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Hybrid Times Call for Hybrid Measures: Reflecting on the Information Bubbles Phenomenon in Light of the Nature-culture Debate

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Abstract. In the digital era, algorithms have assumed a mediation role historically associated with journalism, limiting and prioritizing information in a personalized manner for each user. This curation contributes to the formation of information bubbles that reinforce selection effects and potentially feed preexisting beliefs. Although it is not a consensual view, several authors believe this phenomenon increases polarization, posing significant challenges to democratic discourse and societal cohesion. This paper reflects on information bubbles in the context of Bruno Latour's and Edgar Morin's perspectives on the nature-culture dichotomy. Together, these perspectives help us understand the algorithmic personalization of information as a hybrid (arising from the interaction between humans and non-humans) and complex phenomenon (multidimensional, engaging various parts of knowledge), where the central role of non-human actors and the continuous interaction between the whole and the parts are evident. It is concluded that addressing the information bubbles conundrum will require: (1) abandoning simplification and reductionism, while accepting contradiction and controversies, (2) mapping and analyzing the interactions between actors, (3) conducting inter- and transdisciplinary research, and (4) developing hybrid solutions.

Keywords: Information bubbles; nature-culture; hybrid; complexity; Latour; Morin.

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1. Introduction

The idea that selection effects influence media consumption emerged in the 1940s, with the first studies conceptualizing media use as a result, rather than a predictor, of certain attitudes (Valkenburg, Peter & Walther, 2016). The new characteristics of the media system, which inevitably impact audience attributes (Shah *et al.*, 2017), increasingly highlight the significance of selection effects. As media audiences fragment into smaller homogenous subsets, it becomes less likely that media messages will challenge preexisting predispositions (Bennett & Iyengar, 2008). These orientations are closely tied to cognitive and social biases: we prefer information that aligns with our views (Lazarsfeld, Berelson & Gaudet, 1948; Nichols, 2018; Sears & Freedman, 1967) and with that of our social circles (Jamieson & Cappella, 2008; McPherson, Smith-Lovin & Cook, 2001).

In an era of information overload (Coleman, 2017), in which we consume media content everywhere with decreasing levels of attention (Couldry, 2019), algorithms have become necessary tools for organizing information. The problem is that these algorithms are programmed by tech companies competing for user attention, aiming to maximize the time individuals spend on their sites and increase the profit from advertising (Geschke, Lorenz & Holtz, 2019). Thus, these filters tend to adapt to the users' preferences and end up reinforcing the individual and social biases mentioned above.

While the personalization of information benefits individuals as consumers, it is not advantageous for them as citizens (Sunstein, 2020). Democracy requires that citizens are well-informed and live, to some extent, in a shared reality to discuss and debate the present and future of society (Sætra, 2019). Some authors downplay the concept of information bubbles, arguing that most people still share common ground, consume mainstream media, and encounter differing opinions (Bruns, 2019; Fletcher & Nielsen, 2017; Möller *et al.*, 2018; Seargeant & Tagg, 2019). Considering that polarization remains a severe problem in contemporary societies (World Economic Forum, 2024) and information bubbles are a highly complex theme that is difficult to study, I argue that, despite the lack of consensus, this phenomenon still warrants careful monitoring and reflection from the academic community.

In this conceptual article, I explore the phenomenon of information bubbles through the perspectives of two influential philosophers and sociologists, Bruno Latour and Edgar Morin, focusing on their contributions to the nature-culture dichotomy. Latour's concept of hybrids and Actor-Network Theory (ANT) and Morin's paradigm of complexity offer valuable frameworks for understanding and addressing this issue. This analysis is contextualized within the scope of a comprehensive literature review on algorithmic personalization and its potential effects, in general and within the context of Asian societies.

2. Literature review

2.1. Personalization and information bubbles

The multiplication of sources and the endless options for consuming information in the digital world lead researchers to question whether the internet provides the shared experience – the 'social glue' that democracy needs (Sunstein, 2020: 260). Concerns about the fragmenting effects of new media (McQuail & Deuze, 2020) are heightened by the increasing possibility of information personalization.

In 1995, Negroponte predicted that the digital world would bring about a new economic model of news selection, where users' interests would play a more significant role. He called it the 'Daily Me', a personalized electronic newspaper for each individual (Negroponte, 1995). Although this format has not fully materialized, the logic of personalization in digital information consumption has intensified and raised growing concerns about the consequences of 'information cocoons' (Sunstein, 2006: 9).

