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ONE BIOLOGIST, ONE MILLION DEATHS: EXPERTISE BETWEEN SCIENCE, SOCIAL MEDIA, AND POLITICS DURING THE COVID-19 PANDEMIC IN BRAZIL

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ABSTRACT

The article discusses the multiple forms of expertise articulated by a specific kind of digital influencer - online science communicators - during the COVID-19 pandemic in Brazil. Our case study focuses on the performance of Atila Iamarino, a PhD in Microbiology that achieved an unprecedented public recognition after predicting, in a YouTube live transmission, that more than a million people could die in the country due to the coronavirus. Assuming the relational and networked dimension of expertise, the article discusses how Atila combined and interchanged academic, affective, and sociotechnical abilities in his performances on social media and on other (media) institutions during a public health crisis marked by the lack of coordination and the political instrumentalization of science by the Brazilian federal government. The case study is based on a systematic observation of Atila's accounts on YouTube and Twitter, and on additional material published from March to August 2020. In the conclusions, based on how the Brazilian science influencer managed his visibility, alliances, and scientific background during the radical uncertainty period, we highlight how the expertise was built based on conditions of possibility that emerged in Brazil during the pandemic, which reveals contemporary tensions between science, politics, media, and other epistemic institutions.

Keywords: expertise; COVID-19; social media; science communication; digital influencer

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1 INTRODUCTION

On March 20, 2020, when Brazil had already reported 793 confirmed cases (Our World in Data, n.d.) and eleven deaths caused by COVID-19, the biologist and PhD in Microbiology Atila Iamarino made a live transmission on YouTube about "what Brazil should do in the coming days". Acting for more than a decade on his online science communication projects, especially on YouTube, Atila - as he is known to the broad public - used his own channel (Atila Iamarino, n.d.) to predict that Brazil could reach around one million deaths if nothing was done to stop the spread of the virus. Based on a study by the Imperial College, the "one million deaths live", as the transmission became known, achieved more than four million views in a week and launched Atila to a new level of public acknowledgment by and visibility on distinct kinds of media and public institutions.

The singular repercussion of this video - and of the following months' episodes starring Atila to be discussed in this study - illustrates how the COVID-19 pandemic, as a period of radical uncertainty (Callon, Lascoumes and Barthe, 2009), triggered an intense search for people or institutions that could be recognized as up-to-date and well-informed sources. The intense circulation and disputes involving quantitative data as well as general public recommendations culminated not only in an "infodemic", as addressed by the World Health Organization (2020), but also in a rearrangement of diverse kinds of expertise.

More than in most other countries, the public health crisis in Brazil must be understood in light of the lack of coordination (Calife & Maciel, 2022) and the ambiguous and conflicting position of authorities on issues such as the severity of the illness caused by the new virus and even the relevance of making investments in vaccines (Taylor, 2021). Thus, it could be stated that the scientific and the sanitary populism (Oliveira, 2022; Magalhães & Casarões, 2022) assumed by Jair Bolsonaro's government raised the pandemic's tensions between politics and science (Jasanoff et al., 2021) and opened room for disputes and conflicts between public experts, a high-engaged online audience and science communicators.

In this scenario, Atila Iamarino became a prominent voice in Brazil especially for engaging on YouTube and Twitter with the current scientific debates and with the (frequently contradictory) public health recommendations. Rankings elaborated by the IBPAD Institute and the data platform Science Pulse pointed out that Atila was the most influential voice among Brazilian scientists on Twitter in 2020 and 2021 (Meirelles, 2020; Meirelles & Rodrigues, 2021). On this platform, his numbers grew five-fold during the pandemic, and, by the end of 2020, he also reached one million followers on Twitter. On YouTube, the total number of views of Atila's channel increased 786% from February 27 to May 31, 2020 (Robalinho el al., 2020). His "extraordinary YouTube career" was highlighted by the YouTube Team (2021), who stated that Atila made his "standout year" live streaming "the microbiological aspect of the pandemic and making science and tech explainer videos".

Previous studies have already analysed Atila Iamarino's performance on social media in different moments of his career as a science communicator (Costa, 2019; Sousa, 2019; Oliveira, 2021; Blanco et al., 2022). By focusing on the negotiations and tensions between scientific expertise, social media practices and materialities, and political issues in Brazil during the COVID-19 pandemic, this article takes Atilla Iamarino's recognition as a prominent science influencer as a singular example of how different kinds of expertise are frequently combined in order to make someone both visible and trustful in the contemporary media landscape. Our main questions are: how did Atila Iamarino combine and interchange expertises in his public performances on social media platforms and on other (media) institutions during the COVID-19 pandemic in Brazil? How does he manage his scientific background and his experience as an online communicator during the disputes triggered by ambiguous policy recommendations and political instrumentalization of science? How does his growing presence as a science influencer can inform us about the tensions between science, politics, media, and other epistemic institutions in Brazil?

Our broader aim in the article is to contribute to the dialogue between different research fields, such as expertise, public communication of science, platform, and digital influencer studies. The debate here proposed is not guided by the analysis of public policies and scientific expertise as conducted by the Brazilian Federal Government during the pandemic. Instead, it focuses on Atila's performance as a science influencer that managed different expertises to navigate in a troubled media and political landscape. The professional use of social media by scientists and science communicators (and their dialogues with legacy media), their conflicts with politicians and activists inspired by extremist and/or negationist perspectives, and also the affective relationship with the audience are some of the topics related to the platformization of science discussed in this article.

