

Problems of Deepak Chopra’s discourse: a metalinguistic analysis of “Quantum Healing”⁺

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Abstract

In this paper, our objective is to contribute to the debate around the “quantum mysticism” phenomenon, exploring discursive aspects that permeate an utterance with this kind of theme. To this end, we bring forth an analysis of the book Quantum healing by Deepak Chopra, based on the philosophy of the Bakhtin Circle. We investigate not only the author's argumentative strategies, but also the constitutive elements of this utterance (theme, structure, and style) with its context of publication, production, and reception. We end our arguments recognizing the incoherence that Chopra demonstrates with his intertwining of mystical and alternative conceptions with a scientific worldview, while uttering inconsistent metaphors and serious contradictions, but we also highlight that the author was able to influence the way in which concepts related to Quantum Physics circulate outside academia.

Keywords: *Quantum Mysticism; Quantum Physics; Metalinguistics; Bakhtin.*

I. Introduction

The interest on Quantum Physics (QP) and its connections to subjects such as mysticism, “oriental philosophies”, and alternative medicine has been addressed by several academic texts; many of them have been devoted to the historical and epistemological analysis of this phenomenon, which might be described as “the cultural phenomenon of

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quantum mysticism” (PAURA, 2018; PESSOA JR., 2011; SAITO, 2019). In the Caderno Brasileiro de Ensino de Física, as an example, two recent works that investigate aspects related to this phenomenon in different ways were published; works whose discussions we plan to elaborate on (MOURA; SANTOS, 2017; PIGOZZO; LIMA; NASCIMENTO, 2019).

To illustrate the reach of this “cultural phenomenon”, one must simply search terms on Google, such as “*cura quântica*” and “*saúde quântica*” to observe that the number of results is relatively similar to the results when searching for terms such as *quantum mechanics* and *quantum physics*.² In searches with the same terms in English, the results are also notable³. Therefore, it is reasonable to assert that the number of pages that deal with subjects related to mystical⁴ understandings of concepts of Modern and Contemporary Physics (MCP) is virtually the same size as the number of pages that bring the term Quantum Physics.

In Science Education, the subject has been associated to the development of alternative conceptions and misguided understandings of QP, even though they are freely shared among several different social groups. The difficulties and incomprehension that create great distance between how QP is understood by society in general and how fundamental QP is to several contemporary scientific consensuses are often highlighted as part of a number of obstacles, which should be overcome in the process of teaching and learning MCP in different educational spaces (CUESTA-BELTRÁN, 2018; GRECA; FREIRE, 2014; HILGER; MOREIRA, 2012; HILGER; MOREIRA; DA SILVEIRA, 2009; PEREIRA; OSTERMANN, 2009).

Similar associations are also frequent in relation to individuals such as Deepak Chopra, the creator of the concept of “quantum healing” and to the cultural phenomenon it represents. In traditional and independent media, the pieces that deal with Chopra's works and life events are written both in ways that are relatively simplistic and naively favorable to the theme and in aggressive and deprecating ways (ALMEIDA, 1999; INDIATODAY.IN, 2015; LANG, 2000; PLAIT, 2009). In the context of specialized academic works, the approaches of the works that deal with the subject are also considerably diverse, yet frequently analytical, prudent and in-depth (BAER, 2003; MOURA; SANTOS, 2017; PESSOA JR., 2011; WARRIER, 2019).

The reactions to Chopra's works have been common since the 1990s, around the publishing of the book *Ageless body, timeless mind: the quantum alternative to growing old* (1993), when he was part of an episode on Oprah Winfrey's TV show, an event that introduced him to the public imagination. According to Paul A. Offit (2013), one hundred

² Approximately 1,140,00 Portuguese results on quantum healing (*cura quântica*), 3,190,00 on quantum health (*saúde quântica*), 1,240,00 results on quantum mechanics (*mecânica quântica*), and 3,230,00 on quantum physics (*física quântica*). Accessed on May 20th, 2020.

³ Approximately 23,000,000 results on quantum healing, 261,00,00 results on quantum health, 150,00,00 results on quantum mechanics, and 219,000,000 results on quantum physics. Accessed on May 20th, 2020.

⁴ In papers and academic texts, the theme is also widely associated to terms such as pseudoscience, charlatanism, esoterism, opportunism, denial (historical and scientific), among others.

and thirty-seven thousand copies of the book were sold in the following twenty-four hours. Since then, Chopra's critics have questioned the responsibility of his actions and accused him of lying and of displaying opportunistic behavior (PLAIT, 2009; WHEEN, 2004). Despite the “accelerated” acquisition of wealth in different periods, Chopra's controversial acts never involved the law regarding systemic financial irregularities and/or illicit acquisition of wealth, however, they have involved the omission of financial interests in the publication of an article in a renowned scientific journal, the establishment of private care without a medical license and, in addition, hostile practices in lawsuits against newspapers, magazines, journals and tabloids (NY TIMES, 1996).

In spite of the actions taken by Chopra and by other members of this movement that still grows around the world, (DOERING-MANTEUFFEL, 2011), in this work our interest lies in understanding the nature of Chopra's utterances and the main elements of his discourse. That is, by understanding that several people are introduced to Quantum Physics through Deepak Chopra's books and through ideas he helped create or disseminate, we believe that it is important to investigate the utterances by explaining their compositional and stylistic characteristics, its theoretical and philosophical standpoints, to which other utterances they answer to, how they relate to the seminal utterances of Physics, which new utterances they create, and how they generally relate to society and culture. We argue that such investigation will provide leverage to better understand the cultural phenomenon of quantum mysticism and the propagation of its concepts in society, as well as to reflect on how formal Science Education can be organized to explicitly debate the problems that arose with such literature.

Analyzing how Chopra interprets (and speaks about) Quantum Physics created several specific outcomes to Science Education. This happens because, if our objective is to overcome whichever kind of "alternative conceptions" or incomprehension related to QP that students or even teachers might have when communicating in the classroom (such as it being common to associate QP to practices such as “magnetic therapy” and “quantum massage therapy” or exclusively to subjects such as “soul” and “spirituality”), it is necessary to know the origins of the potential pedagogical obstacles and which concepts they use. *Quantum Healing* is one of the main origins of these ideas or, at least, it is closely related to them.