By the turn of the century, Sunstein (2001) was already concerned that consumers would increasingly filter what they saw, thereby limiting serendipity – accidental encounters with content not initially chosen – and shared experiences with society. He warned that replacing 'general interest intermediaries' (the media) with personalized content could inhibit freedom of expression and democracy (Sunstein, 2001: 11). The filter bubble concept

would emerge a decade later, coined by Eli Pariser in his book 'The Filter Bubble'. He defines it as a unique informational universe created by algorithms, which changes how we encounter ideas and information by introducing three dynamics: we are alone in the bubble, the bubble is invisible, and we do not choose to enter it (Pariser, 2011). He concludes that "in an age where shared information is the basis of shared experience, the filter bubble is a centrifugal force that separates us" (Pariser, 2011: 10).

It is crucial, however, to understand that this phenomenon does not occur solely at the technological level. Geschke *et al.* (2019) explain that there are individual and social filters in addition to technological filters – algorithms used by platforms like Google and Facebook to maximize user engagement and profit. Individual filters relate to cognitive and motivational processes, connected to concepts of selective exposure and confirmation bias: we seek information that reinforces our preexisting opinions and avoid information that challenges them (Nichols, 2018; Sears & Freedman, 1967) to escape cognitive dissonance (Festinger, 1957). As Lazarsfeld *et al.* (1948: 166) state, "[e]xposure is always selective; there is a positive relationship between people's opinions and what they choose to hear or read."

Social filters, on the other hand, manifest through echo chambers, closed media spaces that amplify transmitted messages and isolate them from opposing views, creating shared frames of reference and feedback loops (Jamieson & Cappella, 2008). This concept is based on homophily, the principle that similarity breeds connection: our interpersonal networks are homogeneous across various sociodemographic and behavioral levels, meaning we tend to associate with people similar to us (McPherson *et al.*, 2001). Thus, information bubbles – a term proposed by Tabrizi and Shakery (2019) to encompass filter bubbles and echo chambers – co-create a comfortable environment populated by our favorite people, things, and ideas (Pariser, 2011).

In this context, technological filters reinforce human cognitive and social tendencies, with potentially harmful effects on democracy (Geschke *et al.*, 2019). Sunstein (2020) argues that excessive information filtering and resultant polarization can lead to closed deliberation circles, which happens, for example, in terrorist groups. Sætra (2019: 7) concurs, noting that digital platforms' facilitation of access to (1) data reinforcing our beliefs and (2) networks of similar people create a 'tyranny of perceived opinion', undermining freedom and democracy. Concerns have also been raised that even journalism, seen as an antidote to information bubbles, has started tailoring content based on audience preferences, with negative consequences for democracy (Machado, 2021; Nichols, 2018).

However, this topic does not enjoy consensus in academia. One line of research considers the emergence of filter bubbles inevitable as long as recommendation algorithms continue to exist and are optimized (Zhang *et al.*, 2023). In contrast, others argue that there is no empirical evidence for this phenomenon (Bruns, 2019). They highlight that users still encounter alternative viewpoints on social media networks (Seargeant & Tagg, 2019), that recommendation systems are no less diverse than journalistic curation (Möller *et al.*, 2018), and that people often consume information from the same media outlets, either proactively or accidentally (Fletcher & Nielsen, 2017). Others, on the other hand, argue that polarization is a serious problem even if it affects a small group of people (Sunstein, 2020) and emphasize that accidental exposure is not truly accidental, as algorithms heavily base content selection on past user behavior (Lee & Xenos, 2022; Thorson *et al.*, 2019).

2.2. *Why does it matter? The case of TikTok*

The effects of algorithms on the creation of information bubbles have become a hot topic in the Asian context, with recent studies conducted in countries as diverse as South Korea (Park & Park, 2024), Indonesia (Pradana & Efendi, 2024; Ruhyat & Wahidin, 2024), and China (Sukiennik, Gao & Li, 2024; Tan & Yoon, 2024; Wang & Guo, 2023). Most of this research focuses on TikTok.

TikTok is a social media app that allows users to create, edit, and share short videos, often enhanced with music, filters, and creative effects. Launched globally in 2017 by ByteDance – a Chinese tech company also known for other popular apps such as Douyin and CapCut – TikTok has become a cultural phenomenon, especially among younger audiences, due to its entertaining and trend-driven content (Ceci, 2024c). In 2024, TikTok is projected to have a global audience of approximately 900 million users (Ceci, 2024b).