The article is divided into the following sections: First, we briefly assume scientific expertise - a topic investigated by a diverse body of scholars - as a network that reorganizes power relations and dynamically negotiates authority, credibility, and similar notions. In the contemporary world, new forms of engagement and the increasing influence of science-related (far-right) populism are some of the aspects that put at stake, for instance, the role of science advisors. This issue is discussed having Brazilian pandemic and governmental context in mind. For public communication of science, expertise is additionally approached as an ongoing process that combines media-related activities, affects, and politics.

Next, the article discusses how science communication nowadays is intricately connected with the socio-technical expertise enacted by the logics of social media platforms. By managing popularity, visibility, and monetization, a multi-layered expert such as Atila Iamarino should also be framed as a science influencer. We discuss the singularities of this self-entrepreneur activity, including a call for intimacy, accessibility, and relatability with the audience. A brief chronology of

Atila's activities informs how these relational abilities relate to his recognition as a scientist and, especially, as a science communicator.

The section "Material and Methods" details the empirical research design. Anchored in Atila's social media accounts on YouTube and Twitter, the case study also explores a more diverse corpus (articles, interviews, statements, etc.) to discuss his process of expertise building during the COVID-19 pandemic. The following empirical study is divided in two parts: first, the focus is on live transmissions starred by Atila on television and on YouTube (including the already mentioned "one million deaths live") from March to August 2020. The goal here is to understand how Atila's science-related arguments are co-produced with his social media performance. A second empirical effort relies on Atila Iamarino's broader networks, which includes partnerships with epistemic institutions (including legacy media and the World Health Organization), the attacks directed at him by supporters of President Jair Bolsonaro and the acknowledgment mobilizations by his followers.

In the conclusions, we discuss how the multi-layered expertise articulated by Atila during the pandemic relates to the conditions of possibilities that emerged in Brazil during the pandemic, which includes the lack of coordination by public authorities. It is discussed how, while simultaneously dealing with in-process science research, contradictory public policies and (social) media logics, the science influencer mobilised institutions and audiences, and became a spokesperson of science in Brazil.

2 SCIENTIFIC EXPERTISE AND THE COVID-19 PANDEMIC

Due to its significant role in politics, public communication, and science itself, scientific expertise has been a topic of concern among a diverse body of scholars during the past decades. While some authors adopt a classificatory approach (Collins et al., 2017) or argue for the death of expertise (Nichols, 2017), others propose a more relational, negotiated, and heuristic sociotechnical approach. For Eyal (2013, p. 871), expertise must be framed when, through practices and conditions of possibility, it is still "in the making". In the process of formulating or addressing a problem, expertises are "networks that link together objects, actors, techniques, devices, and institutional and spatial arrangements" (p.864). To claim and to be recognized as a spokesperson, an expert should be engaged in making alliances and in rearranging power relations.

More recently, Eyal (2019) has pointed out that the contemporary "crisis of expertise" is a phenomenon that puts at stake the "authority, legitimacy, credibility, and reputation" especially of the science sub disciplines that are expected to provide "policy recommendation", which includes public health. The emergency of the COVID-19 pandemic made more evident to a broader public that, especially in shared uncertainty periods (Callon, Lascoumes and Barthe, 2009), the scientific consensus and guidelines are part of an unstable process. Analysing how different countries reacted to the pandemic, Jasanoff et al. (2021) stated as a "fallacy" the

supposed effectiveness of the science advisors' support to policymakers. In some of the studied countries - including Brazil - "experts rarely speak with one voice" and "conflicting expert advice is the norm." While discussing the 'fall of experts' during the COVID-19 pandemic in Brazil, Roque (2021) argues that instability of health authorities' recommendations were used as arguments for the negationism of politicians[1]. These cacophonic and unstable relationships can also be identified in the public communication of scientific research and their outputs. On the one hand, the intense use of epidemiological data culminated in broad circulation of metrics, simulations and predictive models that worked as "ways of assessing and managing *uncertainty*" (original italics) (Eyal, 2019, p.12). On the other hand, its everyday use by different publics culminated in a continuous scrutiny of these indicators (and of the complex ongoing scientific experiments and arguments that support them), increasing, for instance, political disputes. Additionally, the accelerated search for orientations or treatments and the sharing of preprints and not yet validated recommendations enacted a complex regime of circulation characterized not only by misinformation, but also by information overload – or an "infodemic", as addressed by the World Health Organization (2021).

