relativity in the 20th century. Both the fallibility of scientific truth and the prevalence of scientific malpractices, as well as other non-doxastic motives, underlie a longstanding tradition of distrust in science[32]. While still considered as having a privileged epistemic status, as witnessed by the partiality for evidence-based claims in healthcare, legal decisions and regulation[33], it faces a noticeable backlash in contemporary society. However, as previously mentioned, this distrust is not readily apparent in direct measurements[34], pointing to a need for more robust explanations for the observed phenomena.

Trust is a fundamental element in the social contract between society and scientific research, without which it loses its primary source of justification at a philosophical and practical level[35]. When considering the foundations of the perception of science by the public, it is crucial to consider the role that the scientific community itself, represented by its norms and practices, plays in driving and perpetuating distrust, skepticism and the turn away from scientific reasoning and authority. Problems related to lack of reproducibility, the peer-review process, funding choices or statistical misuse have been reported to plague academic research due to systematic pressures and misguided incentives in scientific institutions[36]. Together, these factors reveal how institutional pressures, such as the "publish or perish" culture, competition for funding, and the demand for novel, positive results, can incentivize questionable research practices, reduce transparency, and impair the self-correcting mechanisms of science.

The reproducibility crisis is a well-documented phenomenon, with surveys showing that over 60% of researchers fail to reproduce another scientist's experiment, spanning disciplines from psychology to medicine[37]. This issue is exacerbated by insufficient reporting standards, where key experimental details and data are often omitted, making replication difficult or impossible. For example, a large-scale study in cancer

biology found that none of 193 examined papers fully described their experimental protocols, and over 70% of experiments required additional information requests to even attempt replication[38].

Statistical misuse, another prevalent issue, contributes to unreliable outcomes. Researchers may employ questionable statistical methods, whether intentionally or through inadequate training, to present findings in a favorable light. Practices such as p-hacking, cherry-picking data, or inflating effect sizes not only distort the scientific narrative but also create a landscape where flawed conclusions proliferate unchecked. This type of practice has been widely identified, for example, in the analysis and interpretation of neuroimaging findings, especially when using fMRI[39], and has raised substantial questions regarding the reliability of previous studies based on similar methods.

The institutionalization of science through peer review and collaborative societies further embedded science within society, enhancing trust and facilitating the dissemination of knowledge. Nowadays however, the peer review system, intended to safeguard scientific integrity, has been repeatedly criticized for its inefficiencies and biases[40]. Reviewers may lack the necessary expertise, time, or incentives to conduct thorough evaluations, resulting in missed errors and unreliable assessments. Biases based on authors' institution, geography, or demographics threaten impartiality[41], while some reviewers engage in self-serving behaviors such as obstructing competing research or appropriating ideas. Moreover, peer review is often slow and costly, lagging behind the rapid pace of scientific communication, which can delay dissemination of important findings and frustrate researchers. These systemic flaws contribute to a perception of science as fallible and opaque, eroding trust both within the scientific community and among the public.

Funding biases complicate this landscape. Research agendas and outcomes can be skewed by the interests of sponsors, who may prioritize studies that align with commercial or political goals[42]. For instance, pharmaceutical funding has been shown to influence study designs and selective reporting, sometimes downplaying adverse effects to favor a sponsor's product[43]. This compromises scientific objectivity and can mislead practitioners and patients, undermin-

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ing trust in medical research and recommendations.

Finally, scientists are also affected by cognitive biases when reporting their work[44]: confirmation bias, for instance, leads to preferentially seeking or interpreting data that supports existing hypotheses, narrowing perspectives and impeding the self-correcting nature of science. This can contribute to persistent errors and reduce the reproducibility of findings, which in turn fuels the broader epistemic crisis. Similarly, anchoring bias causes researchers to rely too heavily on initial findings or dominant theories, making it difficult to revise or abandon flawed ideas despite contradictory evidence. The availability heuristic further skews judgment by overemphasizing vivid or recent information, potentially distorting risk assessments and the perceived reliability of scientific claims.

