MODELS OF PUBLIC UNDERSTANDING OF SCIENCE AND CYBERJOURNALISM ON THE FLAT EARTH

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Abstract. The aim of this article is to describe the models of public understanding of science involved in the communication between disciplinary matrices of experts and lay scientific prosumers in digital social networks to develop a *Technique of Critical Documentary Analysis* (TCDA) that allows scientific cyberjournalists to carry out critical-qualitative research practices. The theoretical model that orders the interpretation of the data is the epistemology of testimony, so it is assumed that the development of communities of lay scientific prosumers in social networks is a consequence of the distrust in the normal epistemic authority, while cyber-journalistic interventions are still sustained in the *deficit model*. For the development of the TCDA, a non-experimental descriptive-ethnographic methodological design was used, with a qualitative, retrospective-longitudinal approach, with which were selected, in a period of 6 months (2019-2020), segments of comments from experts, interface agents and laymen, related to terraplanning communities. The results obtained suggest that the development of a TCDA requires situating the activity of interface agents in the interstice between the communities of experts and lay scientific prosumers, as well as traditional or social media, appealing to the meta function of communication, that is, to the possibility of understanding a theoretical position beyond the normal science paradigm, protected by unidirectional/verticalist literacy strategies, as well as the transmedia presumption of evidence and arguments developed by laymen.

Keywords*: cyberjournalism; scientific communication; epistemology of testimony; cognitive deficit model.

Introduction

The conceptualization schemes on public communication of science in the 20th century have assumed the acceptance or rejection of cognitive asymmetry, that is, of a prescriptive logical-theoretical construct regarding the difference between expert knowledge and the popular knowledge of laymen, and from which four hegemonic models of public understanding of science are inferred. The question that structures this article is, then, the following: *¿Which critical documentary analysis technique is relevant*

to interpret the models of public understanding of science involved in the communication between expert disciplinary matrices and lay scientific presumption communities in digital social networks?

The assumptions underlying the interpretation of the data collected are as follows:

a. The formation of lay matrices in digital social networks is a consequence of distrust in the credibility of scientific evidence and, indeed, of epistemic authority.

b. The normal science matrix communicates with lay communities according to the criteria of the classical-empiricist model, that is, by literate compensation of the hypothetical cognitive deficit of the public.

c. The interface mediating agent (educommunicator, science journalist, science popularizer, etc.) protects the ideological interest of the normal science community, to the detriment of the lay science prosumers.

The disciplinary relevance of the presented study is given by the fact that it occupies a space of theoretical vacancy in the face of the persistent use of scientific demarcation criteria typical of the *standard conception of science* by interface agents who carry out public communication and apply unidirectional communicative models, based on the extension of scientific literacy/propaganda and *cognitive asymmetry* to relate to laymen or experts. Thus, the general objective of the study is interpreted, consisting in the development of a TCDA based on a historicist-pragmatist epistemological understanding, which allows different interface agents to generate a critical description of the communication between experts and laymen in digital social networks.

Hegemonic models of public understanding of science

Cognitive asymmetry has given rise to four models of public understanding of science, namely:

a) *Cognitive Deficit Model (CDM)*: The *Information Deficit Model* (*IDM*), which focuses on understanding the interests, attitudes and knowledge of the public, has led to a significant controversy regarding the role of science communication in explaining the relationship between disciplinary matrices of experts and the mass public; it originated around 1980 in the United States and the United Kingdom, in the context of the debates linked to the linear hypothesis that establishes *the prevalence of greater social skepticism towards science due to a generalized lack of knowledge about the processes and products it develops*. In this model, the task of public communication of science consists of the disciplinary development of science journalism, educommunication, social and scientific communication, as well as the formation of a system of scientific propaganda that fulfills the primary objective of literacy to compensate for the cognitive deficit registered by the lay public.