The contemporary understanding of expertise should also be framed based on the expansion of a science-related populism. An "antagonism" between ordinary people and an "academic elite" and the call for a civil and individual "sovereignty" in the decision-making are two of the characteristics of this anti-establishment movement identified in different countries (Mede & Schäfer, 2020). During the COVID-19 pandemic, President Bolsonaro coordinated a singular case of scientific and sanitary populism marked by "political instrumentalization" of science (Oliveira, 2022) as well as by a "charismatic healer" who opposes the economic power of the pharmaceutical industry. (Magalhães & Casarões, 2022)

While the centralised participation of the scientific community in decision-making arenas (Dagnino, 2007) has historically contributed to the implementation of evidence-based public policies, including in public health (Maciel et al., 2022), during the COVID-19 pandemic, the Federal government "undermined science" mostly for ignoring "tried-and-tested pandemic-containment strategies" (Taylor, 2021). According to Kalil et al. (2021), the denialism, conspiracy theories and other populism tactics spread specially on social media by Jair Bolsonaro were converted "into official state discourse as well as public policy". Among other episodes, this attitude can be recognized in an official pronouncement on TVs and radios in late March 2020, when President Bolsonaro ignored his Minister of Health's efforts to

[1] When the World Health Organization (WHO) declared that lockdown practices should not be the main method to control the pandemic, President Jair Bolsonaro took the somewhat confusing statement as evidence that he had always been right about the supposed inefficiency of social distance. Another important example was the use of masks: in April 2020 WHO indicated the use of masks only for health professionals and symptomatic patients. Two months later, the guidelines were updated (masks were recommended for general use), but the previous orientation continued to be evoked by some to justify the so-called 'freedom of choice'.

manage policies in accordance with the global health guidelines known by then and asked mayors and governors to roll back "scorched-earth" policies like closures of businesses and schools (Coronavirus: Bolsonaro downplays..., 2020).

Relevant works on science communication also recognize how the public communication of scientific expertise blurs the lines between science and politics in modern democracies (Scheufele, 2014). Peters (2021) defines as "public experts" those scientists that are engaged in 'public events', such as media interviews, "when they not only talk about their research in public but relate scientific knowledge to orientation needs of a lay audience or political problems of society at large" (p.114). Acting as advisors or as public communicators, science experts are supposed to cross "the boundary of science, entering society as an actor and exposing oneself to internal and external criticism" (p.124). As such, scientists who engage themselves in social media and media events often become increasingly popular, enacting a "feedback loop" (Peters, 2021, p.122) that redefines the logic of "visible scientists" previously identified by Goodell (1977).

In dialogue with these authors, we assume that scientific expertise, especially in its interfaces with public communication, is determined not only by the academic background or the institutional legitimacy, but also by how he/she manages to combine visibility and reliability by articulating different media-related materialities and practices in a given situation. Thus, what makes someone recognizable as a scientific expert is closely related to the "affect and feelings" (Líndén, 2020) involved in the public engagement with scientific issues, triggering a continuous process of negotiation around empathy and confidence. As states Eyal (2019), expertise cannot be taken as "a set of skills possessed by an individual or even by a group, but a historically specific *way of talking*" (original emphasis).

2.1 Scientific influence and social media expertise

The comprehension of scientific expertise as part of an interplay that involves different actors, objects, devices, institutions, etc. (Eyal, 2013) evokes new challenges when one aims to go deeper into the entanglements between the contemporary public communication conducted by experts and the data-driven and normative dynamics of online platforms. In dialogue with the previous studies that claim a media-oriented expertise analysis (Peters, 2021; Egher, 2020), we argue that social media platforms must be taken not only as 'social networks' in which a previous expertise can be performed or (re)negotiated, but mainly as infrastructures that demand specific socio-technical expertise to manage popularity, visibility, and monetization.

To discuss the performative dimension of expertise in digital media contexts, Chan (2019) studied how a group of experts in a specific professional activity (Uber drivers) articulate their presence in a social media platform (YouTube). Despite having experience with algorithmically driven systems, such as the Uber Driver app and the surge pricing embedded into it, drivers need to reshape and amplify their

expertise to also become youtubers. While some of the self-presentation practices discussed by Chan (2019, p.16), such as constructing "know how" and realness, seem to be more related with drivers and other workers of the gig economy, the performance of the "uniqueness" and the "relatability with audiences" can be taken as common efforts of other kinds of experts (such as scientists) on social media platforms.

Following the discussion, it can be said that an analytical effort to understand the presence of science experts and science communicators in social media platforms could rely on the notion of "digital influencer". In a study focused on the broader concept of internet celebrity, Abidin (2018) discusses the specificities and challenges of an influencer. The maintenance of his/her visibility and the creation of a sustained business, argues the author, require "economic, technical, cultural, and social skills" (p.98) that are related with the logics of the industry (fashion, music, etc.) and of the medium.

While studying the knowledge-building and interpretive processes by Instagram influencers, Cotter (2018, p.897) highlights the importance not only of playing the 'visibility game' with the algorithms, but also of building 'a sense of intimacy, accessibility, and relatability' with the audience. In a complementary way, Van Driel e Dumitrica (2021) put into light the process and tensions of self-professionalisation. To become a brand and an entrepreneur, a digital influencer is expected to conciliate the authentic performance desired by followers and attractiveness to advertisers.

For scientists, acting and being recognized as an influencer may take to new levels a closer relationship between scientists and their audiences discussed previously by authors such as Brossard (2013). However, communication and engaging with science topics in an influencers-oriented media environment does not come without trouble. Analysing Brazilian communication efforts during the pandemic, Tatiana Roque (2021) states that one of the consequences of the lack of trust in institutions is the excessive emphasis on the "personal manifestations of specialists, who became celebrities on the internet and on television".