Such influences undermine confidence in published results and potentially fuel public skepticism. Philosopher Neil Levy highlights that a lack of accessible and reliable information creates significant challenges for individuals, who are left to navigate a chaotic climate of conflicting data and misinformation[45]. A similar discourse can be found in Kristen Intemann's work regarding hype[46], a widespread phenomenon which exacerbates the challenge of fostering warranted trust in science, particularly during times of crisis when accurate information is most critical. Hype not only distorts public perception of scientific progress but also undermines trust in scientific communicators. This erosion of trust deprives individuals of the reliable resources they need to critically evaluate scientific claims and make informed decisions about their health and safety.

Incidentally, and most notably during the Covid-19 epidemic, there has been a growing disenchantment with the privileged epistemic position of science and its representatives, practitioners and outlets[47]. The disconcerting display of counter scientific discourse and distrust in science and other knowledge producing institutions which accompanied that public health crisis prompted several counter measures on a global scale which attest to the gravity and urgency of this matter. These included significant international efforts such as a global infodemic observatory, tools for assessing reliable health information and calls for improving education on media literacy[48].

5. BELIEFS AND JUSTIFICATION IN THE 21ST CENTURY

In the traditional view, in order to procure knowledge, individuals engage in continuous processes of forming and justifying beliefs. These processes are shaped by the setting in which they are enacted and accordingly change with differing environmental properties. The notion of an *epistemic environment* was introduced to describe the social, technological, informational, and institutional contexts that shape how individuals and communities form beliefs, acquire knowledge, and make epistemic judgments[49]. In his book *Bad beliefs: Why they happen to good people*, Neil Levy[50] discusses the role of institutions in creating what he terms *epistemic pollution* – an epistemic environment tainted by unreliable sources of information, which does not allow for procuring knowledge effectively.

Sources of pollution recognized by Levy include those displaying misleading cues of expertise, such as charlatans and dubious scientific journals, but also the previously discussed research practices which may not arise from ill intent. He recognizes that the role of institutions in creating such environments may not be a devious one, but that it may nevertheless result in denying individuals the necessary epistemic tools for making well-grounded decisions and promoting their own wellbeing. Timothy Buzzell and Regina Rini have also recognized the difficulty individuals face when attempting to make decisions in an epistemically hostile context, in which there are too many unreliable sources of information[51]. In attempting to bypass experts and navigate this complexity alone, which they term *epistemic superheroism*, society becomes more vulnerable to the technical systems that propagate and amplify misinformation.

In such an environment, the foundations of shared knowledge, reason, and expertise are increasingly challenged, giving rise to widespread skepticism and distrust. Consequently, the current epistemic environment does not provide the conditions for associating trust with truth, as individuals largely lack the ability to judge trustworthiness. As addressed by Levy in response to prominent epistemic theories which entrust individuals with the task of assessing reliable information sources:

Goldman, Anderson, and other writers are optimistic that ordinary people

can identify experts, using the criteria they set out. I think their optimism is misplaced. The epistemic pollution… makes the task of distinguishing reliable from unreliable sources too difficult for ordinary people to reasonably be expected to accomplish it.[52]

Not only external factors but also internal mechanisms of perception are involved in the justification of beliefs and the assessment of truthfulness. These mechanisms form mutually influential networks within changing contexts and contribute to the complexity of learning from environmental cues. For example, cognitive biases play a pivotal role in mediating scientific evidence by shaping how the public processes, interprets, and trusts scientific information within a given epistemic environment. These biases – systematic patterns of deviation from rational judgment – can distort knowledge formation and exacerbate skepticism. When the public encounters conflicting scientific messages, often amplified by media or social networks, biases such as motivated reasoning and confirmation bias lead individuals to selectively accept information that aligns with their preexisting beliefs or ideologies, deepening distrust in scientific consensus[53].

