

Quantum mysticism in times of post-truths: a critical analysis of discourses presents in an exemplary case on Facebook^{+,*}

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Abstract

In this paper we engage in a dialogue with research that investigates aspects of the circulation of discourses related to science in society and its repercussions on understandings, positions and decision-making by non-specialists. More specifically, we analyse conceptual, historical, epistemological, cultural and sociopolitical aspects of quantum mysticism in discourses on the social media Facebook. Based on Critical Discourse Analysis, we analysed a video published in this social media that refers to concepts of Quantum Physics (QP), so as to discuss both conjunctural and textual aspects and their effects of meanings. Thus, we problematise relationships between elements of conceptual and sociopolitical nature, controversies within the scope of QP, neo-esoteric discourses and influences from neoliberalism, and aspects of discursive representations of actors and social events that are present in the description of the video. Results suggest that QP is mobilised in the context of presenting an alternative to solve everyday problems and/or to promote financial, personal, professional, spiritual or health improvements. We identified appeals to individual beliefs, values and desires that characterise a favourable scenario for the construction of post-truths and the use of discursive strategies that articulate cultural, political and historical aspects present in society, strengthening

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networks of significance and reinforcing ideologies. We emphasize, therefore, the need for curricular approaches that incorporate analyses of discourses that are present in everyday life and that are part of the repertoire that informs students and teachers in decision-making processes in contemporary society.

Keywords: *Critical Discourse Analysis; Social Media; Post-Truths; Quantum Mysticism; Science Education.*

I. Context and objectives

The interest in science in everyday contexts, including popular media, is reflected in the growing presence and importance of science communication practices. However, according to McIntyre (2019), some mistaken views of science are formulated due to ignorance of the various contemporary theories developed to describe the development of scientific knowledge and can reverberate in pseudoscientific practices in society, especially on social media like Facebook and Twitter. According to the author, pseudoscience happens when “someone seeks the mantle of science to promote a fringe theory about an empirical matter (such as intelligent design), but refuses to change their beliefs even in the face of refutatory evidence or methodological criticism by those who do not already believe in their theory” (*ibid*, p. 150). In fact, the term ‘scientific’ is frequently used in situations where the aim is to convey an image of reliability and credibility about an argument and/or proposition. This phenomenon also involves a refusal to change one’s beliefs, even when there is evidence of methodological or refutational criticism from scientists.

In this article we engage in a dialogue with research that investigates aspects of the circulation of discourses related to science in society and their repercussions on the development of understandings and positions by non-specialists. In particular, we analyse examples in which discourses related to Quantum Physics (QP) are incorporated into texts on social media. Based on the assumption that social media are spaces conducive to the existence of discourses of the most diverse nature (Pivaro; Giroto Júnior, 2020) – be they scientific, pseudo-scientific, anti-scientific, denialist or post-truth – our objectives are (i) to analyse the ways in which discourses related to QP are represented in the social media Facebook and (ii) to identify socio-cultural and socio-political aspects present in discursive constructions related to the cultural phenomenon of quantum mysticism. This interest is justified by the fact that social media are important sources of information in society because they group information together in virtual bubbles of common interests (*ibidem*) and that discussions about QP are not frequent in basic education curricula (Pigozzo; Nascimento; Lima, 2022).

Specifically, we explored quantum mysticism, understood as a cultural phenomenon which, as well as intriguing teachers, researchers and physicists, also has its nature, origins and forms of dissemination in society questioned and often criticised. The adjective ‘cultural’

refers to the way in which it has transcended the field of physics, manifesting itself in areas such as politics, arts, medicine and, above all, religion (Saito, 2021, p. 1102). According to Saito, it can be understood as a hermetic phenomenon, which touches on aspects related to the nature of science, (non)scientific knowledge, effects of the circulation of scientific knowledge in the social sphere, as well as on issues concerning philosophy and Physics in their contributions to the promotion of Science Education (*ibidem*). According to Moura and Santos (2017), quantum mysticism can be related to naturalistic, animistic, idealistic, subjectivist or religious interpretations of quantum theory that promote relationships between quantum phenomena and spirituality.

In this way, the object of our investigation involves representations and influences of scientific knowledge in different social and cultural spheres. This approach is justified insofar as it can provide elements for understanding the ways in which QP, a specific scientific theory, may be able to influence these spheres and even integrate and come to constitute them (Saito, 2021).

No less importantly, our subject involves the mobilisation of vocabulary and concepts specific to the discourse of science in the development of arguments outside the scientific sphere. In this respect, in particular, it touches on the discussion of post-truths, since so-called quantum mysticism often involves statements supposedly anchored in scientific formulations. Discursively, post-truth uses a strategy called resonance (Siebert & Pereira, 2020): the more intensely a given set of misinformation is repeated, the more it is presented as plausible and reliable. Politically, post-truths take part in a process of signification, linearisation and homogenisation of information and events with which we have daily contact, in a process that culminates in their reification (*ibid*).

The formulation of public opinion is moulded by debates about different social meanings based on realities that are subjectively conceived as being broad and complete. However, public facts are produced by social actors who experience and produce different policies in order to persuade the public they want to reach. This is because: (i) political realities that aim for importance and control over public facts are treated as normative; (ii) society is influenced by previous values formulated by rulers; (iii) values extrinsic to a society are treated as control mechanisms for the (false) strengthening of a ‘truth’ in the public sphere; and (iv) the post-truth phenomenon breaks paradigms with regard to the development of modern democracy and the conception of public facts (Jasanoff; Simmet, 2017). In this way, discussions about truths and facts can omit both the nature and the limits of the realities that help formulate public opinion. Likewise, they do not emphasise the interactions between the state and the population, but “the durability of public facts, accepted by citizens as ‘self-evident’ truths, depends on the procedural values of fairness, transparency, criticism, and appeal” (*ibid*, p. 763).