Another issue in Brazil is the increasing involvement of all types of digital influencers in political debates. During the pandemic, a journalistic investigation found out that nineteen Brazilian influencers (with hundreds of thousands of followers each) had been paid by the Federal administration to support "early treatments" that were already refused by health authorities (Fleck & Martins, 2021). Felipe Neto, one of the most popular youtubers worldwide (around 44 million subscribers), acted in the opposite direction, publishing in the New York Times' opinion section a video called "Trump Isn't the Worst Pandemic President - Just ask Brazilians" (Neto, 2020)[2].

[2] The piece triggered intense online attacks by the far-right president supporters and was later presented as an argument to the digital influencer's inclusion in another list: the 100 most influential personalities of 2020, according to Time Magazine. Not by coincidence, the other Brazilian listed was President Bolsonaro himself, criticized by Neto.

Before presenting the case study of Atila Iamarino's performance as science influencer during the pandemic, a brief chronology of his career may enlighten how his public recognition has long been associated with the capacity of building networked expertises as a scientist and especially as a science communicator. *Science Blogs Brasil*, a project co-funded by Atila in 2006 (Fagundes, 2013), is a singular example of the "new wave of science communication" (Bauer,1997) enacted by massive government investments in research institutions and universities in the early 2000's (Massarani and Moreira, 2016).

In 2008, during his PhD in Microbiology at the University of São Paulo, Atila created his own science blog (*Rainha Vermelha*) (Iamarino, n.d.) and a Twitter account (@oatila). After working as a postdoctoral fellow at USP and Yale University, Atila was invited in 2015 to host *Nerdologia* (n.d), that later became one of the biggest science and technology Brazilian YouTube channels (3.29 million subscribers in November 2022). By exploring the interfaces between nerd culture (movies, games, sci-fi, etc.), Science and Humanities (Blanco et al., 2022), the now former scientist expanded his original science communication bubble and realised that his dream was becoming a "teacher of the crowds" (Iamarino, 2020i).

In August 2019, Atila created his own YouTube channel, which two years later achieved over 1.52 million subscribers. Becoming a Youtuber made Atila finally a one-man brand that could be commercially explored. A variety of videos were published in the first months, including sponsored-like / vlog content about companies such as Tesla (Iamarino, 2019)[3] and Apple (Iamarino, 2020e). Publishing 'advertorials' without clear distinctions between science content and ads was also a frequent practice in Atila's former channel *Nerdologia* (Blanco et al., 2022) and continued to be an issue after his peak of visibility and popularity[4], revealing a long-term effort to explore commercial value of his science-based credibility.

3 MATERIALS AND METHODS: INTERCHANGING EXPERTISES

This case study is based on an intense empirical observation aimed to identify Atila Iamarino's key actions during the COVID-19 pandemic as well as the public repercussions and deployments triggered by his performance as a multi-layered expert. Two social media accounts managed by Atila are deeply scrutinised in the study: his YouTube channel and his Twitter account. However, we work with a multiple and more diverse corpus that includes not only Atila's own publications

[3] In the process of editing this article, the video was put in private mode and is no longer available on the channel.

[4] In May 2021, he published an "editorial video" (Iamarino, 2021a) in which explains how sponsored content is signalized and clarifies that, as the sponsor only decides a final advertising message, he had total editorial freedom on his channel. Additionally, he explains that he had decided to have few but coherent sponsors that do not have any conflict of interests with his content.

but also video interviews, statements from followers, newspaper articles and other content that contribute to the understanding of the phenomenon.

The observation begins with a video published on March 20, although previous content, such as a video from January 31, is briefly cited to contextualize how and since when Atila was mobilizing his followers around topics related to the pandemic. The empirical analysis ends on August 2nd, 2020, with the mobilization of Atila's supporters through the hashtag #ObrigadoAtila (Thank you, Atila).

The first section of empirical analysis is dedicated to five YouTube videos starring Atila (four published on his channel and one by a TV show). In this section, we also use CrowdTangle - a Meta-owned data analytics tool - in a preliminary analysis to identify how the first of his videos resonated in other social media platforms. While those five videos published on YouTube are analysed to highlight Atila's arguments on scientific evidence, public policies and related issues, his more diverse use of Twitter guided a broader 'backstage' mapping of how the scientific digital influencer managed his social media expertise as well as how his increasing public visibility mobilized a highly engaged audience.

The methodological efforts of this study also include a second section with the systematisation of Atila's main dialogues and partnerships with traditional epistemic institutions, including legacy media. The aim was not to delimitate a corpus or to assume a systematic approach, but to follow how tweets, opinion articles, pictures, trending topics and hashtags could help us analyse Atila's performance as both an influential communicator and a visible scientist that is publicly recognized as an expert.

3.1 "Broadcasting himself" and explaining COVID-19 on YouTube and TV

The COVID-19 crisis was first mentioned on Atila's channel in the video "What if the CORONAVIRUS arrives in Brazil?", published on January 31 - a day after the WHO declared "Public Health Emergency of International Concern" and before the circulation of the new coronavirus had been officially identified in Brazil. Until March 2020, a few other of his videos attempted to interpret the latest information from global health authorities and scientific research.