Considering that, we present a metalinguistic analysis (section IV) of the book *Quantum Healing* by Deepak Chopra (we bring more information about him on subsection IV.1.2), based on the philosophy of language of the Bakhtin Circle⁵ (section III). This book is one of the main representatives of the cultural phenomenon of quantum mysticism. To do so, our research questions are the following: What is the theme of Chopra's utterance? To which speech genre does it belong to? In which extraverbal context is it structured? What is its structure and compositional style? To whom is this utterance directed and to whom does it answer? How do these elements support the author's intentions?

⁵ Group of philosophers composed by Mikhail Bakhtin, Valentin Voloshinov, and Pavel Medvedev.

In the following section, before the theoretical-methodological overview and the results of the investigation, we substantiate the present article by gathering data on Twitter users' perception of the terms Physics and Quantum Physics so we can exemplify how widespread the phenomenon really is.

II. Quantum Physics on Twitter

The analysis of posts on social media is within the field of text mining, a growing field of statistics in the past years (SILGE; ROBINSON, 2017). The main idea is to select an expressive number of posts on themes or specific users and conduct different analyses, such as the recurrence of words, analyses of feelings and term association. For this article, we only analyzed the recurrence of words in posts about Quantum Physics, to map the understanding of the population of this area of Physics. In order to compare, we also analyzed posts that only had the term Physics. The R software was used in the search for posts and in the statistical analyses (R CORE TEAM, 2015).

The selection of posts was done one June 28, 2020. On that date, we searched for the last 500 tweets with the terms *#physics* and *#quantumphysics*. The search was conducted in English to cover a more heterogeneous group of users. In each group of posts, we analyzed the most frequent words. The images 1 and 2 show the most frequent words in the 500 tweets that contained the aforementioned terms.

By looking at the most frequent words in the tweets that contained the term *physics*, we noticed that there were no occurrences of terms related to mysticism or elements of the New Age movement. The words most associated with *physics* are usually within educational and academic environments, such as schools and universities. A few terms might be strange, such as *pay* or *finance*. A detailed analysis of these posts show that these words are related to Physics courses sold on the internet and marketed on Twitter. Regardless, it is evident that part of this analyzed population does not associate the term physics with elements of mysticism.

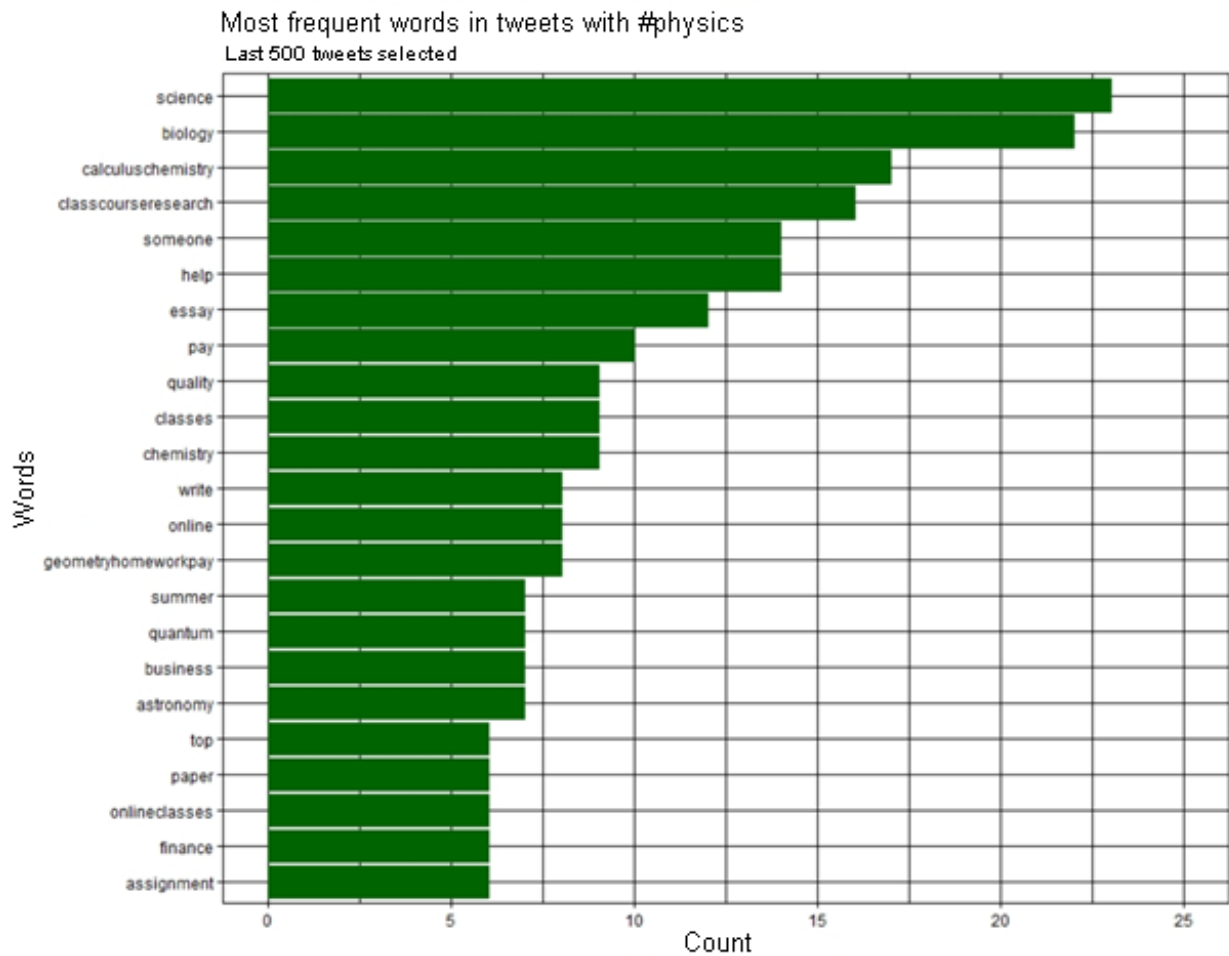


Image 1 – Most frequent words in tweets with the term physics.