Scientific literacy, also assumed in the objectives of the *Vienna Circle*, is

conceived from the deficient understanding that the scientific education of the citizenry is concurrent with the need for civil society participation in public debates on science and, ultimately, is seen as a predictor of democratic quality: social unrest, put in consideration of significant problems such as nuclear energy, cloning, vaccines, agricultural or food technologies, etc., would require scientific literacy strategies so that overt hostility does not prevent the implementation of developments that could eventually constitute a future social benefit, would require scientific literacy strategies so that overt hostility does not prevent the implementation of developments that could eventually constitute a future social benefit. This perspective assumes the articulation between the scientific community, together with governmental sectors and industry, to *recognize that a hostile public and media are likely to seriously limit or even veto a controversial research program* (Miller, Pardo, Niwa, 1997), and this assumption has been substantial in the understanding of the cognitive deficit of the public as a condition for acquiring a skeptical attitude towards science.

The *deficit model* assumes that both public optimism and skepticism about the benefits of scientific progress are due to a *cognitive asymmetry* between the disciplinary matrix of experts and the lay community, a community that thus resorts to mystical beliefs or irrational fears as primary arguments against the practices of science. If this hypothesis is accepted, the immediate implication for science policy is the development of public information campaigns that compensate, in banking terms (and in accordance with the metaphor of the *hypodermic needle*) for the manifest deficit. However, since the publication of the Bodmer report (1985) by the Royal Society, the field of public communication of science has successively questioned the deficit model, as a consequence of the practical ineffectiveness of science literacy as an introjective mechanism of compensation. In this sense, the public understanding of science was crossed by the underlying governmental and corporate interest aimed at "selling science" (Nelkin, 1995), using the traditional media as a propaganda system (see d.).

b) *Ethnographic-Contextual Model (ECM)*: it was constituted according to a substantive critical perspective with respect to the deficit model and, especially, to the *cognitive asymmetry* that distinguishes between the expert knowledge of scientific discourse and the knowledge of laymen. Jasanoff (2000) interprets that public understanding of science is not given by the mastery of scientific knowledge structured in conceptual terms, but by the appreciation of the mutual claims required in the relationship between science, technology, and society. For her part, Wynne (1992) criticizes the dependence of the deficit model on quantitative surveys designed with knowledge extracted from textbooks to evaluate the formal contents of scientific knowledge. Thus, the articulation of the contextualist perspective has argued that the exclusive quantitative approach is not likely to offer reliability in the data obtained, since they delocalize the respondent from his or her own social environment and are, therefore, intrinsically incapable of examining or controlling the potentially variable and socially internalized meanings that the terms have for the public (Wynne, 1995).

This model has made use of an ideographic-qualitative approach based on case studies for the construction of the empirical base, and quantitative/survey-based research to maximize reliability and validity, as far as the conditions of generalization of the data are concerned. For, while the critical position of the contextualist model is extensive, and thus inscribes itself in a defined epistemic-normative framework, the paradigmatic opposition to the deficit model is ambiguous with regard to the use of qualitative-quantitative tools. However, the ethnographic-contextual model differs substantially by recognizing that subjects do not constitute themselves as a *tabula rasa* passively receiving information, but that social and economic organization schemes molded by previous experiences pre-exist in subjectivity, which determine the modality of social relationship with scientific practices. If the deficit model reproduces a pyramidal, verticalist and unidirectional scheme of information transmission, based on the behaviorism of *Mass Communication Research*, the SCM uses a down-top scheme that inverts the mechanism of scientific literacy, to explore in qualitative terms the specific contexts of reception, appropriation and production of knowledge that cross the audience. Thus, the model rejects the uniformity assumed by the linear hypothesis of the CDM, to admit heterogeneous degrees and typologies of social perception of science (Donghong et. al., 2008), according to socio-cultural contexts that determine the way in which people process and respond to this information: "The public is not only conceived as a competent agent but also as an agent capable of reflecting on what it knows. Based on that popular epistemology it can be explained why sometimes they prefer certain sources of knowledge to others -for example, their own experience rather than scientific statements or procedures-" (Cortassa, 2012, p.33)

c) *Epistemology of testimony*: the formal enunciation of the general principle of testimony establishes that "If A [the public] has good reasons to believe that T [the scientist] has good reasons to believe p [a factual fact] then *A* has good reasons to believe *p*" (Hardwig, 1991, p.697). Thus, the *epistemology of testimony* is circumscribed as an alternative that inquires into the mode of justification of knowledge from a deferential scheme in systems of epistemic authorities: it sustains the *cognitive asymmetry* proper to the MDC, since: "recognizing that positions are asymmetrical does not necessarily imply reducing the public's options to blind trust. In this sense, the question to be asked is, rather, *in what way the adoption of a belief formed from the word of another agent to whom epistemic authority is conferred is reasonably sustained"* (Cortassa, 2012, p. 68).