Nine days after the WHO declared the ongoing crisis as a pandemic, Atila broadcasted a live transmission on YouTube that would suddenly transform his presence in the media and on digital platforms. Later known as the "the one million deaths live", the video broadcasted on March 20 under the title "What Brazil needs to do in the next few days" (Iamarino, 2020f) projected that the number of deaths from COVID-19 in Brazil could reach one million people in the next months depending on the policies adopted.

The estimation presented by Atila was based on a so-called "very reputable study" by the Imperial College (Ferguson et al., 2020) that "was guiding policies all over the world", as Atila argued. It did not present specific data related to Brazil,

but, in a scientific effort, Atila made a prediction analysis based on the UK-researchers' model and stated that, if nothing was done to prevent the spread of the coronavirus - as "some are preaching", he said - the country would reach 1,4 million deaths caused by COVID-19 by August 2020. Even if Brazil adopted "mitigation" efforts, one million people "or more" could die in the next few months[5]. A "suppression" policy like the one adopted by China would flatten the COVID-19 curve to a "few thousand deaths", according to him.

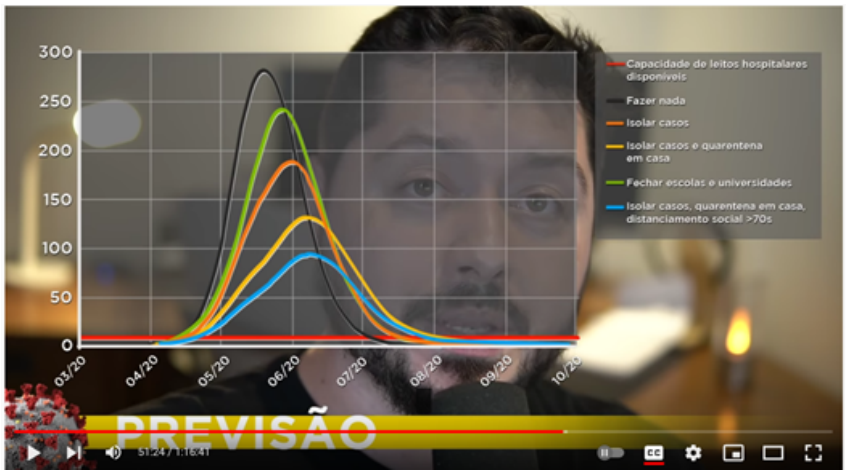

Figure 1. Different scenarios, such as "doing nothing" (in black) and "isolating cases and home quarantine" (orange), were presented in a multiple line chart.

As a science communication piece, the live transmission by Atila on March 20 combines scientific terms, descriptions and charts that illustrate the challenge of flattening the curve of deaths that could be caused by the new coronavirus (Figure 1)[6].

This video reached remarkable numbers: in less than a week, it had already passed 4.6 million views, and reached a large and diverse audience on other platforms. Using CrowdTangle, a Meta-owned tool for data analytics, we identified the YouTube video URL was shared in 94 public pages and verified profiles, and in 390 public groups. The live broadcast was also largely watched outside YouTube. According to CrowdTangle Team (2021), a full version published by an entertainment fan page followed by more than 8 million Facebook users was shared

[5] The discussions on isolation policies were then taking its first steps in Brazil. A few hours before Atila's "one million deaths live", the then minister of Health, Luiz Henrique Mandetta, had made his most emphatic public statement to date, warning that the new coronavirus spread could "collapse" the public health system in the upcoming weeks.

[6] The articulations between scientific and social media expertise by Atila can be observed in other moments. Right at the beginning of the video, he recommended that people should not watch it if they were feeling anxious, because he would have a "not very nice" conversation with the audience. He deactivated the chat and emphasized the necessity of "using his license" as a scientist and his expertise as a biologist and researcher with post-doctorate in virus studies to alert about the seriousness of the situation. An hour later, just after presenting the data he had estimated to Brazil, his camera turned off and his voice echoed: "This is the worst live to have technical problems", he said, sweating and tense.

17,176 times and reached more than 1,1 million views on this platform (Mistérios do Mundo, 2020).

Another milestone in its media visibility and the crossing of politics in his science speeches happened ten days later (on March 30), when Atila joined a traditional TV show that invites journalists on a weekly basis to interview public personalities (Roda Viva, 2020). Hosted for decades by the public channel *TV Cultura* (Botin, 2016), Roda Viva regularly mobilizes its audience on social media, but, that night, the show reached the Worldwide Trending Topics on Twitter, and the highest TV audience of Roda Viva since 2018, when the then presidential candidate Jair Bolsonaro had been the guest. The YouTube video quickly reached more than three million views and became the second most watched on the TV show channel (the first is Bolsonaro's 2018 video). A few hours after the show aired, the host presenter, Vera Magalhães, tweeted:

> 1:33 am. #RodaViva is still the first Twitter topic in Brazil. AND THE THIRD IN THE WORLD. The respondent is a scientist. I said in the (TV show) opening text: perhaps the only positive point of this nightmare is the rescue of science. @oatila completed: and journalism. Together (Magalhães, 2020)

As the tweet indicates, an alliance between two epistemic institutions (science and journalism) had been reinforced during that Roda Viva edition. In crisis situations such as the outbreak of the pandemic, both "scientists and journalists are like heralds of bad news", Vera Magalhães had stated during the TV show.