However, we observed a completely different case with the tweets that contained the term *quantum physics*. It is clear that this part of the population has a diffuse understanding of what Quantum Physics is. The presence of words such as *consciousness*, *spirituality*, *love*, and *meditation*, as an example, reveal the strong influence that authors such as Chopra have had in the diffusion of Quantum Physics between people. Why do people not have the same understanding when we speak of Physics in general? How is the Quantum Physics in these works capable of producing such understanding? Our work intends to present some answers to these questions from an in-depth analysis of the book *Quantum Healing* by Chopra. In the following section, we present the theoretical-methodological framework we used to analyze this work.

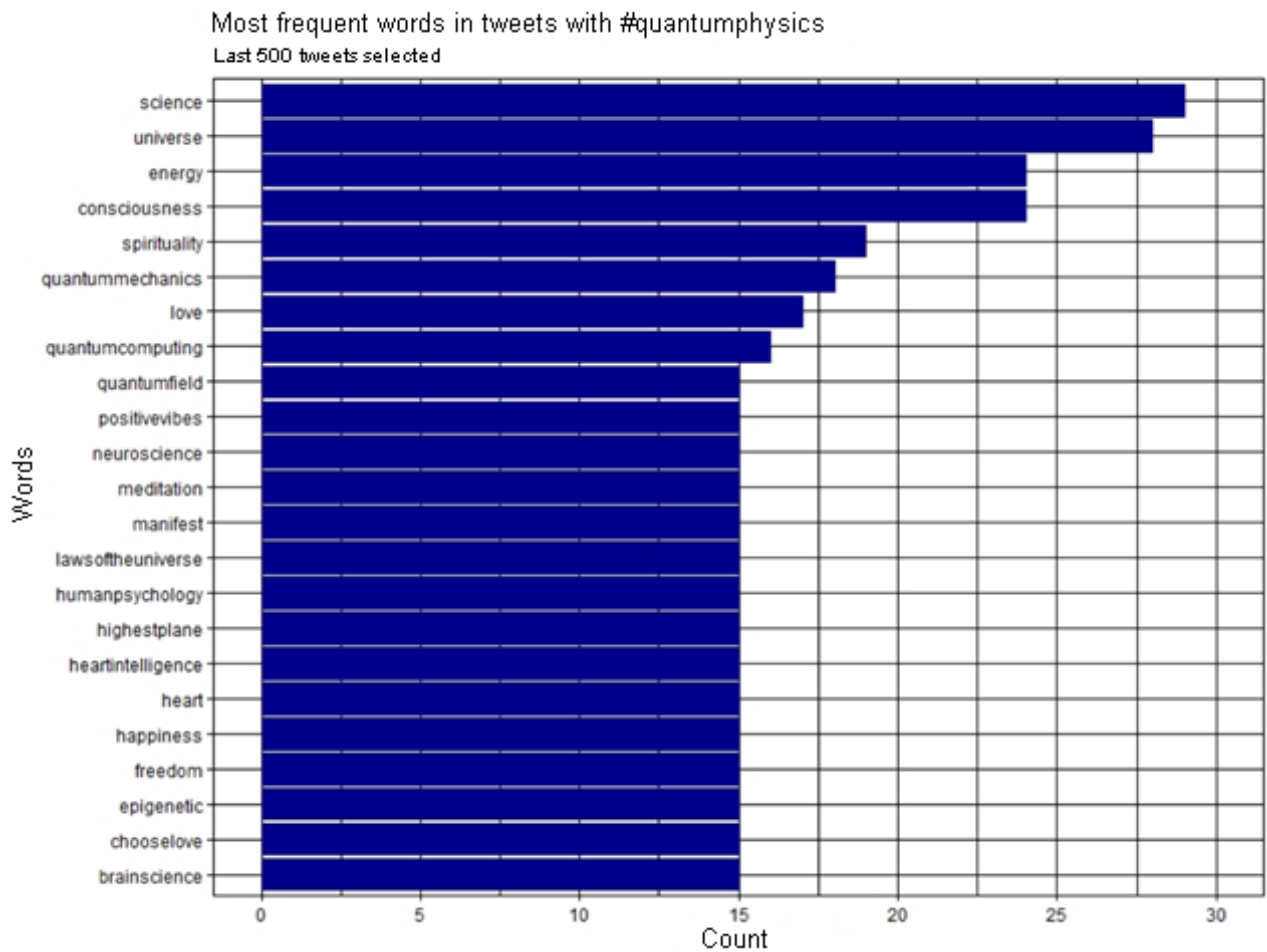


Image 2 – Most frequent words in tweets with the term quantum physics.

III. Theoretical-methodological framework

In this section, we bring a brief presentation of the Theory of Concrete Utterance (TCE) and of the Metalinguistic Interpretation (MI) in the Bakhtin Circle; a group of philosophers here referred to simply as “The Circle”. To do so, we orient the discussion by highlighting some key concepts such as act, utterance and speech genres based on the works of the Circle (BAKHTIN, 2002, 2010, 2011; MEDVIÉDEV, 2012; VOLÓCHINOV, 1981, 2018) and on several other works (LIMA *et al.*, 2019; MACHADO, 2005; SOUZA, 2002; VENEU; FERRAZ; REZENDE, 2015).

MI is the paradigm, the practice or the subject of analyses that seek to study the concrete utterance, to correlate concrete linguistic materials and, based on the application of a sociological method to the study of language, explain conflicts and correlations between utterances and theories. With it, it is possible to conduct studies on speech that seek to complement or even overcome, legitimately, the limits of linguistics, yet without ignoring it and still considering its possible analyses and results. TCE, on the other hand, can be understood as the conceptual basis for the analysis of language through the concrete unit of discursive communication, the analysis of the nature of utterances and the diversity of speech

genres in the various fields of human activity, established in texts such as *Speech Genres* (BAKHTIN, 2011). In this analysis, there is a dialectic synthesis that, opposed to the presuppositions of idealist subjectivism and abstract objectivism, can be understood in part as an image of Bakhtin's ethical-phenomenological vision (LIMA *et al.*, 2019; SOUZA, 2002).