Exercising, sustaining and substantiating political and ethical aspects are actions that must be carried out alongside questions about ‘what’ and ‘how’ the knowledge that reaches

the population is produced, interpreted and translated. This makes it possible to understand the role of the state, of the market and of individuals, in order to maintain and encourage active and democratic social participation throughout these processes (Jasanoff; Simmet, 2017). Sismondo (2017) warns us that if post-truth breaks with the structures of knowledge production and development, then there is no democratisation of knowledge, but rather the establishment of authoritarian practices.

These considerations reinforce the need for a discursive analysis of quantum mysticism that articulates and establishes relationships between elements of the contemporary conjuncture and textual elements. To this end, we adopted Critical Discourse Analysis (CDA) as the theoretical-methodological framework for the research, in order to delimit our research problem and support analyses of its conjuncture, i.e. the conceptual, social, historical, cultural and political aspects that constitute it, as well as its semiotic representation in social media.

II. Critical discourse analysis: a framework for exploring the relationship between discourse and society

CDA, as conceived by Norman Fairclough and Lillie Chouliaraki (Chouliaraki; Fairclough, 1999; Fairclough, 2003, 2016) is a transdisciplinary field of study that characterises and investigates language using contributions from the fields of Critical Linguistics and Social Theories. In this way, it advances in relation to traditional sociodiscursive approaches, as it goes beyond the epistemological boundaries that exist between them (Resende; Ramalho, 2019). The approach proposed by Norman Fairclough (2003, 2016) assumes the irreducibility between the social and linguistic dimensions of social problems, considering dialectical relationships between them. It is a formulation in which the study of discourse is justified by the need to understand and promote social change. Thus, it problematises social effects **in** texts as well as social effects **of** texts. To this end, it explicitly considers the situated nature of texts, the power relations involved in discursive disputes, the process of construction and (de)stabilisation of discourses.

In other words, based on this theoretical-methodological framework, we investigate social practices and their discursivities, their forms of emergence and hegemonisation, and the role they play in disputes and constructions of meanings in specific social practices and situations.

Research based on the CDA identifies a problem based on power relations, on the naturalisation of particular discourses as being universal, and on the asymmetrical distribution of material and symbolic resources present in social practices (Resende; Ramalho, 2019, p. 36). This problem is called a social problem and, in the case of this research, it is stated as: the impacts that discourses related to quantum mysticism present in social media have on decision-making on issues of everyday life. Discourses on quantum mysticism on the social media Facebook is an example of a semiotic representation of this social problem.

The first step in the analysis is to map the context in which the social problem occurs. According to Chouliaraki and Fairclough (1999, p. 61), conjuncture analysis is “a specification of the configuration of practices which the discourse in focus is located within. The focus here is on the configuration of practices associated with specific occasioned social goings-on”. Thus, the conjuncture can be understood as a network of practices in which the social structure is grounded and ordered in space and time. However, these conjunctures can vary depending on the number of practices that are interconnected, as well as being more or less widely unfolded in both time and social space.

We then proceed to analyse texts that materialise semiotic representations of the problem. As well as considering texts as empirical materials, this type of analysis considers them as part of specific events. These events involve actors, social relations, discourses and/or interactions. According to Vieira and Resende (2016),

It is from this linguistic material that we look for dialectical connections between discourse and problematic social aspects, in an effort to help overcome them. To this end, CDA, based above all on Systemic-Functional Linguistics (SFL), proposes a rich framework of linguistic-discursive categories for textual analysis. These categories help to map the dialectical relationships between the social and the discursive, allowing the investigation of the constitutive effects of texts in social practices, and vice versa (Vieira; Resende, 2016, p. 113).

Finally, we look for relationships between aspects of abstract social practices identified in the conjuncture analysis and textual elements of concrete social events represented semiotically in the empirical material.

In this way, once we have identified the networks of practices related to the social problem and their semiotic representation, we are able to analyse the dialectical relationships between discourse and non-discursive elements. This analysis of the context of the social problem allows us to contextualise the textual analysis in discursive terms, allowing the selected texts to be discussed from different perspectives, both in their particular contexts and in their broader foundations (Vieira; Resende, 2016).

III. Analysing the conjuncture: quantum mysticism in social life

Our conjuncture involves establishing the historical, philosophical, social, cultural, discursive and political spheres that are related to the phenomenon of quantum mysticism. In this sense, we discuss (i) conceptual aspects, such as the controversy within Quantum Mechanics; (ii) supposed approximations between scientific and mystical discourses; (iii) socio-political aspects of contemporaneity, such as neoliberalism and the technologisation of life; as well as (iv) relations between pseudoscience and post-truths. In doing so, we seek to identify the challenges that quantum mysticism poses for the field of Science Education.

III.1 The controversy within Quantum Mechanics

The development of Quantum Theory has been marked by predictions and explanations that have, throughout its foundation, led to various debates about the interpretations of this theory, as well as its mathematical formalism. These doubts have become known as one of the most striking controversies in the history of science, which Freire Júnior (2015, 2021) refers to as “the quantum controversy”. Emphasising that controversies are frequent in the development of theories, the author discusses different interpretations of QP by physicists and philosophers, as well as debates about the role of experiments in a possible solution to controversies (Freire Júnior, 2021). These observations demonstrate the importance of understanding aspects of history, the nature of science and the processes of constructing scientific knowledge.

Historically based on the studies of Paty (2005), Saito (2021) argues that QP has three stages of development: (i) 1900-1916: Establishment of a new scope for physical phenomena and systems that were no longer answered by Classical Theory (e.g. the Photoelectric Effect), which caused questions both about the nature of the emergence of a ‘new physics’ and about what this new scope of physics might be, which could also underpin some of the arguments used in quantum mysticism; (ii) 1917-1926: consolidation of Quantum Mechanics in the theoretical and experimental domains, through the development of new conceptions, ideas, methods and procedures which, because they had philosophical foundations and precepts, could directly or indirectly influence the discourses mobilised in the phenomenon of quantum mysticism; and (iii) 1927-: conceptual interpretations of Quantum Theory and theoretical developments related to quantum processes, which contemplated aspects of mathematical formalism and physical studies as well as philosophical interpretations of scientific knowledge. In this way, the main issues arising from the historical development of QP used by quantum mystics are: “debates around causality and determinism in QP; about completeness, realism and non-locality; and about the problem of measurement and the role of consciousness” (*ibid*, p. 1105).