This view is in line with constructivist perspectives[54], which view reality as largely interpreted through social, cultural, and linguistic frameworks, meaning that what is accepted as 'truth' or 'knowledge' is shaped as much by collective processes and negotiations as by objective observation. This view again challenges the idea of a purely objective, observer-independent truth, emphasizing instead the ways in which epistemic agents construct meaning from a dynamic interplay of evidence, beliefs, and contextual influences. Thus, the process of knowledge formation is not a passive reflection of reality, but an active, ongoing negotiation that is deeply embedded in social experience and communicative practices.

As most scientific information is learned through testimony, its acceptance is predominantly based on personal assessment of information sources, which lies in turn on individual tools of assessments and the availability of cues[55]. As such, even if the source of information is well-intentioned, it may exhibit internal errors, impacted by incentives of mediation bodies or misperceived by its audience. Jefferey Freidman recognizes the epistemic crisis as related to a problem of justification:

with truth not being readily evident, people rely on mechanisms of justification which are politically motivated and thus bring to diverse conclusions and fierce disagreement[56].

The epistemic environment itself, characterized by information overload, rapid dissemination and politicization of information, interacts with cognitive biases to amplify their effects. The complexity and opacity of scientific processes can overwhelm non-experts, who then rely on cognitive shortcuts or heuristics to process vast amounts of information quickly but imperfectly. These are compounded by the limited cognitive capacity of the human brain in terms of e.g. attention and memory[57], as well as a natural aversion to the exertion of mental effort[58]. Focusing on available information and neglecting unknown or complex data fosters simplistic or distorted views of scientific issues, sometimes resulting in skepticism or rejection of scientific authority. This interplay highlights how cognitive biases mediate not only individual cognition but also social epistemic dynamics, influencing collective trust in science.

Media is another central component shaping society's perception of information, influencing how individuals and communities accumulate knowledge about the world and understand scientific findings. Scholarly research shows how media exposure influences public beliefs, opinions, and behaviors by shaping the perceived credibility and relevance of information[59]. The credibility of media sources which are rooted in trustworthiness and expertise directly affects how audiences accept or question knowledge claims, thereby mediating the social construction of truth[60]. This dynamic is reinforced by the cultivation theory, which posits that frequent media exposure gradually molds individuals' views of social realities, guiding what issues are seen as important and how they are interpreted[61]. The agenda-setting function of media, i.e. deciding which topics receive attention and how they are presented, has been extensively studied as a mechanism that shapes public discourse and collective knowledge[62].

Previously, traditional mass media served as gatekeepers of knowledge, filtering and framing information in ways that reflected dominant societal values and political interests. Media framing not only influences what people think about but also how they think about it, often

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embedding implicit narratives that align with cultural or political motivations[63]. With the digitization and proliferation of media platforms, the information environment has become more complex and decentralized. The widespread dissemination of data through online outlets has fragmented audiences and introduced challenges such as misinformation and echo chambers which distort the ability to judge incoming information by leveraging cognitive mechanisms to increase profit while prioritizing certain opinions over others for increased user engagement, again for economic incentives[64]. This shift reflects and amplifies societal motivations, including political polarization and commercial interests, which in turn influences how knowledge is constructed, validated, and contested in public spheres[65].

Moreover, media's role in shaping perceptions is not neutral but deeply intertwined with psychological, cognitive and social influences. Social conformity, trust in perceived experts, and emotional dispositions all mediate how media content is received and integrated into individuals' belief systems[66]. The interplay between media practices and societal motivations thus creates a feedback loop where media both reflects and shapes collective epistemic norms and the social acceptance of truth. On basis of these same mechanisms, the media also plays an increasingly active role in shaping the public's perception of the scientific agenda. As a result, scientific validation is increasingly supplemented by criteria such as public acceptance and political utility[67].

This idea, captured also in the aforementioned notion of *hype* - an exaggerated or sensationalized depiction of scientific advancements - has been accompanying scientific innovation since its onset[68]. Crucially, contemporary information practices and techno-social contexts seem to accentuate and exacerbate its harmful aspects.