On the definition of concepts, we start with utterances, which, as proposed by the Circle, are “the unit of speech communication”. Every utterance has as their main characteristics the communicative exchange between speech subjects (between speaker and listener, between speaker and interlocutor), the alternation between such subjects (the element that delimits the utterance) and belonging to a speech genre (relatively stable form of verbal communication). Other important characteristics are the belonging to a chain of other utterances (past and future) and the presence of semantic totality (subject, style, and compositional structure).

Every utterance is an act of discursive communication, in which the act is the integral and singular unit of single occurrence, determined by a social orientation and holder of an ethical and a phenomenological dimension. Among these characteristics, the alternation between speech subjects is the most important one since, in a way, it encompasses the others and can be understood as the convergence of three factors: the semantic and objectual exhaustibility of an object (amount of elaboration and effort when speaking about a certain object), the authorial intentions (the intentionality of an utterance that an interlocutor or listener identifies or recognizes), and, finally, the speech genre (archetypal compositional structure when creating utterances).

The discursive act represented by communication through utterances in the shape of a book is dialogical and can be analyzed under TCE and MI because, according to the Circle, all discursive communication is composed of active and responsible subjects; thus, even a reader's comprehension of a book is an active act. Furthermore, the utterance is not an individual act that can only be explained by the speech subject's mental processes. Similar to the act, the utterance holds dual responsivity: it answers to the world of life (the world of Being, the world of subjectivity) and to the world of culture, that is, the utterance is dialogical, interdependent and does not express only subjective characteristics, instead expressing (and being molded by) social aspects. The utterance is created in the articulation between the field of human activity in which the field of subjective expression of individuals is contained.

Thus, a subject who holds a privileged position to create or analyze an utterance does not exist, even if the utterance is about the subject themselves, because there is no judgement, argument or text that is capable of showcasing or describing the experience of Being or material reality in absolute, objective, and true terms. That is, there is no utterance that does not inherit the world views or the voices of other utterances and speakers and that is not oriented to an interlocutor who, by understanding and answering it, performs an act and creates a connection in the chain of utterances of discursive communication.

Comprehension and responsivity (the act of responding or referencing) of a concrete utterance are closely related to which speech genre it belongs to, that is, to which relatively stable and well-established category of utterances it belongs to. The identification of the speech genre through metalinguistic analysis contributes to the determination of the objective of a concrete utterance and of the field of human activity that contains it.

Finally, we would like to highlight the importance of the speech genres to the philosophy of the Circle, since they are, as previously stated, part of a group of factors that delimit the utterances and characterize the alternation between speech subjects. Every utterance must inexorably belong to a speech genre because the recognition of norms and contexts when we say something and answer to something is necessary. Therefore, these stable types of utterances may variably “restrict” the freedom the speech subject has when communicating and, in a certain way, make it impossible for communication acts to be completely subjective, in the sense that they represent exactly the mental processes of an individual.

IV. Metalinguistic analysis of Quantum Healing

In this section, we follow the analytic path of interpretation of concrete utterances stated in Lima *et al.* (2019).

The first stage consists of delimiting the utterance and its immediate context, thus identifying the alternation of subjects, the thematic content, and information about the author (from what place and time he speaks). The second stage allows us to identify the speech genre of the utterance by seeking to highlight the goals and conditions of the type of human activity in which this utterance is contained. In the third stage, we seek to analyze the direction and social orientation of the utterance, trying to understand to whom it is aimed at.

Afterwards, in the fourth stage, we focus on the responsivity of the utterance, that is, to whom and to what other speeches the analyzed utterance tries to refer or answer to. The fifth stage is that in which the style of the utterance (which manifests itself through lexical, syntactic, and phraseological choices) is analyzed.

Finally, in the sixth stage, we bring new discussions that seek the convergence of the previous results, to reveal our excess of seeing as researchers, that is, to present assertions that only our positions as speech subjects could provide.

IV.1 Utterances and their immediate context

The concrete utterance that is the object of our analysis is the book *Quantum Healing: Exploring the Frontiers of Mind/Body Medicine* – written by Deepak Chopra and first published by Bantam Books in 1989. In our analysis, we considered the utterance in its entirety, from the index card to the last page (and not utterances in particular, such as its

individual chapters) given that we understand that the reader is required to read the entire book for a full understanding or, more specifically, for a responsive understanding.

In other words, we identified that the alternation between speech subjects is only truly established in *Quantum Healing* with a full reading, because the exhaustibility of the theme does not happen in chapters or sections throughout the book, only at the end. Another important factor is that Chopra's authorial intentions extends themselves through all chapters and is only synthesized at the end of the second half of the book. Besides that, the speech genre to which the work belongs (discussed in the section IV.2) does not justify a partial or fragmented reading, because that does not align with the polishing that its utterances typically receive.

To delimit the structure of the utterance, we highlight that the book is composed of a brief introduction and fourteen chapters, organized in two main sections. The introduction works as a simple delimitation of the context in which the utterance was written, something we discuss in the section IV.1.2, and of its special interest in the role of healing in medicine.

In the first chapters of the first part of the book, Chopra narrates cases of “spontaneous cure” in individuals whom he met in his career or about whom he heard in his years of study. This part of the text is divided in chapters that deal with his belief on how there is a natural “consciousness” or “intelligence” in the human body, which is responsible for these cases and, afterwards, in chapters that deal with how modern medicine, specifically areas such as endocrinology and neurology, explains healing processes. In the final chapters of the first part, the author focuses on intertwining all the information given about endocrinology and neurology with some metaphors and with his personal interpretations of the fundamentals of QP, commenting on which could be the supposed philosophical consequences of QP in studies on healing processes.

At the start of the second part of the book, Chopra briefly interrupts the sequence of arguments mentioned until that moment to explain his reconnection to Indian culture. In these chapters, the author builds parallels between ancient ideas from Indian philosophy and quotes attributed to individuals such as Albert Einstein, as well as concepts and terms from the field of cosmology and from QP. With this, some reflections on the nature of reality in Chopra's holistic philosophy are developed in a section of the book that evidently relates to the theory that “*oriental religions would have reached the main ideas of modern physics*”, something that, according to Pessoa Jr. (2011) is relatively common in arguments from utterances associated with quantum mysticism. Finally, in the last chapters of the second part, Chopra presents his ideas about the origins of diseases in the human body, about how QP is supposedly associated with it, and about how it would be possible to follow the path of “quantum healing” that he proposes to establish a new type of medical approach.