In order to emphasise some historical and social influences on the genesis of the relationship between QP and mysticism, Saito (2019) highlights five main aspects that may have contributed to the development of this relationship. These are: (i) Neo-Romanticism at the end of the 19th century, with this movement influencing both the cultural sphere and theoretical physics by valuing emotion, sensitivity and intuition; (ii) the Weimar Republic in the interwar period, through the search for new and broader meanings about reality that transcend knowledge concerning the scientific sphere, in a context in which the reorganisation of political and economic structures in Germany was aspired to; (iii) Hippie counter-culture in the 1970s, with ideals of freedom, spirituality and questioning of scientific and social structures, leading to the emergence of groups aimed at studying and publicising interpretations of QP; (iv) The New Age Movement and Neosoterism, with a view to a broad and integrated understanding of reality, with knowledge that is transcendent to the adjacencies

between science and society; and (v) Physicists with mystical inclinations, who through personal conceptions, the result of interpretations and approaches to QP, have contributed (or may have contributed) to mystical inclinations, even though these inclinations are not reflected in the development of their scientific work. In this article, we focus our discussions on aspects (iii) and (iv).

According to Pessoa Júnior (2011), quantum mysticism stems from interpretations of quantum theory in the context of animistic naturalism, also presenting subjectivist biases or possible mixtures between quantum theory and religious elements. From this perspective, contemplating the phenomenon of quantum mysticism as a result of social representations and cultural appropriations of scientific knowledge explores aspects of the relationship between science and society. The act of appropriating certain knowledge involves its (re)interpretation and (re)signification through lenses coated with different senses, meanings and symbolisms (Machado & Cruz, 2016). In this sense, it is important to consider contextual aspects, such as the characteristics of the statements and the social practices in which the interactions take place, when analysing the effects of meaning in the discourses of quantum mysticism. For example, various statements involve strategies to persuade interlocutors based on beliefs and mechanisms of identification and auto-suggestion, which would contribute to validating the supposed applicability of QP to everyday situations. By using them in other fields of study not directly related to QP, these statements adulterate the meanings of specific concepts.

In addition, attributing the quantum qualifier to commercial products, for example, can signify that both their elaboration and their effects not only have a scientific basis but also deserve unrestricted reliability. In this way, it reinforces the dogmatic nature of science in general and of QP in particular (Saito, 2021).

An obstacle that fosters the cultural phenomenon of quantum mysticism, arising from the propositions of parallels between QP and Orientalism, is the consideration of uncritical perspectives that use fragile arguments of authority in an attempt to stimulate the formulation of an alternative science through simplistic ideals of a philosophical and cultural nature. In this way, there are approximations with discourses related to post-truth, which are currently causing misfortune for social trust in science (Saito, 2021).

III.2 Approaches between unknown worlds

A more robust view of quantum mysticism also requires analysing the social and cultural aspects of this phenomenon. These include the counter-culture movements that took place in the 1960s and 1970s, and the movement known as New Age or Neosoterism in the 1980s and 1990s. This movement allows us to identify the behavioural changes that have taken place in society, not just in terms of individualism, but in terms of how collective standards are developed to guarantee a certain lifestyle (Magnani, 1999).

There are two different conceptions of neosoterism followers' profile. Magnani (1999) tells us that the first refers to those individuals who are very susceptible to believing in

information from cards – tarot decks, for example – and from people who call themselves therapists. The second conception is present in contexts conducive to the commercialisation of materials, contacts with personal and commercial proposals of the most diverse kinds, as well as incentives for individualisation in personal decision-making.

It is not possible to characterise the identity of the participants in the communities or the homogeneity of the various neo-esoteric practices, nor have ethical, hierarchical and dogmatic parameters been established that signal the norms and prohibitions of their practitioners. Despite this, there are different degrees of commitment among followers of neoesoteric practices: (i) erudite: those who follow systematic and homogeneous predilections that have been previously established; (ii) occasional: those whose personal decisions are guided by the market; and (iii) participative: those who frequently take part in neoesoteric spaces, but are more condescending than erudite followers (Magnani, 1999).

The New Age movement arose in the context of criticising capitalist models and consumerism, questioning religious dogmas, tensioning power relations and recovering values identified with peace and freedom. The ethos² of neoesoterism involves: (i) body therapies, which emphasise, through an instructed posture, the powers of words, emotions, intuitions and sensations, privileging the work of the body and mind; (ii) encouraging individuality, with the aim of highlighting the singularities present in each individual, in order to stimulate inner reality and spirituality; (iii) moving the individual to urban communities away from everyday activities – not alternative rural communities – in order to hold courses, lectures and workshops on self-help and personal growth; (iv) reference to the concept of vital energy, i.e. the *chi* of Taoism, which represents the spiritual flow in the human body, as well as its relationship with nature; (v) attention to ecology and communion with nature, considering the individual's vitality as coming from nature; and (vi) the (re)discovery of the feminine and the praising of feminine qualities in terms of intuition, sensitivity and community senses, coming close to the personification of the figure of the witch and her magical powers (Magnani, 1999; Pessoa Júnior, 2011; Saito, 2019).

However, the New Age Movement has not been immune to commercialisation. We often see the offer and commercialisation of courses, lectures and workshops aimed at teaching holistic therapies, philosophical systems of various origins and spirituality, meditation and self-help, as well as the presentation of different conceptions and shamanic experiences. There is also encouragement to consume mandalas, crystals, incense, oils, essences, organic products, medicinal herbs, oriental objectifications, etc. under the assumption that these items will be able to promote personal, spiritual and financial development (Magnani, 1999; Saito, 2019).