One of the most discussed issues during the program was the role of Brazilian political leaders, specially of then-President Jair Bolsonaro. The infection of twenty-two officials after a visit to the United States led by the President and an interview in which Bolsonaro had declared that, for someone like him, COVID-19 "would be at most just a little flu" was some of the situations mentioned by journalists during Roda Viva. In his answers, Atila tried to avoid evaluating or even mentioning the President's denialist actions and discourses, and opted to emphasize the importance of the initiatives coordinated by the Minister of Health, such as adapting the public health system's infrastructure and buying equipment and tests. Beyond this confidence in the events coordinated by public health experts, Atila also assumed that scientific evidence would overlap the denialist perspective of some authorities:

> With covid, the consequences come in two weeks, a month. Whoever is denying the truth now, I just must sit back and wait because what these people are saying is going to change in two weeks. Same thing goes for leaders. (Roda Viva, 2020)

For evading making political statements and for not criticizing the president and other authorities, Atila was labelled by many on Twitter as an "exempted", or "*isentão*", a popular slang in Brazil to name those who do not want to take a clear position about politics.

In Roda Viva, the prediction analysis Atila had made based on the Imperial College study was mentioned only once, when the journalist Mariana Varella asked

which scenario he was more inclined to believe in. Atila answered he was optimistic because "prevention measures were adopted soon enough", as recommended by the study made in the UK.

Despite the new optimistic view, the "one million deaths" live transmission was turned into a permanent issue for his followers and, specially, haters, as we detail in the next section. For instance, on the first day of August - the month in which the "prediction" was supposed to be reached - his scientific expertise was put into question because Brazil had registered "only" 93,563 deaths caused by COVID-19. As an answer to these critics, one of the lives broadcasted on late March (Iamarino, 2020g) was partially reproduced by Atila on Twitter (Iamarino, 2020d) to reinforce that, at that time, he had presented an updated version of the study (Walker et al., 2020) made by the Imperial College COVID-19 Response Team.

The fragment that Iamarino (2020g) recirculated months later makes visible the controversial process of science making. While Atila reinforces the authority of the UK-based research team – "in the words of the New York Times, they are the gold standard that orient public policies", he said – he mentions that part of the original study had been immediately questioned by other researchers. Shedding light into the "in process" dynamics of science in an uncertain period did not avoid criticisms. One of the tweets mentioned by the analysis of Almeida and Santos (2021) regarding Atila's legitimacy by that time argues that "relying on a single study and presenting models without knowing how to make a real one is sailing on a ship that is doomed to sink", questioning his expertise.

Figure 2. Atila comments on his first attempt to make a predictive analysis in a later video called "Where is the one million".

The most important reaction to the critics was a live transmission, by the end of August, called "Where is the one million?" (Iamarino, 2020h) (Figure 2). To resume and explain what was at stake in the broadcast which, more than once, he qualified as "fateful", Atila evoked a more specialized terminology, for instance by

distinguishing "predictions of the future" from the "possible scenarios" outlined by epidemiological studies. The model proposed in early March by the Imperial College was not considering intermediate scenarios - such as what would happen if "everyone was locked at home" - because, according to Atila, this possibility was "unthinkable" at that moment.

To defend himself from critics, Atila points out (with a disappointed smile on his face) that he had been "very innocent" when he announced the estimated scenario: "I did not know why official pronouncements do not give punctual numbers, fixed estimates of what could happen. It is because you will be charged for it". This self-criticism reveals Atila's perception that, at least in March 2020, he was acting not only as a science communicator, but also as an informal advisor who, even though he was dealing with best science-evidence data available, should have been more cautious to avoid the increase of uncertainties.

3.2 Pandemics and beyond: partnerships, monetization and affects

The visibility achieved by Atila in the first months of the pandemic crisis culminated in expressive changes both on his online science communication projects and his insertion in a broader public debate. The expansion of Atila's expertise network (Eyal, 2013) can be identified, for instance, through partnerships and dialogues with legacy media, public organizations, and other epistemic institutions. In April 2020, Atila received financial support from Serrapilheira Institute (Iamarino, 2020b), a private non-profit organization focused on innovative science projects, to produce his YouTube videos. He also became a columnist at *Folha de S.Paulo*, one of the most traditional newspapers in Brazil. Beyond science communication, he also joined an Electoral Supreme Court project to combat disinformation, and was awarded, by the Municipal Council of São Paulo, with the Anchieta Medal and the Gratitude Diploma due to his work on behalf of São Paulo citizens. Also, Atila's participation in the WHO global conference on communicating science during health emergencies (June 2021) can be interpreted as the "peak" of his political and scientific recognition. He was the only Latin American among five science communicators invited, in the opening session, to present "how to effectively convey research results to different target audiences" during a pandemic (World Health Organization, 2021).