6. REESTABLISHING TRUST IN SCIENCE

The longstanding problem of distrust in science appears to take on new characteristics in the current epistemic environment which, according to some, represent an epistemic crisis. This sentiment does not appear to be reflected in direct measures of explicit distrust but manifests in public displays of anti-scientific behaviors. The potential damage to public safety

from a lack of adherence to scientific standards demands more appropriate tools for delineating and facing this problem which also requires better assessment of available markers and measurement instruments. This paper considers the epistemic foundations of trust in scientific knowledge and its current manifestations as stemming from a degraded epistemic environment, indicating the need for conceptual and practical adjustments within relevant institutions.

In order to better quantify public attitudes towards science and to support more effective counteractive tools, it is crucial to differentiate between explicit and implicit forms of trust when conducting studies for quantifying trust in science. As discussed, trust is not a one-dimensional construct and is affected by numerous factors including emotions, social cues, cognitive heuristics and political leanings[69] - many of these not immediately available to conscious perception. More robust signals of trustworthiness must be developed on this basis which could better reflect public behavior. Furthermore, beyond measures of trust, it appears current conditions place substantial obstacles in the way of acquiring knowledge, in its traditional definition as justified true belief. While trust and its associated value system are non-reliable markers, and whereas truth is rarely evident, the main realm of potential change appears to be that of justification, which includes internal and external indications embedded in cognitive and societal structures.

This outlook ultimately raises a vital question: should the current epistemic climate be addressed primarily through individual actions, or does it require systemic reforms at the institutional level? The epistemic environment is inherently multifaceted, involving entrenched practices across academia, media, industry, and policy-making institutions. These sectors are often interlinked with powerful economic and political interests that shape knowledge production, dissemination, and public understanding. Consequently, relying solely on individual responsibility risks oversimplifying the problem and neglecting the structural dimensions that sustain misinformation, bias, and distrust. Drawing parallels with other large-scale societal challenges – most notably the climate crisis – illuminates the limitations of focusing on individual behavior as the main lever for change. For example, the widespread emphasis

on individual recycling and personal carbon footprint reduction, while important, has often been critiqued for deflecting attention from the urgent need for comprehensive governmental policies and systemic transformations in energy, transportation, and industry. Scholars such as Cuoma[70] and others have argued that this individualization of responsibility serves political and economic agendas by minimizing regulatory pressures on corporations and governments, thereby protecting vested interests at the expense of collective well-being.

In countering distrust in science, various measures have been suggested at the individual, group and institutional levels[71] - from education for better critical assessment, to incentivizing reliable media reporting. In his book, Levy[72] discusses preliminary steps to be taken by the scientific community to distinguish and reduce predatory journals such as rendering publication with them less beneficial professionally and economically. He also supports corrective measures within legitimate research cultures, e.g. replication studies should be incentivized, publication of null results and preregistration should be made commonplace. Other measures include addressing mass media portrayal of scientific findings and countering hype. Above all, he argues against "epistemic individualism" and the deficit account which places excessive weight on correcting individual deficits in knowledge, rationality or motivation. Instead, he advances the centrality of the environmental influences on individual knowledge formation, and the importance of paying more attention to pollutants of the epistemic environment.

Importantly, this view purports that beliefs held by individuals evolve from their experiences and the information they have been exposed to, in a rational way. Whether consciously or not, the world is mediated through many filters, external and internal, with immediate and tangible effects on individual beliefs and actions. It is therefore useful to understand what *can* be modified, which is facilitated by returning to the basic conditions of knowledge production and acquisition. Notably, such effects on knowledge formation and the changing consensus around the notion of truth, how it is defined and how to procure it, have led many to fear society has reached an era of *post truth* in which the value of truthfulness is eroded[73]. In order to reestablish epistemic stability, the notion of truth

must regain a place of reverence which emphasizes the presence of truth and the value in pursuing it.