² Ethos is understood as the set of “evaluative, moral and aesthetic aspects, the attitudes and sensitivity of a culture” (Pessoa Júnior, 2011, p. 298).

III.3 The neoliberal ethos: quantum products and their consumers

Looking for approximations with the socio-political context of quantum mysticism, we identified neoliberalism as a possible influence on the construction of quantum mysticism discourses. Neoliberalism is based on the model of democracy related to the political and economic aspects present in classical liberalism and libertarianism (Vilanova; Miranda; Martins, 2021). These reinforce the favouring of “individual rights to private property, the rule of law and the institutions of freely functioning markets and free trade” (Harvey, 2008, p. 75) in such a way as to ensure individual freedoms and stimulate competitiveness between companies, individuals and territorial institutions/organisations. Their aim is to argue that “human well-being can best be promoted by unleashing individual entrepreneurial freedoms and capacities within an institutional framework characterised by solid private property rights, free markets and free trade” (Harvey, 2008, p. 12).

According to Harvey (2008), the neoliberal model, like other models, is structured and reproduced in order to instill values, beliefs, emotions and desires in the context in which we live. If these feelings are well accepted by society – in other words, they become common sense – then they can be seen as true and unquestionable.

This phenomenon can also be intensified when we encounter epistemic ambiguity, the spread of different political conceptions and incentives to choose between binaries – science *versus* pseudoscience; politics *versus* anti-politics; public truths *versus* private truths, etc. –providing alternative facts are constantly present in political decisions. In this way, we are approaching the conceptions of neoliberalism, as this model of political democracy aims to establish relations between the state and the market using incontestable truths in governmental exercise (Jasanoff; Simmet, 2017).

Neoliberalism involves the process of technologising life, especially through information and communication technologies, to the extent that they encourage a shortening of space-time in the performance of market demands. Information technologies are more prominent in the neoliberal democracy model, as it stimulates economic activities of a speculative nature and provides the market with a growing number of temporary contracts for industries that prioritise large-scale productions of emerging cultures, such as video advertising, entertainment and gamification (Harvey, 2008).

Technological transformations, through the lens of neoliberal theory, are based on competitiveness by means of the development of new and diversified products, means of production and organisation through the use of combinations of technologies. Such transformations can corroborate assumptions that it is possible to extinguish poverty worldwide as we find subsidies for free markets and trade in both the individual and collective spheres, i.e. at micro and macro-social levels (Harvey, 2008). However, it is important to point out that this process of mass production can also get out of hand, as some social actors or commercial companies can prioritise the development of new artefacts to be marketed in society, even if they have no prior utility, but which satisfy their own interests,

and can also be responsible for influencing, directly or indirectly, the social and/or institutional relations that take place in a given space-time. In this way, “there is therefore a constitutive link between technological dynamism, instability, the dissolution of social solidarity, environmental degradation, deindustrialisation, accelerated changes in space-time relations, speculative bubbles and the general tendency for crises to form in capitalism” (*ibid*, p. 79).

The job market under neoliberalism has a flexible character, i.e. social welfare no longer comes from the state and the technological changes implemented in society mean that jobs are a reflection of excessive labour forces and capital provided by the market. In this way, the individualisation of the worker is prioritised in temporary employment conditions without socio-economic stability and without social guarantees, for example: unemployment insurance, healthcare and retirement incentives. This individualisation of the worker alienates them from social demands, as their concern is to be free to choose what they want to produce and/or consume in a competitive and individualistic market logic, in which the state does not have enough public policies to meet the needs of each individual (Harvey, 2008).

III.4 Quantum mysticism and post-truths

Socio-discursive discussions at this conjuncture prioritise the context of post-truths. Pivaro and Giroto Júnior (2020, p. 1074) argue that “the post-truth era describes times of a subjectification of reality, in which facts are manipulated and chosen according to previously established personal beliefs”. For Seixas (2019), “the great issue of post-truth is the overcoming of the “truth of facts” by the establishment of conviction as a criterion of validity for an argument” (*ibid*, p. 133). This implies a certain lack of interest in questioning information and looking for reliable sources, as it is more comfortable to maintain one’s own convictions than to continually adopt a critical view. The fact that subjects already have their own experiences does not mean that facts do not matter, but that they can be selected, distorted and presented within a certain context that favours one interpretation as true over another (McIntyre, 2018).

From this perspective, we must consider that not only ethical and moral values, but also passions which are intrinsic to each individual, are present in the actions carried out in society. In the post-truth era, we can understand that individuals relate to each other based on familiarity, i.e. they act in defence of their own convictions as opposed to the interests of others, seeking similarities around the truth they want to believe (Seixas, 2019).

The role of networks, according to Amorim and Vieira (2020), can be associated with disinformation, by automating information through robots – in all areas, especially politics – or by bringing together interests that generate untruths, i.e. the opinion of a minority ends up being externalised as if it reflected the opinion of the majority. In this way, “the work of robots not only spreads fake news, which can have harmful effects on society, but also actively seeks to prevent users from becoming properly informed” (p. 58). From a

sociological perspective, Latour (2020) argues that the post-truth phenomenon has been intensified due to the billionaire monetary investment in the disinformation industry, making public opinion more susceptible to denials of scientific evidence, as well as scepticism regarding socio-political and socio-economic aspects.

IV. Textual analysis: quantum mysticism in Facebook video descriptions

IV.1 Delimitation of the *corpus*

In this article, we present an excerpt from an empirical study that analysed discourses related to quantum mysticism. After an investigation carried out by the authors on the social media Facebook, Twitter and Instagram, it became apparent that the Facebook is the one that most fosters discussions about QP in non-scientific contexts. It has existed for more than a decade, is still very popular with its users and promotes social interactions in different ways: pages, groups, videos etc.