The epistemology of testimony is significant, in the historicist-pragmatist framework of understanding the context of justification and discovery in which the disciplinary matrices of experts operate, because it incorporates in the *transmitting* process of teaching-learning among the members of the scientific community, a dynamic of inter-peer relationship based on trust, a condition by which the cognitive activity of the community is constituted: "The dependence that each of its members maintains with respect to the knowledge acquired in the past, which permeates their intellectual ontogeny (...) when the scientist is

incorporated into the community and adheres to criteria, values and ways of doing established by authoritative voices" (Cortassa, 2012, p.60). ...) when the scientist is incorporated into the community and adheres to criteria, values and ways of doing established by authoritative voices" (Cortassa, 2012, p.60). Thus, if the process of theoretical-experimental production proper to the disciplinary matrices of experts intercommunicates in conformity with a scheme of deference to inter-peer epistemic authority, the epistemology of testimony is shown as an exemplary model to be transferred in its practical application to the public understanding of science, to point out the way in which the public places its trust in certain discourses to which it ascribes credibility

The action of the public is not passive, since it plays a decisive role in the evaluation of the credibility of epistemic authority for reasons that exceed mere *cognitive asymmetry* and in which external factors (psycho-socio-historical) that the SCM has already explored intervene, so that the reasons that support the examination of T may even exempt the direct contact between the expert and the layman. However: "in the process of social reception of science the reality is more complex as the public is often confronted not by one but by two or several scientists whose claims on the same subject may be divergent, and between which they must decide" (Cortassa, 2012, p.72). The justification of A's beliefs, in cases where a scientific controversy occurs, assumes that the public's judgment regarding the reliability of T1 or T2 must appeal to a higher order of sources or to an external arbitration that clarifies the information to improve the conditions for critical reflection in the face of the eventual crisis: *Is the earth flat or geoid*? Cortassa (2012) suggests that it is the interface agents (journalists, educommunicators, disseminators) who must intervene between the public and the experts: "The interface is the initial repository of the scientist's testimony, who must first assess the quality of the epistemic authority on the basis of certain criteria, since the credibility of his own role in the process is at stake" (Cortassa, 2012, p.76). Thus, the interface agent must ascertain the reliability of the experts to reconstruct and communicate the scientific discourse to the lay community, unfolding the deferential activity of the public that must now judge on the reliability of the disciplinary matrices, as well as of the interface agents that mediate/translate the paradigm and, even, the state of the controversy.

d) *Socio-critical model*: in 1947 Max Horkheimer and Theodor Adorno published *Dialektik der Aufklärung: Philosophische Fragmente*, a work in which the concept of "cultural industry" is exposed, referring to the historical process by which the hegemonization of mass communication technology becomes a condition of possibility to maximize the productive capacity of basic consumer goods, while establishing a system of domination by which the excluding end of economic productivity attributes greater superiority to those who hold power over the possession and management of the technical apparatus. If Lasswell understood, with *Mass Communication Research*, the behaviorist mechanism of mass determination by means of the introjective monopolization of the propagandistic message, the *Frankfurt School* will describe the way in which the consumption of cultural products (cinema, television, magazines, radio, etc.) is carried out in an uncritical manner by the public, which receives them as mere

entertainment. Thus, socio-critical theory is constituted in opposition to the organizational scheme of *Mass Communication Research*. The culture industry as a device for the production of mass entertainment does not coincide with the socio-political or economic interests of an alienated public and prevents the development of its critical judgment; it is also constituted as an apparatus that reproduces the conceptual schemes, that is, the ideology of power itself that structures the system of domination of Fordist capitalism. In this way, the consumption of cultural products takes place in planned times of entertainment that suppress freedom to preserve the structure of domination.