TikTok has raised significant filter bubble concerns in Asia for three main reasons. Firstly, its strong presence in the Asian market. In 2024, seven of the ten countries with the largest TikTok user are located entirely or partly in Asia (Ceci, 2024a): Indonesia, Vietnam, Pakistan, the Philippines, Thailand, Bangladesh, and partially Russia. Given the United States' plans to ban TikTok (Maheshwari & Holpuch, 2024), the platform's relative importance in the Asian region is expected to grow even further in the short term.

Second, TikTok's success is deeply rooted in its algorithmic personalization. A quick search for the platform yields its slogan: "TikTok - trends start here. On a device or on the web, viewers can watch and discover millions of *personalized* short videos" (emphasis added). TikTok is recognized for its "powerful algorithm and recommendation system" (Tan & Yoon, 2024: 1), which fosters addictive behaviors (Wang & Guo, 2023). Unlike platforms like Facebook, which emphasize the 'networked self', TikTok operates on an 'algorithmized self' (Nowacki, 2024: 1325). According to Sato (2024: para. 4), "TikTok's algorithm is hyper-personalized, like a TV station calibrated exactly to a user's brain. Its For You page serves content based on what you've previously watched or scrolled away from, and breaking out of these recommendations into other circles of the app isn't easy".

Thirdly, alongside entertainment, TikTok is increasingly used as an information source (Tan & Yoon, 2024; Wang & Guo, 2023). Among Generation Z, TikTok has become the go-to platform for quickly accessing information, thanks to its alignment with their preference for fast-paced, visually driven content (Karimi & Fox, 2023). The information personalization threats outlined earlier have also been identified in the Asian context, such as restricted access to diverse cultural perspectives and viewpoints, as well as increased group polarization (Chen, 2023; Pradana & Efendi, 2024). Societal polarization is pointed out as one of the most relevant global risks for the next two to ten years (World Economic Forum, 2024). Additionally, recent research suggests that certain groups, such as younger individuals, women, and residents of lower-tier cities, are more susceptible to the effects of information bubbles, potentially exacerbating social inequalities (Sukiennik *et al.*, 2024).

For these reasons, and despite mixed results in the literature, studying information bubbles remains critical. As Sunstein (2020) contends, we must move beyond 'pessimism, nostalgia, and speculation' to create new frameworks for understanding and addressing this phenomenon. In this article, we propose exploring information bubbles through the perspectives of Bruno Latour and Edgar Morin on the nature-culture conundrum. Accordingly, we define the following research question: how can Latour's and Morin's views on the nature-culture dichotomy help us understand and address information bubbles?

3. Method

This paper's literature review was conducted to synthesize existing research to develop a conceptual framework. The review process was exploratory and iterative rather than systematic. Relevant literature related to the information bubbles phenomenon was identified primarily through searches in databases such as Scopus and Google Scholar, using keywords such as 'filter bubble', 'information bubble' and 'echo chamber'. Additional sources were included based on references cited in key papers. The selection of sources was guided by their relevance to the theoretical development of the topic. The inclusion of works by Edgar Morin and Bruno Latour reflects their status as seminal contributions widely recognized in the field. Themes and patterns between the two authors were identified through a qualitative analysis of the texts.

4. Latour's hybrid world

All of culture and all of nature get churned up again every day. Yet no one seems to find this troubling. Headings like Economy, Politics, Science, Books, Culture, Religion and Local Events remain in place as if there were nothing odd going on. The smallest AIDS virus takes you from sex to the unconscious, then to Africa, tissue cultures, DNA and San Francisco, but the analysts, thinkers, journalists and decision-makers will slice the delicate network traced by the virus for you into tidy compartments where you will find only science, only economy, only social phenomena, only local news, only sentiment, only sex (Latour, 1993: 2).

In 'We Have Never Been Modern', Bruno Latour (1993) argues that the contemporary world is not as distinctly divided between nature and culture as we often perceive. Instead, he presents the concept of hybrids and hybridization, wherein the lines between nature and culture blur through continuous interactions and transformations. Latour introduces two fundamental practices: translation and purification. The translation process involves creating mixtures of entirely new types of beings, hybrids of nature and culture. This contrasts with purification, which seeks to maintain clear distinctions between human and non-human entities or nature and culture. Although seemingly opposing, these practices coexist in modern societies and contribute to creating a complex network of relationships that defy simple categorization (Latour, 1993).