Considered a discursive space, Facebook provides its users with autonomy so that they can create and manage their own content, without having to go through prior verification of information. Posts can be published and read by any user who is registered on this social media and who complies with the guidelines established by Facebook's Security Advisory Board³. These security mechanisms do not, however, eliminate the coexistence of scientific and pseudo-scientific discourses.

The production of content for Facebook is done exclusively by its users, whether through personal or collective initiatives, the latter being considered a collaboration between individuals and/or companies for content management. However, it is currently possible to find guidelines from the social media itself for content production aimed at developing a profile and/or a company through participation in a specific community for these creators, which is based on: (i) having the creativity to come up with different ways of expressing oneself on Facebook; (ii) connecting with friends and people who have common interests; and (iii) receiving cash rewards from using specific tools to develop video production (Facebook, 2022).

It is worth pointing out that the consumers of this content are the social media users themselves, who have access to this material through organic or sponsored engagement. Organic engagement refers to the natural way in which content reaches the user, based on the content consumed by the profile and the interactions the user makes with their Facebook account. Sponsored engagement, on the other hand, takes place through the creation of adverts so that one or more publications can achieve greater reach and interaction on this social media. These adverts are not only about product offers, but also about promoting content and/or information that the advertiser, who can be any individual and/or company linked to a Facebook account, considers relevant.

³ More information is available at: <https://www.facebook.com/help/222332597793306/?ref=sc>.

To define the research *corpus*, we delimited our search to pages published in Portuguese and on the Brazilian scene during the first fortnight of June 2022, in the various subsections that organise and make it possible to retrieve Facebook posts by identifying the ‘Quantum’⁴ qualifiers, using the platform’s “search” feature. The search results are organised according to the following filters: “Everything”, “Posts”, “People”, “Photos”, “Videos”, “Marketplace”, “Pages”, “Places”, “Groups” and “Events”.

We prioritised the data obtained using the “Videos” filter, as this was the filter with the highest return of results and corresponds to the guidelines for producing material provided by the platform. We did not establish inclusion criteria – in order to have a broad understanding of the content available – and we defined the following as exclusion criteria: (i) language other than Portuguese; (ii) no reference to QP; (iii) no description; (iv) only appearing once on the platform; (v) have a difference between the title and the text of the description; and (vi) including – in addition to the *hashtags* – text in the body of the description. After applying these criteria, we catalogued the results obtained according to the information provided by Facebook’s search platform: “title”, “description”, “duration”, “published by”, “publication date” and “views”. The search returned a set of 232 videos. By means of a thematic analysis, we identified recurring dimensions in most of the texts⁵ and selected 11 exemplary cases of videos whose presentations articulated these aspects.

In this article, we analyse one of these exemplary cases. It was chosen because this publication mobilises aspects of quantum mysticism discussed in the analysis of the conjuncture of this cultural phenomenon. In particular, this video articulates elements of discourse typically related to the language of advertising, through the offer of goods and products that promise well-being, references to the fulfilment of desires through external intervention, unexplored by natural laws, desires for personal development, and relationships between quantum concepts, behaviour and the expansion of consciousness.

We chose to work with the video description in order to prioritise the verbal dimension when analysing discursive and/or textual aspects⁶. In addition, our choice of a single description represents the possibility that a set of elements, characteristics or even patterns that are also recurrent in other examples may be relevant and sustained so that the cultural phenomenon of quantum mysticism and its analysis of the conjuncture present in this particular case are significant in relation to the original set.

⁴ In Brazil, we have the word ‘quantum’ in both the feminine and masculine genders, and the research considered the results of all variations.

⁵ Examples include: a call for social action; a mix of scientific vocabulary and colloquial language; an offer of opportunities for personal development; references to historical and contemporary events; elements of advertising and marketing; references to behaviour, values and forms of religiosity; health and self-care.

⁶ Subsequent analyses can explore articulations between verbal language and other semiotic modes.

IV.2 Textual analysis

In CDA, textual analysis mobilises analytical categories understood as “textual forms and meanings associated with particular ways of representing, (inter)acting and identifying (oneself) in situated social practices” (Vieira; Resende, 2016, p. 114). In this way, they make it possible to map and establish connections between the discursive and non-discursive dimensions of events, considering their social effects (*ibidem*). According to the authors, “a critical discursive analysis is not to be confused with simple reading and interpretation. [...] The choice of which categories to use to analyse a text cannot be made *a priori*. It is always a consequence of the text itself and the research questions/concerns”.

From this perspective, we chose the categories of intertextuality, representation of events and social actors and modality. These respond both to characteristics of the text itself, for example, the presentation of the voices of different social actors in events over time and space, and to research questions about the degree of certainty and reliability in what is said.

According to Resende and Ramalho (2019, p. 65), “intertextuality is the combination of the voice of the person who utters an utterance with other voices that are articulated to it” and is related to the actional meaning. In this way, we can understand that intertextuality occurs as discourses are articulated with each other, whether through mentions, paraphrases or incorporations, approaching the action genre of the discourse. The category of intertextuality allows us to answer questions about the texts and voices that are included, excluded and/or attributed to discourses; how this occurs, whether directly or indirectly; as well as the ways in which other external voices are articulated with the voices of the primary author (Vieira; Resende, 2016).

The representation of events and social actors is related to the representational meaning of discourse. According to Vieira and Resende (2016, p. 151) “representations of social practices are particular, i.e. constructed by particular people and from particular points of view, and therefore represent actors involved in the practices in different ways”. This category allows us to answer which events, authors and elements are included and excluded from the texts, whether the events are represented in a concrete or abstract way, whether the actors are represented in an activated or passive, personalised (e.g. Bohr, Heisenberg etc.) or classified (e.g. “scientists”) way, as well as their space-time relationships (Vieira; Resende, 2016; Resende; Ramalho, 2019).