In the following section, we present the analyses that explore the aforementioned delimitation of the utterance.

IV.1.1 Thematic content

Quantum Healing is a book that deals with, above all, “healing”; something that becomes evident at the very introduction, when “healing” is specifically presented as “one of medicine’s greatest secrets” (CHOPRA, 1989, p. 1). Themes such as “Ayurvedic medicine” and “quantum physics” are secondary because the utterance is strongly focused on informing the reader about ideas and reflections on the healing process in a broad sense of “holistic overcoming of physical and mental disorders”: overcoming cancer, AIDS, addictions, or bad habits, among other issues.

The concept that appears in the title of the work is certainly a relevant part of its thematic content, especially in the last chapters, and is defined in different ways through the text of the utterance. However, with all the information contained therein, this concept can be understood as a set of three Ayurvedic treatments labeled as “quantum” because Chopra argues that among the fundamental components of human reality and consciousness, there is a state of “emptiness” (or “silence”, in his words) through which the human body can perform “quantum leaps” that would lead to a state of healing. This argument can be understood as the manifestation of the premise that “*quantum physics would support alternative therapies*”, according to Pessoa Jr. (2011).

To strengthen the main thematic content, Chopra writes about other subjects, such as “memory”, “intelligence”, “quantum physics” and “cosmology”. These subjects can be considered as secondary themes in *Quantum Healing* not only due to their highlight when complementing the main theme, but also because they are used specially to create metaphors with scientific concepts.

IV.1.2 The author and the extraverbal context

Deepak Chopra was born in the second half of the 1940s in New Delhi, India, in a wealthy family with military tradition in the Indian Army⁶. His father was a renowned cardiologist and his basic education occurred at the famous St. Columba's School. Between 1968 and 1970, Chopra graduated from the All India Institute of Medical Sciences. Around the same time, he married his wife Rita Chopra and together they immigrated to the USA, where he was able to work without great difficulties, given that the country needed to recruit doctors to substitute those working in Vietnam war. During the 1970s, Chopra consolidated his studies and work in the USA; he did residencies, specializing in endocrinology and clinical medicine, became the head of staff at the New England Memorial Hospital and worked with private patients in Boston (BAER, 2003; CHOPRA, 1989, 1991; CHOPRA; CHOPRA, 2013)

⁶ More specifically, his paternal grandfather and his father served in the old British Indian Army. His date of birth is uncertain, as the author himself admits in one of his books (CHOPRA; CHOPRA, 2013) that his birth probably took place in 1946, yet he was registered in 1947.

Contrary to other prominent names in quantum mysticism, or more specifically, names in the “third stage” of quantum mysticism (PAURA, 2018), such as Fritjof Capra and Fred Alan Wolf – physicists who found some difficulties when working in traditional research institutions in the 1970s and 1980s (KAISER, 2011) – Chopra spent a long time in highly qualified formal spaces for education, (clinical) research and work. One may argue that medical professions would hardly have the same problems as the career of a physicist in the final years of the Cold War, yet this detail if his trajectory can still be considered as noteworthy.

In parallel to the context of stability of the medical profession in the US due to the war efforts, in the late 1950s, but especially since the 1970s, there is what we can describe as a “new Asian diaspora” in the Americas, mainly from citizens from South and Southeast Asia (ZONG; BATALOVA, 2016). The annexation of Tibet by the People's Republic of China and other local geopolitical events led to the migration of many Asian citizens, including the 14th Dalai Lama, to nearby countries (such as India) and later to the Americas (TU; DU, 1971). The sociocultural connection between Southeast Asia and the United States can also be represented by the popularity acquired at the time by individuals such as martial artist Bruce Lee, Buddhist authority Dalai Lama and the Indian guru Maharishi Mahesh Yogi.⁷

From 1980 on, Chopra's life starts to change. After reading a book on transcendental meditation, he started to reflect on his life, especially about his health and profession (CHOPRA, 2013). The author explains that he drank excessive amounts of coffee and smoked a pack of cigarettes per day, habits that he developed through the years due to stress, mostly in his work as a doctor, which he managed to quit via transcendental meditation (BAER, 2003. CHOPRA, 1989). Still in the early 1980s, in his usual trips to India, he (re)discovered cultural aspects of his homeland, especially Ayurvedic medicine⁸. From then on, his approach to a holistic health paradigm developed rapidly and, by the end of the 1980s, Chopra had already become disillusioned with modern medicine and endocrinology. He abandoned his position at the New England Memorial Hospital, formed a relationship with Maharishi Mahesh Yogi, established Ayurvedic medicine centers and associations and in 1989, Chopra writes *Quantum Healing: Exploring the Frontiers of Mind/Body Medicine*, one of his best-known books (BAER, 2003; CHOPRA, 1989; CHOPRA; CHOPRA, 2013).

Approaching alternative views of health in the late 1980s was not restricted to individuals like Chopra but was quite popular across the United States from the 1970s onwards; a phenomenon that can be associated with the fiscal austerity policies that began to establish that the US health system would be deeply linked to the private sector. In Ronald Reagan's administration, the United States experienced the aggressive and restrictive

⁷ Responsible for the development of transcendental meditation, a specific meditation technique that uses mantras silently.

⁸ A Hindu medicinal tradition whose practices and techniques that remain in use or that have been relatively modernized are often regarded as alternative medicine.

implementation of economic policies, dubbed “*Reaganomics*”, which hindered – and still does – the access of part of the civilian population to basic services, such as education and health, in a dignified, free, and universal way (CHAIT, 2008). Additionally, the Reagan administration is known and heavily criticized for being negligent with public health and especially irresponsible during the AIDS pandemic in the second half of the 1980s (FRANCIS, 2012). Chopra discusses AIDS in *Quantum Healing*, but evidently not to deal with economic or sanitary policies, but to promote and appeal to cases of “long survival” supposedly due to “habit changes” as examples of his theses about a natural “intelligence” of the human body (CHOPRA, 2013, p. 28, 54, 157, 294).