It is also useful to consider alternative perspectives in this debate, such as that represented by political epistemologist Jefferey Friedman. Friedman[74] advances the idea that the portrayal of the current situation as an epistemic crisis can be regarded as somewhat alarmist. As Friedman writes, the problem might not be a lack of respect or a turn against the idea of truth but a change in the conditions which have previously supported reaching consensus regarding what truth is. He argues that the polarization of opposing opinions arises from a gradual erosion of the epistemological assertion that knowledge claims are fallible, instead giving rise to types of naïve realism. These may be of a first-person type – alluding to one's unmediated experience of the world as an undeniable truth, or of a third-person type, which point to a belief that consensus between mediators, such as experts, constitutes a sufficient requirement for truth.

As Freidman and Levy both argue, human beings are predominantly rational, and their perceptions are a reasonable result of the information environment they are exposed to. While it is tempting and straightforward to blame individuals for uncritical thinking or technological companies for incentivizing fake news, it may be more effective to consider how epistemic environments can be better designed to accommodate contemporary social and knowledge structures and their interactions with epistemic authority and cognitive heuristics. These can be found also in the warnings of Hannah Arendt in *Truth and Politics* which can be read as addressing the implications of over-exposure to a polluted epistemic environment:

…the result of a consistent and total substitution of lies for factual truth is not that the lies will now be accepted as truth, and the truth be defamed as lies, but that the sense by which we take our bearings in the real world — and the category of truth vs. falsehood is among the mental means to this end — is being destroyed.[75]

Any countering measures cannot be effective without restoring the relationship between knowledge and trust. In the present climate knowledge and trust are less closely associated - providing evidence that they can be partially independent:

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knowledge, understood as beliefs that are true and justified, may not be trusted, and trust can be placed in information which does not comply with knowledge requirements. This disconnection can be easily used to manipulate public perceptions in line with various incentives. If mechanisms of trust can be activated without satisfying rigorous knowledge conditions and achieve a similar result, it might be appealing to those seeking various non-epistemic ends, even if not led by evil intentions. In this time of epistemic instability, it is crucial to recognize the mechanisms which determine public opinion and how these have become arenas of manipulation and power struggles.

Several approaches have been suggested to incorporate such theoretical epistemic foundations to meet the above-mentioned challenges. One possible approach is that of the introduction of a legal claim based on the concept of *epistemic rights* (Watson, 2021), previously introduced. This approach places formal and enforceable duties on epistemic authorities in regard to their epistemic responsibilities. Another approach derives from discussions of public health practices[76]. Surrounded by multiple sources of unverified or false medical claims, over information and misinformation, with inappropriate tools for judging their credibility, individuals are placed in unfavorable environments for effective knowing. Levy suggests that reducing epistemic pollution requires *nudging*, a highly contested practice of nuanced institutional coercion which refers to the use of different measures to lightly push or persuade individuals to make favorable personal health decisions, as established by accredited experts. While the paternalistic aspect of this practice cannot be sidestepped, it points to the difficulty in overcoming the apparent mediation gap between individuals and effective knowledge acquisition.

As shown, in order to confront this complex issue, it can be useful to reassess epistemological foundations and conceptual relations between the fundamental components of knowledge and its later interpretation within social contexts[77]. This involves a concerted effort to restore the place of truth as a guiding principle, but also practical-by building initiatives to bolster scientific integrity on one hand and develop mechanisms for enhancing media literacy and curating trustworthy source – empowering individuals but also enacting systemic changes targeting the

structural roots of epistemic dysfunction. Crucially, without such comprehensive strategies, efforts risk being fragmented and symbolic, failing to restore public trust or improve the quality of shared knowledge on a societal scale.

Finally, as trust is a central component in the relationship between science and its implementation and consideration in society, it needs to be measured accurately and considered when examining the challenges in the production of scientific knowledge: knowledge production mechanisms must take into consideration the rapidly evolving information landscape and the impact it has on public trust in science. Such considerations would also highlight the commitment and responsibility of the scientific institution as an epistemic authority to the procurement of knowledge. While this is a task for the scientific community and its internal mechanisms, it is in the hands of regulators and advisors, as well as academicians and the public, to demand science adheres to the highest standards of practice, in light of the daunting impact of distrust in science on society as a whole.

NOTE

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