The last category we consider is modality, which concerns the identificational meaning of discourse. Epistemic modality allows us to identify the extent to which people are committed to their discourses, representing the speaker’s responsibility for the truth or certainty they have about what they say. The deontic modality is related to the character of permission, obligation or necessity that the speaker expresses about what they say (Resende; Ramalho, 2019). Examples of modalisation markers include the use of verb tenses, verbs and/or modal adverbs (Vieira; Resende, 2016). For example, the use of the present tense (e.g. “the sun rises in the east”) or adverbs such as “surely” indicate a high degree of certainty

about what is being said, i.e. high epistemic modality. The use of modal verbs in the future tense expresses permission (e.g. “you could do this”) or some degree of obligation (e.g. “you should do this”), while the use of the compound future tense and adverbs (e.g. “as” and “possibly”) indicate a low degree of commitment to the statement.

The table 1 summarises the above-mentioned categories of analysis and the questions we can direct at the analytical *corpus*.

Table 1 – Categories of analysis and questions about the analytical *corpus*.

Categories	Questions about the analytical <i>corpus</i>
Intertextuality	What other relevant texts/voices are included? Which ones are significantly excluded? How are other voices included? Are they attributed? Specifically or non-specifically? Are the attributed voices reported directly (quotation) or indirectly? How are other voices woven into the author's voice and into each other?
Representation of events and social actors	Which elements of the represented social events are included or excluded? Which included elements are more prominent? How abstractly or concretely are the events represented? How are processes represented? What are the predominant types of process (material, mental, verbal, relational, existential)? Are there instances of grammatical metaphor in the representation of processes? How are social actors represented (activated/passivated, personal/impersonal, named/classified, specific/generic)? How are time, space and the relationship between ‘times-spaces’ represented?
Modality	How do authors commit themselves in terms of truth (epistemic modalities)? And in terms of obligation and necessity (deontic modalities)? To what extent are modalities categorised (affirmation, negation, etc.)? To what extent are they modalised (with explicit modality markers)? What levels of commitment are observed (high, medium, low) when there are explicit modality markers? What are the modalisation markers (modal verbs, modal adverbs, etc.)?

Source: Vieira and Resende (2016, p. 116-118).

We chose these categories because they allow us to identify relevant discursive crossings in the choice of sources, legitimisation mechanisms and the construction of authority in the discourses that circulate on social media.

Our analysis followed the following pattern: first, we indicated the title assigned to the description by the author of the post. Subsequently, we contextualised the description in question by indicating the qualifier that provided the search result, the length of the video, the

author of the post, the date of publication, the number of views, the directional link and an illustrative printscreen. At the end, we highlight the fragment for analysis, carry out the textual analyses based on the analytical categories and get closer to the discussions previously proposed at the conjuncture.

The video description selected for analysis represents a cultural premise, i.e. it mobilises aspects of the cultural phenomenon of quantum mysticism and allows us to recognise them as they are mentioned in the analysis of the social problem identified. In addition, our choice of a single description represents the possibility that a set of elements, characteristics or even patterns that are also recurrent in other examples may be relevant and support the cultural phenomenon of quantum mysticism and its analysis of the situation in this particular case in relation to the original set.

We illustrate our procedure by analysing the description of the video entitled “*See this Quantum Leap!!!*” (Pfrimer, 2021), identified because it contains the qualifier “Quantum” in the title. It is five minutes and eighteen seconds long and was posted by Frederico Pfrimer on 18 January 2021, as shown in figure 1. Furthermore, on the day the mapping was carried out – 11 June 2022 – the video had eleven thousand views. Below is a printscreen of the post and a transcript of the video description.

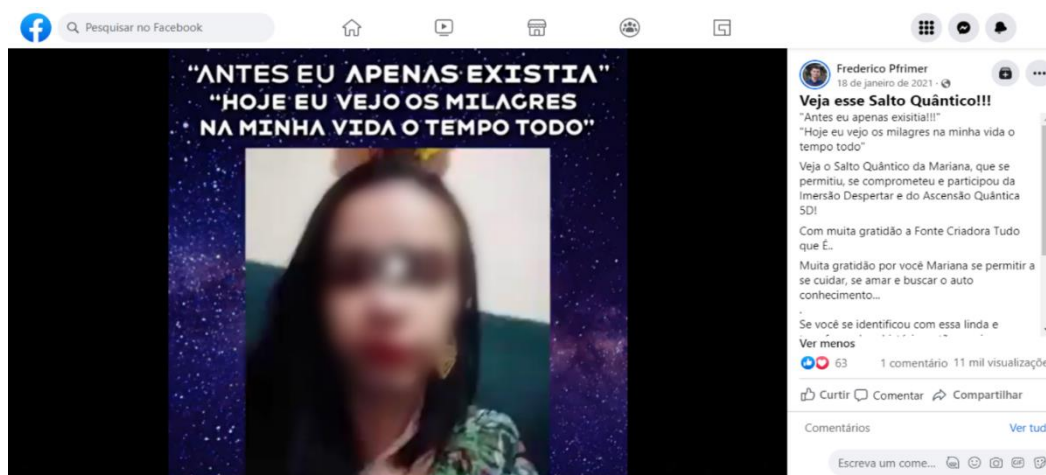


Fig. 1 – Printscreen from the video “*See this Quantum Leap!!!*”. Source: Facebook reproduction.

Literal transcription of the video description:

[1. Mariana's speech] “*Before* [adverb of time] *I* [straight personal pronoun] *only* [adverb of exclusion] *existed* [sic] [imperfect past tense]!!!”