In *Selling Science: How the Press Covers Science and Technology*, Dorothy Nelkin (1987) describes the way in which interface agents, in essence, specialized journalists or cyberjournalists, report scientific activity by making use of a sacralizing assessment of the truth it produces. Thus, scientific propaganda obeys the logic of *selling science* as a pure cultural product that, from a socio-critical perspective, *entertains* the public, keeping it in a state of passive alienation that dismisses any possibility of critical judgment. The sacralization of the image of science corresponds to the inscription of *instrumental rationality*, under whose administration "public communication is one of the agents of social control. The culture industry is the equivalent of what American researchers call *mass culture* or *popular culture*" (Marafioti, 2010, p.186). Thus, the cult of scientific activity, thanks to the intervention of the media, circumscribes *scientific literacy* as a control device that fetishizes techno-scientific knowledge, turning it into mere merchandise to be consumed as propaganda subservient to the interests of capitalist ideology, that is, the public communication of science becomes an *entertainment industry*.

Method

Study design: the development of a cyberjournalistic TCDA was carried out from a non-experimental, descriptive-ethnographic study with a qualitative, retrospective-longitudinal approach. The use of digital ethnography techniques allowed us to practice documentary analysis and participant observation, that is, direct interaction with the active members of the communities of terraplaners, experts and interface agents in digital social networks.

Population and sample: the population consisted of the terraplanist prosumo communities, in which interactions between experts, interface agents and laypeople were recorded. The non-probabilistic, purposive sample selected 160 segments of comments made over a period of 6 months (2019/2020) on:

1. 2 Facebook Grpuo/Pages: a) "Flat Earth Creationist" and b) "Terraplanistas Latin America".

2. Hashtags "terraplanist" and "terraplanism" on Twitter.

3. Comments to 5 YouTube videos: a) "I invite you to check it out": This was the interesting face to face between a geologist and a terraplanist"; "Why terraplanism is dangerous"; c) "The truth of a Terraplanist" d) "Six hours with 300 terraplanists"; e) "Oliver Ibáñez: ridiculed and humiliated on TV"; f) "A Terraplanist's truth"; g) "A Terraplanist's truth".

Data collection and processing technique: data were collected through documentary analysis, coding of message segments and processing through *Atlas.ti.* Message segments were included only in Spanish, with the exception of scientific nomenclatures or specific linguistic uses.

Data analysis: code saturation was the criterion applied to the selection of data segments, fulfilling the non-probabilistic and intentional character of the sampling technique, thanks to which the retrospective-temporal length of the sample had a flexible character, to the extent that -if the saturation of the categories had not occurred within 6 months, then this would have been extended to a period of 1 year-.

Access to the sample involved requesting membership in the case of closed Facebook groups, while it did not require authorization in the case of public Twitter posts or pages, or videos on YouTube channels, as they are public domain information, although the anonymity of the authors of the message segments used as examples is preserved in the published documents.

Results

The "flat Earth" hypothesis formulated through the *International Flat Earth Society* and the *International Flat Earth Research Society* -founded in 1956- considers that the planet lacks curvature and remains immobile, being at its limits a great wall of ice and above it, a protective dome or firmament: "DOMO Dome, irrefutable proof". In what follows, the segments of comments from experts, interface agents and laymen in digital social networks related to the terraplanet hypothesis will be articulated, based on a classificatory system from which the TCDA will be inferred (see Discussion and comments).

1. Rejection of the epistemic authority of experts: the assumption of this study postulates that "The formation of a community of scientific prosumers of laymen in digital social networks is a consequence of public distrust in the credibility of scientific evidence and, indeed, of epistemic authority". The emergence of the terraplanist community does not come to solve an anomalous conceptualization scheme of the normal science paradigm, since there is expert consensus that accepts as satisfactory the heliocentric model of Earth with oblate spheroid format; instead, terraplanism questions the agents involved in the production of scientific evidence itself and *the distrust in the credibility of the scientific community leads to a form of presumption that recovers and/or updates the theoretical development of already consummated paradigms,* for example: "The ball Earth (...) is based on theories that are based on theories that have already

been developed in the past. ...) is based on theories that have never been proven and on fraudulent images created by computer".