However, soon after this time, in the 1990s, Chopra became disillusioned again; this time, with Maharishi Mahesh Yogi and with the movement associated with transcendental meditation and distances himself from both, without clear explanations, yet he retains his focus on Ayurvedic medicine and on mind-body medicine⁹. During this time, he moved to the West Coast of the USA, specifically to California, and great controversies about his work and public life became frequent; several of those were brought to court (NY TIMES, 1996). As we commented briefly earlier, at this time, Chopra was involved with accusations of omission of financial interests for a co-authored article published in the *Journal of the American Medical Association* (JAMA, 1991; SKOLNICK, 1991). In addition to that, Chopra offered private care without proper medical license from the state of California under the explanation, given by an employee at *Sharp HealthCare*, where he was the executive director, that he did not formally see his patients as a physician at the clinic he established (PETTUS, 1995).

IV.2 Speech genre

To show to which relatively well-established speech genre *Quantum Healing* belongs to, we highlight the existence of pointed similarities between the textual structure of Chopra's utterance (compositional structure, lexical choices, and style) and the non-fictional literature of science communication. This highlighting, however, is done with caution, given that the little amount of technicality that is possible to find in some passages of the book can be completely unintentional and clearly has different levels of organization, quality, and depth. Similarities can be observed in the introduction to the book and in chapters such as “The Body Has a Mind of Its Own”. However, they are constantly accompanied by emphases on personal experiences and insights that appeal to emotion, by metaphors with the most diverse degrees of explanatory power, and by thematic content of controversial and “alternative” nature. As Warrier (2019) states, this emphasis on personal experiences and insights can be understood as a representation of the belief that the ultimate epistemological authority lies exclusively in the individual, in personal experience, that is, in the representation of an “epistemological individualism”, in which the voices of authorities must be evaluated and

⁹ Alternative medicine associated to a holistic paradigm of health.

mediated, basically “filtered” by the individual's personal experience. Thus, we consider it much more appropriate to describe *Quantum Healing* as part of the non-fiction literary genre of self-help.

It is from these characteristics that Chopra builds an utterance that dialogically uses scientific, religious, and psychological concepts in order to separate it from the stable and reasonably homogeneous character that these topics have in other speech genres, resulting in, as highlighted below, contradictory arguments in his concrete utterance that are not capable of actually synthesizing everything the author presents.

Finally, it should be noted that the speech genres of any prose books, even non-fiction ones, are secondary genres, that is, complex genres that arise from the act of creating utterances from cultural instruments (BRAIT, 2005). Consequently, *Quantum Healing* arises from the same type of act. In addition, we should also that “non-fiction” is a term that has become quite popular in the literary market, yet to this day it generates doubts and criticism (KEEN, 2015). However, it is popularly used to differentiate traditional literary products from products focused on personal development and self-help. Notwithstanding, the use of the expression has currently become quite widespread and, therefore, we believe it is necessary to introduce descriptors such as “science communication”, “textbook”, “self-help”, “biography”, among others to really establish a good understanding of the genre which we are discussing.

IV.3 Directing and social orientation

There are several ways of identifying to whom an utterance is addressed to and what is its social orientation. In this section, we start this identification through the analysis of the market of self-help books.

In the North American context, the demographic for the non-fictional literary genre of self-help is historically composed mostly by women (approximately 70%) who live on the coasts (MARKETDATA LCC, 2015). However, Nehring and collaborators (2016) state that the cultural phenomenon of self-help generally has a popular and *transnational* character due to its political-ideological (neoliberal) homogeneity, which enables its themes to spread easily throughout the world and among any individual who is drawn by personal development and well-being. The authors also reaffirm similarities found in other works on the dissemination and marketing of self-help in the USA, Great Britain, Mexico, Israel, Germany, the Netherlands, Brazil, and many other countries.

Despite the differences between self-help consumers in the 1980s and in the 2010s, there is a consensus about its demographic homogeneity which, in spite of fluctuations, has been increasing considerably in number of readers, rather than in the diversity among them¹⁰ (NEHRING *et al.*, 2016; MARKETDATA LLC, 2015). However, it is important to mention that the most notable works that define the profile of these consumers appear from the 1990s

¹⁰ For additional information and a different perspective on the analysis of the demographical characteristics of the consumers of self-help literature, we recommend Zhou's work (2017).

on, therefore, whether Chopra knew of all these variables or not remains unknown. In other words, it is entirely possible that “women living on the east and west coasts of U.S.” were not the demographic desired by Chopra, regardless of whether the author understood his work as non-fictional self-help literature or not. Notwithstanding, it is reasonable to assume that he had a notion or basic understanding of to whom his book was directed and who was truly reading it, with or without the research information that delimited the profile of his potential consumers.

For a true identification of the demographic and social orientation of an utterance, it is also necessary to consider its extraverbal context and addressing, clearly or not, in the text of the utterance. As commented previously, in the 1980s, Chopra's personal life underwent profound changes, among which we highlight the reconnection with his Indian cultural heritage and his habit changes which made him stop smoking, start practicing transcendental meditation and immerse himself in the world of alternative medicine, more specifically Ayurvedic medicine. This immersion clearly created in Chopra's conscience a need to disseminate and legitimate it to a wider audience. As the author himself states: “I was determined to show that this healing power was a science in its own right [...]. Yes, it would come. Indian thought has always been grounded on the conviction that *Satya*, the truth, alone triumphs” (CHOPRA, 1989, p. 3). We assert that it is highly likely that the intention was to reach a wider audience, and not specifically the scientific community, since, despite wanting to “demonstrate that this healing power was a science in its own”, Chopra clearly restricts the scope of his work by choosing to publish it in book form, without adopting a dissemination strategy focused on formal research spaces and without considering the principles of a rigorously academic text, for example, by not referencing adequately recommended bibliographies or mentions of primary sources¹¹.