In explaining hybrids, Latour (1993: 40-50) draws our attention to 'monsters' such as "frozen embryos, expert systems, digital machines, sensor-equipped robots, hybrid corn, data banks, psychotropic drugs, whales outfitted with radar sounding devices, gene synthesizers, audience analyzers." He also invites us to consider societal problems such as the ozone hole, global warming, and deforestation, "Where are we to put these hybrids? Are they human? Human because they are our work. Are they natural? Natural because they are not our doing" (Latour, 1993: 50). In this context, Latour questions how, in an era full of evidence of translation processes, we continue to see the world purified into categories, dividing themes and problems into artificial boxes, as the opening excerpt shows.

The intertwinement of humans and non-humans becomes even more apparent in the Actor-Network Theory (ANT), which he developed alongside Michel Callon and John Law. ANT posits that both human and non-human entities (referred to as actors and actants)

participate equally in the creation of social reality, and this co-creation is evident when considering how long a social connection lasts without relying on any object (Latour, 2005). According to the philosopher, non-human entities, such as technologies, objects, and natural phenomena, also possess agency and can influence social processes. Latour (2005: 72) explains that it "does not mean that these participants 'determine' the action", but "things might authorize, allow, afford, encourage, permit, suggest, influence, block, render possible, forbid, and so on."

This view is also shared by Winner (2020: 29), who argues that objects have a political nature: "The issues that divide or unite people in society are settled not only in the institutions and practices of politics proper, but also, and less obviously, in tangible arrangements of steel and concrete, wires and semiconductors, nuts and bolts." To explain how artifacts can be political, Winner (2020) famously uses the example of bridges designed by Robert Moses over a parkway in Long Island, New York, deliberately constructed with low clearance to prevent buses from passing underneath. The alleged objective was to restrict the access of poorer populations to Jones Beach, an upscale park designed by Moses for middle-class white people.

According to ANT, the key to understanding social phenomena is to follow the network of interactions among these various actors (Latour, 2005). This work necessarily implies finding complexity and contradictions. However, Latour (2005: 16) claims that "social sciences have become much too timid in deploying the sheer complexity of the associations they have encountered" and that it is possible to draw insights from controversies.

5. Morin's Complex World

Because we were taught to separate, compartmentalize, isolate learning instead of making connections, the whole of our knowledge forms an unintelligible puzzle. Interactions, retroactions, contexts and complexities, lost in the no man's land between different disciplines, become invisible. The major human problems disappear, obscured by specific technical problems. (...) We find ourselves in a vicious cycle of increasingly multidimensional problems, increasing incapacity to think multidimensionally; the crisis worsens as fast as the incapacity to reflect on the crisis increases; the more planetary our problems, the more they are left unthought. (Morin, 1999: 17)

Like Latour, Edgar Morin (1999) questions the artificial divisions of nature and culture. He argues that this relationship is typically depicted in one of two paradigms. In the first, man (culture) is included in nature, emphasizing his 'human nature'. While in the second, there is a disjunction between culture and nature, highlighting the characteristics that distinguish human beings from nature. Morin explains that what these perspectives share is the fact that they belong to a paradigm of simplification, which attempts to deal with complexity through reduction or disjunction. Like the Cartesian paradigm, it supports the worldview in dichotomies such as subject/object, soul/body, and mind/matter, among others. For the author, this "normalizing force of dogma" fuels stereotypes, marginalizes dissenting voices, and keeps knowledge confined within a box of "imperatives, standards, prohibitions, rigidities, deadlocks" (Morin, 1999: 9).

Thus, Morin's paradigm of complexity challenges the classical scientific paradigm, which is based on isolating a particular object of study, reducing the "knowable to the

manageable" (Morin, 2005a: 30). Unlike reductionism, which seeks to break down phenomena into their simplest components, Morin's approach emphasizes the interconnectedness and interdependence of various dimensions of knowledge. He points out that the word 'complex' originally means "that which is woven together", and thus, the concept of complexity is rooted in the idea that reality is composed of networks of interrelations (Morin, 1999: 16).

Morin (2005b) posits that the reductionist approach of traditional science fails to capture the dynamic and multifaceted nature of real-world phenomena. He uses the human being as an example, noting that we are simultaneously "physical, biological, psychic, cultural, social, historical" entities, and therefore, knowledge of society cannot be solely based on calculations and formulas (Morin, 1999: 2). This perspective calls for a holistic approach that considers the interplay between different levels of reality.