2. Deference to the epistemic authority of laymen: we will call here *oblique deference* to the case in which, after rejecting the evidence and arguments offered by the epistemic authority, lay scientific prosumers *cross* their deposit of trust to agents (laymen or experts) rejected by the normal science paradigm. In the case of terraplanism, this is Samuel Birley Rowbotham, who wrote the foundational book of terraplanist theory, namely, *Zetetic Astronomy: Earth Not a Globe*, published as a pamphlet in 1849. Likewise, *oblique deference* operates in digital social networks through the hypertextual embedding of references to active community members who present evidence in favor of the paradigm. If Plantinga (1993) and Audi (2006) considered that the testimonial source must sometimes support p with other sources such as perception or induction, identical is the procedure by which laypeople give support to evidence about the flat Earth, appealing to the observations of other members of the community to confirm the truth of their own observations (a practice that exercises the community *confirmatory bias*).

3. Linguistic-epistemological resemantization and inter-paradigmatic incommensurability: the differentiation/assimilation between communities of science that attribute different/similar meanings to the statements is given, in meta-scientific terms, by previous learning experiences that introduce a theoretical load in the observation such as to produce difficulties in the inter-communicability of what is perceived. Thus, the rejection of the epistemic authority of the experts exposes situations of linguistic, epistemic and mixed deference in which laymen dismiss the meaning/meaning of the conceptual system of the normal paradigm and object to the scientific substantiation to build a theorization scheme with neologisms: "ball Earth", "terraglobist", "Big Bang religion", "Flat Earth Department", etc., which are exposed as a vocabulary designed in the context of prosumption, while concepts such as "gravity", "heliocentrism" or "science" are resignified in such a way that incommensurability increases, introducing problems of inter-translatability with experts or interface agents.

4. Propositional entanglement in the communication between experts, interface agents and laymen: taking into account the formal enunciation of the general principle of testimony, when transferring to the public good reasons to believe in *p*, the expert puts at stake his credibility as a testimonial agent of the truth of *p*, so he needs to give reasons to support *p* by means of other sources that justify the validity of the manifest knowledge. The dissatisfaction of the terraplanist public with respect to the reasons of the normal science community for postulating the sphericity of the Earth, presupposes the suspicion of the existence of an elucidated

intentionality concurrent with the will to preserve a system of techno-social domination (a dimension that involves the ideation of *conspiracy*).

The questioning of the credibility of expert agents institutes a *propositional interdict* in the communication between experts and interface agents; the latter assume a *cognitive asymmetry* for-mor-of the preeminence of the DCM, appealing to improve scientific literacy strategies that maximize the reasons to support *p* and compensate for the perceived deficit, when in truth the laymen do not ask for good reasons to believe in *p*, but rather for evidence to trust the credibility of scientific practice itself. The *propositional interdict* blinds scientific literacy strategies whose objectives appeal to improve the didactic-pedagogical transposition of contents produced by expert agents and interfaces (or to transform them into objects of *entertainment*), because the public does not have good reasons to believe in the normal science community, associating any proof offered and any literacy program with the preliminary discrediting of the issuers.

5. Communicative interventions: the substantive characteristics of the communicative interventions practiced by members of the expert community are a necessary consequence of the *rejection of authority, oblique deference, resemanticization and propositional interrogation* of the formation of scientific presumption communities.

    5.1. *Retentive-defensive literacy:* due to the effect of the *propositional interdict*, paternalistic and unidirectional scientific literacy in social networks does not try to convince a dissatisfied public but, instead, to retain laymen who still trust the expert disciplinary matrix: the normal science paradigm is protected, offering good reasons for the public to believe in *p*, and in the interrogation of *incommensurability*, an exclusionary discursive device is instituted that removes critical laymen from the disciplinary matrix and retains the loyalty of the laymen themselves.

    5.2. *Redemptive-hostile literacy:* the objective is to demonstrate the cognitive deficit of the laymen in order to bring them back into the ranks of the expert paradigm; it is the usual way in which the cognitive deficiencies of the adversary are shown in order to convert them to the normal paradigm.