As another example of how social orientation can be perceived by interpreting the concrete utterance and not simply by its extraverbal context, we can highlight how, from “A Personal Introduction” and the chapter “After the Miracle”, the reader is introduced to certain conflicts between arguments: in the introduction, Chopra denies the concept of “miracle”, claiming that he does not see the spontaneous cures of his past patients as miracles. This denial in the introduction of the book exists so that the reader does not feel uncomfortable with the possibility that the author (who initially presents himself as a doctor immersed in the biomedical and scientific paradigm of health) will stray from scientific themes and approaches. However, at the beginning of the following chapter, we read: “Several times in my medical career I have been privileged to witness miraculous cures” (CHOPRA, 1989, p. 9). This statement, which contradicts the first, works as a “dog whistle” or “silent whistle” for the author to communicate directly with readers who would naturally accept it in a non-conflicting way, or rather, who tend to ignore such contradictions and who would be more

¹¹ There are editions, especially the North American ones, which have a brief list of recommended readings, which are indicated more as similar texts than as materials for deepening the themes in question.

easily convinced by parallels and metaphors that omit or modify well-established scientific concepts and consensuses that are used later in the book. Evidently, this is an example of the anecdotal character right at the beginning of the work and, regardless of whether it is intentional or not, it is precisely because of this character and its place in this utterance that it exemplifies the contradictions present in the attempt to communicate through an utterance that seeks to hybridize the non-fiction literary genre of self-help with the non-fiction literary genre of science communication.

IV.4 Responsivity

Quantum Healing is an utterance that responds to several other past utterances, for instance, from individuals such as Maharishi Mahesh Yogi, Albert Einstein, Arthur Eddington, David Bohm, John S. Bell, among others. It is also responsive to utterances from the genre of scientific speech such as clinical research on hypnosis, meditation, and spontaneous cure. However, our responsivity analyses of *Quantum Healing* were focused on the concrete utterances that are more relevant to Physics Education: the concrete utterances of Arthur Eddington and Albert Einstein.

Although Chopra does not adequately reference the utterances which his interpretations are based on and respond to, it is possible, in a metalinguistic interpretation, to trigger the excess of seeing that we as the authors of this interpretation have so we can conduct the appropriate analysis.

About the mentions of Arthur Eddington, for example, we recognize that his work, in addition to its didactic value, is recognized for mentioning an “unknown” type of content in “Nature” that would be related to “Time” and “Truth”, when discussing philosophical implications of the "New Quantum Theory" for the clash between QP and Classical Physics in solving the problem of light propagation:

A quantum action may be the means of revealing to us some fact about Nature, but simultaneously a fresh unknown is implanted in the womb of Time. An addition to knowledge is won at the expense of an addition to ignorance. It is hard to empty the well of Truth with a leaky bucket (EDDINGTON, 2007, p. 115).

However, an exaggerated focus on Eddington's metaphysical reflections, as Chopra does, may overshadow some clarifications that the author himself makes to his readers in the same chapter, but before delving into reflections such as the one mentioned previously:

From time to time physical discoveries are made; and new entities, coming out of the unknown, become connected to our experience and are duly named. But to leave a lot of unattached labels floating in the as yet undifferentiated unknown in the hope that they may come in useful later on, is no particular sign of prescience and is not helpful to science (EDDINGTON, 2007, p. 111).

Regardless, we consider it reasonable to state that, based on the aforementioned excerpts and on several others (EDDINGTON, 2007, p. 130-135, 146-147) Chopra frequently tries to be responsive to reflections that permeate the work “*The Nature of the Physical World*”, without reproducing or mentioning Eddington's arguments on the illusory and unproductive character of such ideas.

On the mentions to Albert Einstein, for example, the affirmation in parenthesis and without proper references, that “Einstein considered himself deeply spiritual” (CHOPRA, 1989, p. 160), we recognize the existence of several ways to analyze it. However, by focusing on an interpretative strategy of mediation and skepticism, it becomes clear how reductionist Chopra's interpretation on the way Einstein saw himself is. Max Jammer (2000), for example, demonstrates how the complex ethnocultural influences of a Jewish heritage and of conflicting sociocultural beliefs radically transformed Einstein's thinking countless times throughout his life.

In line with this, when we explore Einstein's concrete utterances, we find more complex and careful opinions than simply recognizing oneself as “deeply spiritual”; we even found statements that are essentially contrary to that, such as his express preference of being recognized as “agnostic” (CALAPRICE, 2011, p. 340). If Einstein ever came close to such a claim, it was something that clearly occurred in a specific context and due to his ideas on a “cosmic religion”; a metaphysical belief about religiosity that does not involve an anthropomorphized idea of god, but that is based on a well-founded trust in the concrete, “physical” unity of the universe (EINSTEIN; SHAW, 2009). As Einstein was a true *Kulturträger*, “a bearer of culture”, it is difficult to delimit which utterances Chopra tries to be responsive to, however, we believe we have offered sufficient reflections on the origins of these questionable interpretations.

It should not be unmistakably wrong to state that Chopra's responsivity to Eddington and Einstein is an inadequate materialization of an argument that appeals to authority. It is evident that, especially due Chopra's disregard of proper crediting and referencing, the appeal to authority exists simply because of the credibility that the author attributes, and sees being attributed, to the two aforementioned scientists. Chopra seeks to mobilize such credibility to strengthen the arguments in his utterance, ignoring the fact that both Eddington and Einstein are not authorities in the fields of medicine or spirituality, much less of alternative medicine, and that both had fundamental but considerably specific contributions to the fundamentals of QP.

IV.5 The style

In a metalinguistic interpretation, the analysis of the style of a concrete utterance requires the identification of lexical choices, that is, the sets of words used and their functions. To do so, we illustrate Chopra's most frequent lexical choices in *Quantum Healing* in Table 1,

elaborated through text mining, to present a selection of words used in the book more than forty-five times, in the Portuguese translation.