During these demanding institutional engagements, Atila was also dealing with his increasing popularity and credibility on social media, and consequently managed different and new expertise in this leading and high visibility role. His Twitter account was used to talk not only about COVID-related content, but also about YouTube's policies and the algorithmic-mediated performance of his science communication pieces. In the breakout of the COVID-19 pandemic, for instance, YouTube temporarily suspended the monetization of all videos related to the still very unknown public health issue (Fonseca & d'Andréa, 2020) - and Atila tweeted in accordance with the platform policy (Iamarino, 2020a). On April 17, for

instance, Iamarino (2020b) asked followers to share one of his previous live transmissions because it had been "blocked" by YouTube and could not be found by anyone. On May 13, the visibility achieved on the video platform was celebrated (Iamarino, 2020c): his interview with Marcia Castro - a Professor of Demography at Harvard University - was in the second position on the trending ranking curated by YouTube. During this live interview, he also displayed a plaque provided by YouTube after his channel reached one million followers.

Atila and his audience also had to deal with the worsening of the pandemic in Brazil as well as with an escalation of the political polarization. In the mid of 2020, the denial of the health crisis and the lack of strategic decisions by Jair Bolsonaro, the inertia of the new Minister (which was the third since the beginning of the pandemic[7]) and the President's insistence on advocating early treatments (e.g., with chloroquine) culminated in the president's worst public evaluation so far. However, the strong rejection did not seem to change the online behaviour of the President's supporters, who continued to stand up for his recommendation of ineffective drugs and the boycott of social isolation measures to "secure the economy".

Regarding this radicalization, Atila was increasingly targeted by anti-science movements and pro-Bolsonaro users. In the analysis of the public responses to Atila's pinned tweet from March to June 2020, Almeida & Santos (2021) make visible a range of aggressive attacks or ironic references, like a photomontage of the activist Greta Thunberg with his face. One of the collected tweets states that Atila is the "*tupiniquim version* [in Portuguese, this a pejorative expression that relates to the Indigenous people with a bad quality national copy of something] of Al Gore". Like Thunberg, the former US vice president is a global personality known for combating global warming denialism.

Not coincidentally, the escalation of online hate attacks peaked at the end of July, exactly four months after the prediction analysis made during the "fateful" live. On July 14th, for instance, his name reached Twitter Trending Topics: according to detractors, Atila should be "cancelled" for overestimating the risk of the pandemic. But Atila made efforts to defend himself by performing his expertise as scientist and science communicator both on social media and on legacy media. On July 30, Atila even used his *Folha de S.Paulo* article to criticize the "active ignorance" of those who spend time and energy to, aggressively, keep people in doubt about ongoing issues such as the tests phase of the vaccines research (Iamarino, 2020j).

The most emphatic response to all the attacks, however, was articulated by Atila's supporters, who organized the hashtag-oriented mobilization #ObrigadoAtila (Thank you, Atila) to thank him for being engaged in science

[7] After Henrique Mandetta was fired, Nelson Teich was chosen for the position, but resigned less than a month later. The next Minister of Health was Eduardo Pazuello, member of the Military, who was involved in investigations for omission in the coronavirus crisis. At the time of the writing of this article, Brazil has its fourth minister of health, Marcelo Queiroga.

communication for more than a decade, and for acting as an online advisor dedicated to mitigating the consequences of the pandemic. Among the tweets that boosted the campaign towards Twitter Trending Topics on August 1st and 2nd is a highly shared cartoon published by Ruas (2020) (Figure 3).

Figure 3. The cartoon shows Atila in some quotidian moments of an indoors quarantine remembering a character that he should not go outside home yet

Although the pandemic kept showing signs of decreasing in Brazil, due to the pace of vaccination and consequent reduction of cases and deaths, Atila seems to have developed a consistent digital presence, which consolidated his role in the scenario of public communication of science in Brazil, beyond the COVID-19 crisis.

4 CONCLUSIONS

This article aimed to discuss the multiple expertise articulated by Brazil's most well-known online science communicator during the COVID-19 pandemic. Atila Iamarino's performance on social media platforms - and on legacy media -, his growing dialogues with traditional epistemic institutions, and the continuous engagement with a polarised online audience are some of the aspects studied to shed light into the contemporary entanglements between science, politics, and media in Brazil.

Based on the case study, it could be stated that the performance of Atila Iamarino during the outbreak of the public health crisis, in 2020, puts in evidence how the recognition of science expertise is increasingly embedded into conditions of possibilities that combine - and sometimes collide - institutional, material, political, and economic arrangements. While the first cases of COVID-19 were still being detected in Brazil, the lack of coordination by public authorities, absence of

public experts and the ambiguity of the policy recommendations made room for an unprecedented public recognition of an already experienced science communicator.

Having a PhD in Microbiology and previous positions as a researcher allowed Atila to immediately claim the position of a science expert. This can be easily recognized during the 'one million deaths live', when he evoked his academic background as a "license" to "manage uncertainty" (Eyal, 2019) by riskily making a predictive analysis based on a just released epidemiological model. In the following months, while receiving several types of criticism, Atila defended himself emphasizing his scientific authority, such as using more precise terms ("predictions of the future" and "possible scenarios"), producing and exhibiting inscriptions (tables, graphs), and highlighting the importance of a continuous literature review.