    5.3. *Hostile-hostile literacy:* it excludes from the enunciation any refutation of evidence from the rival paradigm: "Stop stealing! Separation of Pseudoscience from the State NOW!" or "Terraplanists, checkmate! On the other hand, and despite the fact that dialogue or debate is the academic condition of origin of digital networks, it is functionalized according to the challenge that implies the discursive incorporation of non-formal fallacies, ironies or insults directed to all the participants of the communicative plot: experts, interface agents and laymen.

    5.4. *Literacy orphanhood:* in *The Distribution of Knowledge,* the paradigmatic work of Philipe Roqueplo (1983), the author makes explicit a situation of inferiority and radical dependence of the laymen with respect to

the symbolic and factual deprivation of the context of production of scientific evidence. Thus, the literacy tasks surrounding the *deficient model* would fulfill a partial transfer of the results obtained, a fact that is all the more significant when laymen question the credibility of the epistemic authority because of the sources used.

Scientific literacy in digital social networks offers good reasons to believe in the sphericity of the Earth, but does not provide confidence-building arguments in the context of evidence production; if terraplanists claim that the *historical articulation between NASA, the global elite, governments and media oppresses/controls the masses through the production of a false scientific paradigm - heliocentrism/terraglobism* - the literate response (retentive, redemptive or hostile) of experts is presumably satisfactory in favor of the heliocentric-terraglobist model, without elucidating reasons to maximize belief in the source-system that produces the scientific evidence. It is this situation that leads the rival lay community to remain in a state of *orphanhood*, due to failed strategies in public communication of science that address good reasons about *p* to an already loyal science community, without offering good reasons about their own credibility and the evidence used to a hostile public.

6. Critical individualization and socialization of lay knowledge: the lay community builds its own evidence production system, with rules for validation of results and theorization schemes that are, in themselves, correlative to the generation of a literacy and popularization program that, far from imitating the unidirectional-monological character of the MDC, is instituted as a permanent transmedia dialogue by means of which participants share - in accordance with an *oblique deference* - new reasons to believe in p. Thus, the evidence obtained by laymen in their own context of production becomes more valuable than that offered by experts in an incomplete form: the implementation of a scheme of presumption of evidence - regulated by *oblique deference* as a re-ordering of the system of epistemic authorities - is given as an inevitable response to the *orphanhood* to which the laymen are submerged, internalizing along with the process of *resemantization* a critical perspective towards the paradigm of normal science and a systematic exercise of confirmatory bias, fed back by conspiratorial approaches.

7. Criterion of scientific demarcation: experts and laymen systematically adopt the interpretation criteria of the classical conception of science, by instituting interpretation schemes based on the disjunctive exclusion between science and pseudosciences (or metaphysics) and by tracing a necessary correspondence between the formal section of the theory and the empirical basis that sacralizes the materialistic dimension of the *facts* (materialistic monism) as a source of truth, without problematizing its nature. The laymen's understanding of science is heterogeneous, because, although they agree in considering observational perception as the exclusive source of validity of the formal system of theorization

about the flat Earth, they judge that the context of production of expert evidence is mediated by instruments intentionally manipulated by agencies such as NASA.

8. Scientific propaganda: Anton Toursinov (2012) suggests that propaganda is necessarily linked to manipulation and, in this sense, he quotes Teun van Dijk to describe the constituent elements of it:

8.1. Victimization: terraplanists appeal to the sense of collective construction of a research community bent on revealing the *historical articulation between NASA, the global elite, governments and the media that oppresses/controls the masses through the production of a false scientific paradigm, heliocentrism/terraglobism*; thus, a sense of *us* is presented, in expressions such as: "Good job terraplanists, every day there are more of us awake! Such a sense of nostrality proposes that: *We: Victims of a global deception designed to control us.*

8.2. Public enemy: terraplanists insist on evidence manipulation carried out by NASA: "In the #NasaLies everything is illusion, fantasy, speculation and mathematics", although the number of dangerous enemies is even indeterminate: "Everybody lies! Even your parents lie to you!". Ergo: *They: control/oppress us through deception and evidence manipulation.*