Morin also criticizes the hyper-specialization prevalent in contemporary science: "it keeps us from seeing the global (which it fragments) and the essential (which it dissolves)" (Morin, 1999: 16). He argues that this specialization is based on the erroneous belief that the whole equals the sum of its parts (Pombo, 2006). Instead, Morin's systemic principle suggests that parts and the whole are in a constant state of mutual influence, which he explains by citing Pascal: "all things being caused and causing, assisted and assisting, mediate and immediate, and all of them joined by an intangible natural bond that connects the most distant and the most variant, I hold it impossible to know the parts without knowing the whole, or to know the whole without individually knowing the parts" (Morin, 1999: 14).

This holistic view of complexity is not entirely new. It echoes the thoughts of Aristotle, who claimed that the whole is more than the sum of its parts, an idea later popularized by Gestalt psychology. This perspective is foundational to Bertalanffy's General Systems Theory, which Morin acknowledges as a precursor to his thoughts on complexity. Bertalanffy applied complex thinking to biology, arguing that the characteristic organization of living organisms means that examining individual parts and processes in isolation fails to explain biological phenomena coherently (Bertalanffy, 1968).

Finally, in line with Latour (2005), Morin (2019: para. 6) emphasizes the importance of embracing complexity and controversy: "when you reach a contradiction, it doesn't necessarily mean an error, but rather that you have touched on a fundamental problem. Therefore, I believe that these contradictions should be recognised and upheld, rather than circumvented."

6. Understanding and addressing information bubbles based on Latour and Morin

Bruno Latour's concept of hybrids and ATN and Edgar Morin's paradigm of complexity help us gain a more nuanced understanding of information bubbles and how to address them.

6.1. Understanding information bubbles

6.1.1. A hybrid phenomenon

Information bubbles exemplify Latour's notion of hybrids: simultaneously cultural and natural entities. Information bubbles are created through human activities, such as content creation and consumption patterns, but they are heavily influenced by algorithms and technological infrastructures that operate beyond direct human control. These algorithms, designed to personalize and optimize user experience, contribute to forming information bubbles by selectively filtering content. This dynamic illustrates Latour's idea that hybrids emerge from the continuous interactions and translations between humans and non-humans, blurring the lines between natural and artificial processes. Thus, they are "human because they are our work" and "natural because they are not our doing" (Latour, 1993: 50). This dual nature of information bubbles highlights the intertwined roles of human agency and technological processes in shaping our informational environments.

6.1.2. The importance of non-humans

Latour's Actor-Network Theory (ANT) emphasizes the agency of non-human actors, such as algorithms, in shaping social realities. In information bubbles, algorithms do more than passively deliver content; they actively shape the type and scope of information individuals encounter by affording, encouraging, permitting, suggesting, and influencing information consumption patterns (Latour, 2005). This recognition of algorithmic agency challenges us to consider how these technological actants contribute to forming and maintaining information bubbles, underscoring the need to study their design, function, and impact on information dissemination. As non-human entities with an agency, algorithms play a crucial role in determining which content becomes visible to users and remains hidden, thereby influencing public opinion and discourse. This perspective shifts the focus from solely blaming users for their selective exposure to examining how algorithmic design and platform policies shape the information landscape.

6.1.3. A complex phenomenon

Edgar Morin's paradigm of complexity offers a framework for understanding the multifaceted nature of information bubbles. The triple-filter bubble model – comprising individual, social, and technological filters – illustrates that information bubbles have many different layers (Morin, 1999). Cognitive processes like selective exposure and confirmation bias lead individuals to seek information that reinforces their preexisting beliefs, while social filters, such as echo chambers, amplify messages within homogeneous groups. Technological filters, through algorithms, further personalize content delivery, reinforcing existing biases. Understanding information bubbles as a complex phenomenon requires us to consider how all the dimensions coexist and interact.

6.1.4. The importance of the whole and the parts

Morin (1999) emphasizes that the parts and the whole are in a constant state of mutual influence. In the context of information bubbles, this means that to understand the overall phenomenon, one must examine the individual components (e.g., personal preferences, social networks, and algorithms) and their interactions. Conversely, one must consider the broader context of the entire informational ecosystem to comprehend the influence of individual components. This holistic view is crucial for identifying leverage points for intervention. For example, altering algorithmic design without addressing social and individual factors may not effectively mitigate the problem. Similarly, efforts to change individual behavior must consider the broader social and technological context that shapes and reinforces these behaviors. By adopting a systemic perspective, we can identify synergistic strategies that simultaneously address multiple dimensions of the issue.