“*Today* [adverb of time] *I* [straight personal pronoun] *see the miracles in my* [possessive pronoun] *life all the time*”

[2. Speech by the author of the post with attribution to Mariana] *See* [affirmative imperative] *the Quantum Leap of Mariana, who allowed herself* [past perfect tense

+ reflexive pronoun], *committed herself* [past perfect tense + reflexive pronoun] and *participated* [past perfect tense] in the *Awakening Immersion and the 5D Quantum Ascension!*

With much gratitude to the Creator Source of All That Is.

So much gratitude to you Mariana for allowing yourself [past continuous tense + reflexive pronoun] *to take care of yourself* [infinitive + reflexive pronoun], *to love yourself* [infinitive + reflexive pronoun] and *to seek* [infinitive] *self knowledge* [sic]...

[3. Invitation to the reader of the description] *If you identified with this beautiful* [adjective] and *transformative* [adjective] *story, then you need* [affirmative imperative / necessity] *to take part in the AWAKENING Immersion. This event for people who are awakening will help you* [possibility] *to find everything you're looking for* [sic] *and more.*

Participate [affirmative imperative] *in the Movement's lives every Tuesday at 8.20pm to expand your consciousness* [possibility] *and raise your vibration.* [our markings] (Pfrimer, 2021).

Through the lens of intertextuality, we identified the inclusion of Mariana's voice ("Before I just existed", "Today I see miracles in my life all the time"), who speaks in the first person and emphasises a process of personal transformation over time, marked by the use of the adverbs "before", "today" and "all the time". Mariana's voice is followed by the voice of the post's author who, using the imperative verb ("see"), addresses the reader through references to reflexive actions carried out by the deponent over time, in the infinitive ("allow yourself", "take care of yourself", "love yourself" and "seek yourself") and in the past perfect tense ("allowed yourself", "committed yourself" and "participated"). In this way, discursive effects are produced that refer to the readers' identification with the speaker and the attribution of meanings to her actions.

The voice attributed to Mariana is reported in the form of a direct quote, using inverted commas. The use of straight personal pronouns ("I") and possessive pronouns ("my") is a strong indication that this is strictly personal speech. The contrasts marked by the use of adverbs of time ("before" and "today") and of exclusion ("only") reinforce the sense that the changes in Mariana's life occurred after she took part in the event promoted by the author of the description. In addition, giving Mariana a voice lends credibility to the information offered to the reader. In other words, Mariana's testimony not only allows the event to be publicised, but also attests to its effectiveness. She also encourages public participation through the use of imperative verbs ("you need to" and "take part").

In this fragment, we identify the representation of both events and social actors. Mariana is a social actor, while the social events described are the "Awakening Immersion" and the "5D Quantum Ascension". However, both the social actor and the events are abstractly represented through an evidential process, without concrete mentions that allow us

to identify, for example, what Mariana's personal profile is, what her living conditions are as an individual in society, and what specific impacts participation in the events has had on her life. The social actor is represented in an active, personal, named and specific way, while the social events are represented in a passive, personal, named and specific way, reinforcing the relationship established between the spaces-times represented in the text, since publicising the event could be done independently of the social actor. However, the choice to associate the actor and social events lends credibility and reinforces the publicity of the events.

All the modalities found are affirmative categorical, given that the description uses explicit modality markers, such as the use of the future and the modal verbs “*need*” and “*can*”. We identified epistemic modality in the use of the compound form of the future (“*it will help you*”) and deontic modality in the references to the need to participate (“*so you need to participate*”) and the possibilities that can be offered to those who wish to take part in this event (“*to expand their awareness*”). We can thus observe high levels of commitment on the part of the author to the text, even though there is no use of modal adverbs in this fragment.

IV. Discussion: establishing relationships between conjuncture analysis and textual analysis

In the description of the video as a whole, we identify a form of discursive realisation of the conception that quantum mysticism comes from interpretations of Quantum Theory that adopt subjectivist biases (Pessoa Júnior, 2011), for example: “*If you identified with this beautiful and transformative story, then you need to take part in the AWAKEN Immersion*”, through the discursive mobilisation of adjectives (“*beautiful*” and “*transformative*”) to emphasise individual and subjective points of view arising from Mariana's testimony. It is also related to statements that suggest social applications of Quantum Theory and the expansion of its relevance to other areas not linked to Physics, such as, in this example, self-knowledge. From this perspective, we can say that the meanings constructed within the scope of QP are adulterated (Saito, 2021), to the extent that QP concepts are (re)interpreted and (re)signified through different lenses coated with symbolism, senses and meanings (Machado; Cruz, 2016) related to the interests of the author of the description.

Another important aspect to mention is the discursive construction of Mariana's profile as an adherent of neoesoterism. Following Magnani's (1999) propositions about adherents to neo-esoterism highlighted at the conjuncture – that is, (i) an individual who believes in information from people who call themselves therapists; and (ii) the commodification and individualisation of decision-making processes – we notice that the interviewee is portrayed as being very susceptible to believing information from people who call themselves therapists, especially when the author of the description states that Mariana managed to have a “*Quantum Leap*” because she “*allowed herself, committed herself and took part in the Awakening Immersion and the 5D Quantum Ascension*”. In addition, the text emphasises a degree of participatory commitment on Mariana's part, as she frequents

neoesoteric spaces, even though she is not portrayed as someone who is faithful to the systematic and homogeneous predilections of the hierarchical and dogmatic parameters proposed in the New Age.

In line with the ethos of neoesotericism – that is, the behavioural and cultural foundations of this movement as proposed by Magnani (1999), Pessoa Júnior (2011) and Saito (2019) – two main aspects stand out in the text: (i) the role of body and mind work involved in the sensitive experiences in which Mariana participates voluntarily and actively (“*the Quantum Leap of Mariana, who allowed herself, committed herself*”) and the resulting changes in posture (“*transforming history*”); and (ii) the encouragement of individuality, as the author of the description highlights Mariana’s singularities (a person who has allowed herself to “*take care of herself, love herself and seek self knowledge [sic]*”) and encourages spirituality through participation in the social events mentioned above (“*Awakening Immersion and Quantum Ascension 5D*”). It is worth pointing out that this expression “quantum leap” is not aligned with the assumptions present in QP (i.e. the transition of an electron to different quantum states in the same atom), but rather with the distorted interpretations of this theory that symbolise an internal evolution of the subject that occurs through physical and psychological behavioural changes.