8.3. Exaggeration: along with the non-formal fallacies employed, terraplanists use the metaphor of light and darkness (dichotomous exclusionary thinking), to distinguish between the awakened, to whom the truth is revealed, and the oppressed, still dominated by the rival paradigm: "Mental slavery gives you the illusion of freedom, makes you trust, love and defend your oppressor and see as enemies those who are trying to open your eyes and free your mind": *Us: the truth. Them: the lie.*

8.4. So, does the public communication of experts employ a propagandistic communication scheme in social networks? In cases where a controversy arises, experts or interface agents often use the same mechanisms as their rivals: *victimization, construction of a public enemy,* and *exaggeration.* In this case, the normal science community victimizes itself by attributing psychological or comprehension difficulties to the rival: "It makes no sense to debate rationally with deniers of reality": Us: We are victims of paranoia/denial/ignorance.

The public enemy is explicitly the rival paradigm, whose capacity for harm is exaggerated by means of fallacies: "Collective delusions are always dangerous and potentially violent": *They: Terraplanism is a cancer/violent delusion that spreads in society.*

Also, the language of experts in social networks incorporates scientific demarcation criteria of the inherited conception in the form of hashtags to attack their rivals, especially through the use of the hashtag *#pseudoscience* in each post generated.

On the other hand, both communities critically interpret the role of interface agents as promoters of *disinformation*; firstly, terraplanists, who accuse the media of defending the normal science community by "propagating" the heliocentric hoax; secondly, experts, who accuse interface agents of *viralizing* the irrationality of the rival lay community.

Discussion and comments

The conceptual elucidation carried out on the basis of the four models of public understanding of science allows structuring a formalized reasoning scheme according to the presence of 2 hypotheses (H1, H2), 8 initial conditions (4 c/hypotheses) and two expected observational consequences (CO1H1, CO2H1). In this way, it is assumed that, in the *traditional* scheme of public communication of science:

H1. The propaganda system of the normal disciplinary paradigm-matrix practices *gatekeeping* and unidirectional/verticalist scientific literacy/dissemination strategies, which assume a "cognitive asymmetry" between experts, interface agents and laypeople.:

C1H1. The disciplinary paradigm-matrix operates according to a "double operational density: theoretical practice and experimental practice" (Cortassa, 2012, p.51), or in Reichembach's terms, in a *context of justification* and *context of discovery*.

C2H1. The normal science community splits the *double operational density* with respect to the *communication context*.

C3H1. In the *communication context*, the normal paradigm differentiates between internal science communication and external communication; the former institutes a system of evaluation, control, and peer-to-peer editing (scientific *gatekeeping*) to maximize the scientific credibility of the results; the latter assumes the *cognitive deficit* to establish literacy/dissemination strategies to maximize the social credibility of science.

C4H1. "The interface is the initial repository of the scientist's testimony, who must first evaluate the quality of the epistemic authority on the basis of certain criteria, since this is where the credibility of his own role in the process is at stake; as we have already pointed out, among his functions and responsibilities is that of verifying the reliability of the experts, in order to prevent the knowledge shared from being erroneous or fallacious. And, at the same time, it is the one who reconstructs that account in front of the wider community of receivers. This means that the public receives not one but two informants: the original source and the mediator." (Cortassa, 2012, p.76)

CO1H1. Gatekeeping (of internal science communication) and science literacy strategies maximize credibility in science.

CO2H1. The interface agent mediates between the source (experts) and the laymen (addressees) by assessing the credibility of the epistemic authority in order to transmit *contrasted knowledge*.

However, it happens that:

a. The formation of a lay scientific presumption community in digital social networks is a consequence of distrust in the credibility of scientific evidence and, indeed, of epistemic authority.

b. The normal science community communicates with the lay community according to the criteria of the classical-empiricist model, that is, by means of literate compensation of the hypothetical *cognitive deficit* of the public.

c. The interface mediating agent protects the ideological interest of the normal science community to te detriment of the lay disciplinary matrix.