If months later Atila recognized that he had been "very innocent" - in his own words - for having publicly made risky predictions, just one week after the 'one million deaths live' - in Roda Viva's interview - one can identify a more cautious posture, or a more careful management of the visibility. At the same time, the exponential increase of his own YouTube channel - coincidentally released a few months before the pandemic - allowed Atila to explore new formats and commercial deals, consolidating the science communicator as a one-man brand. Playing the algorithmic visibility game, interpreting the platform governance, combining monetization resources, mobilising an intimate audience, and dealing with detractors or haters were some of the daily activities that allow us to recognize Atila as a specific kind of expert: a science influencer.

Not coincidentally, the entanglements between social media and science communication expertise were the key arguments mentioned by the WHO and YouTube - two transnational institutions with quite diverse backgrounds - to highlight Atila's contribution during the pandemic. In the words of Eyal (2019), it could be stated that he was recognized as a contemporary multi-layered expert due to his "historically specific way of talking" while using different platforms' affordances and infrastructures to contribute to the public understanding of, and to engagement with science.

Also, the platformization of science communication occurs in connection with a broader media and institutional environment. Being recognized as a science influencer escalated his dialogues and his partnerships with different national epistemic institutions and made Atila an *ad hoc* public expert or even a policy advisor. The invitations to be 'the' person interviewed in the beginning of the pandemic in an "academic elite" TV show as Roda Viva and to discuss, with the Supreme Electoral Court president, the sanitary conditions for holding an election are key examples of how becoming a contemporary "visible scientist" (Goodell, 1977) require a tactical articulation a multi-layered expertise.

The intense rearrangement of alliances and other power relations in the expertise network elevated Atila to the position of "super" science communicator and, at least during some months in 2020, of the main spokesperson of science in

Brazil[8]. For being recognized as a kind of representative of the 'establishment', Atila became a target of far-right politicians and activists that insisted on denying scientific procedures and evidence. Not coincidentally, the main argument used to attack him was the super estimated predictive analytics made on the "one million deaths live". As Mede & Schäfer (2020) discuss, taking advantage of the instability of science efforts during periods of radical uncertainties is a known tactic of the "science-related populism".

In this online science war, the #ObrigadoAtila mobilization can be taken as a singular example of the affective relationship built with the audience only during the pandemic, but also after years acting as a science communicator. If, especially in the breakout of the pandemic, science and journalism had been the "herald of bad news", as the Roda Viva presenter tweeted, in the 'quarantined' everyday life Atila was recognized by many as an intimate and trustworthy "real person" available to reinforce the "stay at home" recommendation and to clarify other stressful quotidian issues. This sense of intimacy became even more clear on the day Atila made his speech at the WHO. Once again, his name was on Twitter's Trending Topics, not because of his talk, but due to the announcement of a personal event: his wife was pregnant, and he would soon become a father (Iamarino, 2021b).

The (ongoing) COVID-19 pandemic renewed the public call for a better comprehension of how the long-standing mixture between science and politics is being reshaped by the multiple uses of social media by scientists, politicians, activists, and other actors. Among the possible broader contributions of this article to this unprecedented research challenge, we emphasize that a contemporary notion of expertise should consider the role of digital platforms not only to orient an online science communicator's performance, but also their capacity to rearrange power relations between institutions, public authorities, and citizens. More specifically, we argue that the current debate on scientific expertise should be framed considering centrality and the complexity of the alliances and the conflicts between epistemic institutions and the platform-oriented dynamics articulated by influencers, fans, and other actors. In this sense, interdisciplinary dialogues between scholars of fields like platform and public communication of science studies should consider how expertise is nowadays an attribute that articulates academic, affective, and sociotechnical abilities based on specific institutional, political, and material conditions.

AFTERWORD

Most examples and situations described during this study are concentrated in the first six months of the pandemic in Brazil (March to August 2020). During this

[8] Natalia Pasternak (microbiologist and founder of Questão de Ciência Institute) and Margareth Dalcolmo (doctor and research at Oswaldo Cruz Foundation) are some of the experts that later acquired significant public visibility, what includes being at Roda Viva (June and December 2020, respectively).

period, the mortality caused by COVID-19 increased daily until late May 2020, when the moving average stabilized at around 1,000 deaths a day. This number decreased until early November and then increased progressively until April 2021, when, on average, 3,000 people died everyday due to the new coronavirus. At the end of 2021, when the first version of this article was edited, the data - and the fear - linked to the pandemic were, thanks to the vaccination, progressively decreasing. By the end of 2022, more than 680,000 Brazilians have been fatal victims of the virus. A 1,289 pages report approved in October 2021 by a parliamentary commission of inquiry established that part of the death rate was due to the irresponsible way the crisis was conducted by the President, other public authorities, and even by health institutions (Comissão Parlamentar de Inquérito da Pandemia, 2021). On the eve of approval of the report's last version, the Brazilian Senators decided to exclude from it the term "genocide" to qualify the indictment of President Jair Bolsonaro for committing "crime against humanity, in the modalities extermination, persecution, and other inhumane acts". A few months before - and a year after making efforts to separate science and politics in Roda Viva - Atila gave an interview to *BBC Brasil* and the highlight was: "Brazil bet on a 'genocidal' strategy to fight COVID-19, says Atila Iamarino" (Barrucho, 2021).

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