6.2. Addressing information bubbles

6.2.1. Avoid simplification and accept controversies

Latour (2005) and Morin (2019) caution against reductionism, which oversimplifies complex phenomena and eliminates critical information. Addressing information bubbles requires recognizing and exploring the controversies and contradictions inherent in the interplay between human behavior and technology. For example, debates around algorithmic transparency, data privacy, and content moderation often involve conflicting interests and values. Also, the existing research about the theme is contradictory and does not lead in one single direction. Not only acknowledging but also studying these controversies can inform our knowledge about the topic.

6.2.2. Follow the network of interactions

Latour's advice to "follow the actors themselves" (Latour, 2005: 12) suggests focusing on the interactions and associations that create and sustain information bubbles. This involves mapping out the networks of relationships between users, algorithms, content creators, and platforms to understand how information flows and bubbles form. By analyzing these interactions, we can identify critical nodes and connections that could be targeted for interventions. For instance, studying how users engage with content on social media platforms can reveal patterns of interaction that contribute to the formation of bubbles. We can promote more diverse information exposure by targeting these patterns through design changes or policy interventions.

6.2.3. Develop inter- and transdisciplinary research

Morin (1999) advocates for an approach that assembles and organizes knowledge from various disciplines. Research on information bubbles often focuses on a single area of knowledge. However, the phenomenon's complexity demands collaboration among various disciplines to capture its multifaceted nature. Even though areas of study sometimes overlap, there is a lack of a transversal perspective in the sense of interdisciplinarity (reciprocal

action) or even transdisciplinarity (going beyond what is specific to a single discipline) (Pombo, 2006). Areas such as computer science, engineering, sociology, psychology, philosophy, politics, media studies, and education should dialogue and find common ground to develop more comprehensive and practical strategies to address information bubbles.

6.2.4. Work on hybrid solutions

Since information bubbles are hybrid phenomena, solutions should also be hybrid, integrating both social and technological dimensions. Relying solely on technological fixes or social interventions alone will not suffice. Technologists can work on improving algorithms to promote diversity and serendipity, policymakers can create regulations that encourage transparency and accountability in digital platforms and also support independent journalism, educators can foster media literacy and critical thinking skills from a young age, journalists can strive for balanced reporting, and the public can engage in self-reflection about their information consumption habits. All of these measures are only possible through the interaction between humans and non-humans. By addressing the nature and culture dimensions of information bubbles, and everything in between, hybrid solutions can more effectively mitigate their negative impacts.

7. Conclusion

In this paper, we explored the phenomenon of information bubbles through the theoretical frameworks of Bruno Latour and Edgar Morin about nature-culture, providing a deeper and more nuanced understanding of this contemporary issue. With his concept of hybrids and Actor-Network Theory, Latour highlights the interconnection between human and non-human agents, exemplified by the algorithms' central role in reinforcing information bubbles. Morin, on the other hand, with his paradigm of complexity, warns against reductionism and hyper-specialization, promoting a holistic approach that acknowledges the interdependence between parts and the whole.

To mitigate the negative impacts of information bubbles on democracy and social cohesion, we argue the need to (1) avoid simplification and reductionism and accept inherent contradictions and controversies; (2) map and analyze the interactions between the various actors involved; (3) develop inter and transdisciplinary research that addresses the multiple dimensions of the problem; and (4) explore hybrid solutions that integrate both technological and social dimensions. By understanding information bubbles as hybrid and complex phenomena, we can develop more effective and comprehensive strategies to promote a more informed and democratic public sphere. Thus, the combined perspectives of Latour and Morin offer a helpful theoretical framework to tackle one of the pressing challenges of the digital age.

This article has limitations. First, it focuses primarily on the perspectives of two specific authors, Bruno Latour and Edgar Morin, which necessarily restricts its scope. This narrow focus may overlook other valuable theories and perspectives that could further enrich the understanding of information bubbles. Secondly, since this is a conceptual paper, the claims are not empirically tested, so the arguments made are not supported by concrete evidence. Lastly, some of the recommendations traced out are difficult to translate into

concrete actions since they require systemic changes and even a new way of looking at things.

However, the strengths of this paper lie precisely in its adherence to the principles espoused by Latour and Morin. In a Big Data world, looking back and organizing knowledge is more important than ever. In this study, I try to emphasize the importance of grasping the bigger picture in scientific inquiry by following interactions and making connections. Rather than solely seeking innovation and hyper-specialization, science needs to connect the dots and build bridges. By encouraging such an integrative approach, I aim to inspire further studies that address the multifaceted nature of contemporary challenges such as information bubbles. After all, as Morin (1999: 16) reminds us, "essential problems are never fragmented."

Notes on Contributors

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