Because of assumptions a., b., and c., the communicative practices of expert and interface agents in social media *call into question* the expected *CO1 and CO2* of *H1*, due to the modification of the initial conditions (C1...4). Strictly speaking, the scientific propaganda of the normal paradigm that applies unidirectional/verticalist literacy/dissemination strategies in social networks (Facebook, Twitter and/or YouTube) aimed at lay-users who reject, due to the effect of a testimonial relationship of distrust, the epistemic authority of expert agents, fails to maximize the social credibility of science, because of the fact that:

C1H2. The expert paradigm and the *lay scientific presumption community* operates according to a "double operational density: theoretical practice and experimental practice" (Cortassa, 2012, p.51), or in Reichembach's terms, in a "justification context" and "discovery context" (Cortassa, 2012, p.51), or in Reichembach's terms, in a "context of justification" and "context of discovery".

C2H2. The *exclusion of laypeople from the context of justification/discovery and internal communication of science*, that is, from the construction of the formal-theoretical apparatus, data collection and validation of the credibility of sources - by peer and interface expert agents - *reduces confidence in the epistemic authority of experts*.

Consequently, laypeople *unify the context of justification/discovery* and *the context of communication*, so that the 2.0 platforms (*medium*) constitute the *context of production/communication* (process = presumption) of sources and evidence, that is, of

proofs and arguments (product), as well as the medium for carrying out transmedia literacy strategies:

C3H2. The laymen lack internal communication and then practice *open community/participatory gatekeeping* of the sources and evidence they consider credible; in this way, they *unify* scientific and social credibility criteria around a *public transmedia communication of evidence and arguments*.

C4H2. In social media, disintermediation leads to a direct relationship between experts and the layman, and the *gatekeeping* practiced by the interface that evaluates the credibility of the source, as well as the reconstruction of the account that ascertains the reliability of the sources and evidence, *protects the ideological interest* of the normal science community.

This means that:

If CO1H1, however, in social media *scientific gatekeeping* and unidirectional/verticalist literacy strategies performed by interface agents do not maximize credibility in science

Meanwhile, if *CO2H1*, in social media the interface agent is not a mediator between the source (experts) and the laymen (recipients), because, despite evaluating the credibility of the epistemic authority to avoid transmitting "non-contrasted knowledge", it uses demarcation criteria of the *Standard Conception of Science*, based on materialistic/methodological monism.

Thus, if the initial conditions *C1...4* of H1 are modified, -in essence, if digital social networks intervene as the substrate in which public communication of science occurs-, then:

H2. "The rejection of the epistemic authority of experts" (A) is a condition for "the emergence of lay scientific presumption" (B) that unify, on 2.0 platforms, a "context of justification, discovery and communication of evidence and arguments" (C) by means of "transmedia strategies of communication/literacy" (D) and "*open community/participatory gatekeeping* of sources and evidence" (E) mediated by an "oblique deferential system" (F).

The following is a partial version of the TCDA designed in the framework of the developed study, which allows the interface agents to generate a *critical-qualitative* description regarding the public communication models between experts and lay presumption communities in digital social networks, according to H1 and H2 (see Table 1).

Table 1.

Dimensions of analysis for the development of a TCDA

Dimensions	*Guiding questions*
Differential system	1. What is/are the epistemic authority(ies) in whom the expert/legal community places its trust?
Gatekeeping	2. Do laypeople participate in the production and evaluation of the results obtained by the normal science paradigm?
	3. Do laypeople use 2.0 platforms to share and/or produce their own evidence and arguments?
Resemantization	4. Do laymen employ the scientific vocabulary of the standard paradigm, or do they resemanticize and construct neologisms of their own?
Literacy strategies	5. Is the literacy practiced by interface agents/experts/leaders unidirectional/vertical or transmedia?
Metascientific demarcation criteria	6. Kit de Shermer (2010, pp.34-41)
(Disinter)mediation of interface agents	7. Do experts themselves communicate the results obtained in digital social networks?
Scientific propaganda	8. Do interface agents passively receive and relay to the public information provided according to communicative criteria pre-formulated by expert agents?
	9. Does the normal disciplinary matrix/community of lay prosumption victimize, blame and/or exaggerate the qualities of rival laymen?

Note: Author's own creation (2021).

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