The approximations between this textual fragment and a supposed ideology of neoliberal democracy are present in the invitation to individual freedom, marked by the reflexive pronoun “if” (e.g. “*if you allow yourself*”) and in the presentation of solutions offered by the market, in this case the “*Awakening Immersion and 5D Quantum Ascension*” to achieve individual aspirations which, if they become common sense, can then be understood as universal truths. In addition, the way the text is structured seeks to weave relationships not only with the individual beliefs, emotions and desires (Harvey, 2008) of the readers of the description, as there is a directional invitation: “*If you identify with this beautiful and transformative story, then you need the AWAKEN Immersion.*”, but also with encouragement to individualise the decision-making process in society (Magnani, 1999).

Other relationships with neoliberalism, which correspond to what Harvey (2008) calls the technologisation of life, concern individual and/or corporate social actors seeking to market solutions that are responsible for solving personal problems based on QP, which collapses space-time relationships and does not distinguish local specificities, as is the case with the event advertised in the video description: “*This event for people who are awakening will help you find everything you’re loo[k]ing [sic] for and more.*”. We also identified an encouragement of individualistic attitudes in the passages referring to self-care and the search for self-knowledge, as well as in the statements relating to commitment and allowing change (“*allowed yourself*”, “*committed yourself*”), reinforcing neoliberal ideological attitudes in a video description that has an advertising character.

Finally, it is important to emphasise that the discussions presented throughout this analysis do not only involve ethical and moral aspects in relation to the offer to take part in

the event promoted by the author. There are also lenses aimed at appealing to the passions and emotions intrinsic to each individual active in society (Seixas, 2019) and who can access this description through Facebook. If we consider that we live in a post-truth era (Pivaro; Giroto Júnior, 2020), we need to pay attention to the way in which this text can foster relationships through the familiarity of convictions among users of this social media (*“if you identified with this beautiful and transformative story, then you need to take part in the AWAKEN Immersion.”*), and the strengthening of networks of practices that prioritise defending the truth they want to believe in (*“this event for people who are awakening will help you find everything you’re loo[k]ing for [sic] and more”*), as well as *“take part in the Movement’s lives every Tuesday at 8.20pm to expand your consciousness and raise your vibration.”*).

V. Implications for Science Education: overcoming discursive obstacles

Our analysis shows that there are cases in which Quantum Physics is portrayed on the social media Facebook as an alternative for solving everyday problems and/or promoting financial, personal, professional, spiritual or health improvements. This provides a favourable scenario for the construction of post-truths that encourage the formulation of public opinion through false promises of improvements in various aspects of the individual’s life. In the case of quantum mysticism, this is done using, on the one hand, appeals to the beliefs, values, subjectivities and desires of the subjects in their lives and, on the other, supposed references to a Physical Theory that is focused exclusively on a subnanometre-scale universe. We identified that the specific discursive strategies used articulate and materialise aspects of a cultural, political and historical nature present in society, strengthening networks of meaning and reinforcing ideologies.

Quantum mysticism is a cultural phenomenon that, despite appearing around the 1970s, is still present today and makes its home on social media because this is a space that accepts a variety of discourses that are not rigorously evaluated as to their trustworthiness or reliability.

In addition, some discursive constructions in the texts analysed can reinforce aspects associated with contemporary neoliberal ideologies, to the extent that they highlight the role of the individual and the market, for example (i) in encouraging the search for individual solutions, involving the consumption of goods and services, to social problems and/or demands of a collective nature, such as mental health, unemployment etc.; (ii) in undermining the importance of the state in providing rights, for example to health and social welfare; (iii) in building mentalities and valuing certain behaviours such as proactivity, belief in oneself, individual effort and merit, typically associated with the neoliberal ideology of the entrepreneurial individual; and (iv) the promise of magical, salvationist alternatives, to the detriment of engaging individuals and social groups in problematising the socio-political and economic realities in which they find themselves and in collective efforts aimed at transforming them.

Although based on the analysis of one case, the analysis broadens the grounds for the discussion of quantum mysticism insofar as it highlights the importance of socio-political aspects, such as neoliberal ideologies underlying contemporary society, in the constitution of this cultural phenomenon.

The results point to the need for the field of Science Education to problematize the circulation of pseudoscientific discourses and to analyse critically their relationships with other discourses that permeate the social practices of the school public.

Thus, the discussions proposed in this article reveal the need for curricular approaches that incorporate dimensions related to discursive analyses of these discourses that are present in everyday life and which are part of the repertoire that informs students and teachers in decision-making processes in contemporary society. This demand also goes hand in hand with the necessary understanding of the concept of contextualisation, beyond the simple relevance or application of scientific concepts in everyday life. No less importantly, it points to the relevance of research that explores the nature of science, the methodologies of enquiry teaching and the analysis of epistemic practices in the training of students and teachers. This is imperative given the appeal of social media as a source of information and a search for knowledge of the most diverse kinds. For this reason, it is necessary and important for the field to mobilise actions aimed at criticising the scientific information that is in circulation and to prioritise discussing the need to develop a critical sense in order to evaluate the information with which public opinion is coming into contact, given that it is possible to find different types of discourse on social media.

Finally, in an age of post-truths, having knowledge about science is not the only factor in not believing pseudoscience and/or information that is manipulated in order to spread misinformation in society, but by promoting scientific knowledge in various contexts, it is possible to provide a foundation for the subject to be able to weigh up the information they are coming into contact with and make their decision-making process orientated on the various scientific, social, economic, political, cultural etc. aspects that make up the discourses that circulate in society.

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