Table 1 – List of the most used words in *Quantum Healing* in decreasing order, translated into English.

word	frequency	word	frequency	word	frequency	word	frequency
body	380	cell	105	point	70	capacity	55
being	349	patients	104	normal	69	chemistry	55
can	290	people	100	ayurveda	68	physics	53
mind	246	system	100	truth	68	idea	53
cancer	199	part	95	day	67	interior	53
time	195	case	94	man	65	memory	53
brain	171	fact	91	doctors	64	moment	53
you	166	nature	90	perception	64	simple	53
dna	164	shape	89	heart	63	science	52
life	162	field	86	molecules	63	place	51
cells	161	way	86	organism	63	adventure	49
years	149	big	84	rishis	63	energy	49
intelligence	146	matter	82	hundred	62	cause	48
illness	140	treatment	82	person	60	meditation	48
reality	132	space	77	pain	59	chemistry	48
patient	131	level	76	example	58	human	46
cure	124	consciousness	74	blood	58	immune	46
doctor	123	experience	74	substances	58	void	46
quantum	122	process	74	thing	57	bigger	45
world	119	thought	72	environment	56	thoughts	45
medicine	118	light	70	thinking	56	signs	45

It is equally important to identify the semantic choices that follow the lexical choices. As an example, the term “level” happens frequently, because it is associated to the concept of “quantum level”, similar to the term “body”, that appears frequently not only because the book deals with “mind-body medicine”, but also because one of its central concepts is “quantum mechanical body”. “Intelligence” and “memory” are words that happen with considerable frequency, especially because Chopra assigns different meanings to them from his worldview based on alternative medicine. These characteristics are not only descriptions of the function that such words have, but also of the new meanings they mobilize (in this case, metaphorical meanings in relation to scientific concepts) and, therefore, become examples of semantic choices.

To strengthen our argument that the fundamentals of QP should not be considered as the main thematic content of the book, we emphasize that, when developing Table 1, all variations of the word “quantum” (in Portuguese, “quântica”, “quântico”, “quânticas” and “quânticos”, with variations in number and gender) were replaced by “quantum” and, even with this strategy, we obtained a resultant frequency lower than that of terms, such as “time” or “DNA”. “Cure”, the element that we identified as the main theme, appears few times more

than “quantum”, yet similar terms (“treatment”, “medicine”) and words strongly related to the message of overcoming physical and mental disorders (“disease”, “cancer”) appear very frequently and demonstrate the accuracy in identifying the theme of the utterance.

Some of the most frequent words work basically as a shortcut in the communicative act between the speaker and their audience. The word “light”, for example, does not happen often simply because Chopra discusses its nature and mentions the wave-particle duality: its repeated use is due to a popular association, not completely unreasonable, between “light” and the word “energy” which, in turn, is often interpreted not through different scientific conceptualizations, but through holistic and alternative conceptions (GUERRIERO; STERN, 2017).

Regarding the phraseological choices and the compositional structure of the utterance, we emphasize that, in “A Personal Introduction”, the presentation of several of the initial stylistic elements of utterances from the non-fiction literary genre is quite disordered. The utterance brings sentences delineating the theme, descriptions of personal experiences, establishments of work premises, mentions of professional experiences, characterizations of the philosophy that is the basis for most of the work (Ayurvedic medicine), and the composition of (something similar to) “research problems” or “guiding questions”

The first part of the book, "The Hidden Physiology", is where the entire style is focused on hybridizing or rather interspersing sentences that, on the one hand, describe factual evidence about "spontaneous cures" with sentences that, on the other hand, describe the author's and his patients' relatively personal experiences through the focus on the concepts of “memory” and “intelligence”. Chopra shows the reader the conclusion that these cases of cures cannot be understood as eventualities, such as, when he states that:

When a blood cell rushes to a wound site and begins to form a clot, it has not traveled there at random. It actually knows where to go and what to do when it there, as surely as a paramedic-in fact, more surely, since it acts completely spontaneously and without guesswork (CHOPRA, 1989, p. 37).

There is a pattern that repeats itself in the style of the utterance, not just during the first section of the book, but especially in the conclusions of the chapters: the more extraordinary claims are made, the more metaphors are used; meanwhile, less scientific, or minimally factual evidence is presented. Evidence and facts are more frequent at the beginning of chapters and generally do not adequately correspond to the level of explanation required by Chopra's claims. Chapter 2, “The Body Has a Mind of Its Own” (CHOPRA, 2013, p. 31-50), adequately represents this pattern.

In the second and last part of the book, "Body of Bliss", it is definitely established that, in Chopra's worldview, spontaneous cures happen because the human body is essentially its consciousness (which is always connected to the aforementioned concepts of “memory” and “intelligence”). Consciousness, in turn, is essentially “quantum” given that, for the author, us humans “*are like a light radiating not photons but consciousness*” (CHOPRA,

1989, p. 203). That is, human beings, or more specifically the “quantum mechanical body” supposedly has something that acts as its “mediating particle”, the consciousness, which, like the photon, has a mysterious and dual nature that defies notions of cause and effect; something that the author already tangentially established in the first part of the utterance when he stated that “[*there is*] no straight-line connection between a nonmaterial thought and a material object, even one as small as a peptide molecule” (CHOPRA, 1989, p. 93).

IV.6 Discussion

It is important to reiterate that, perhaps not surprisingly, Quantum Physics is not the main theme in the analyzed book and even less so a fundamental part of the concept of “quantum healing”. That is, there is no concrete relationship between the book's main thesis and the mathematical formalisms of QP or the rules that researchers use to create correspondences between empirical phenomena and equations of physical theories. When Chopra uses a metaphor that tries to justify or explain the “quantum” aspects of his theory of healing, there are no mentions to elements such as axioms or the mathematical elegance of Paul Dirac's bra-ket notation. There are no references to the correspondence rules of QP, except for passing mentions to the Bell theorem. There are also no proposals or evaluations of possible experimental arrangements to assess his ideas because, as the author himself states:

Because quantum physics works with ultrahigh-speed accelerators, you may think that quantum healing uses radio-isotopes or X rays. But that is the opposite of what it means. Quantum healing moves away from external, high-technology methods toward the deepest core of the mind-body system (CHOPRA, 1989, p. 18).

When Chopra's utterance mentions and reflects on the fundamentals of QP, the created arguments serve as a way to turn the concept of “quantum” into a simple *commodity* (that is, into a simple product of intellectual labor that can be commercialized without restriction) that adds value to the goods and services that the author offers (books, lectures, mentorships, aesthetic products) through the Chopra Foundation and his personal website. To classify this process of turning the concept of quantum and other aspects of the fundamentals of QP into marketing products, the work of Burwell (2018) uses the term quantum commodification.

If there is any kind of genuine relationship between Chopra's speech and QP, it falls within another important element of any scientific theory: interpretations; in this case, from the fundamentals of QP. That is, in the occasion that we can really consider the existence of a relationship between quantum healing and QP, it exists only with regard to theses connected to abstract formalisms and correspondence rules; elements that offer a greater explanatory power for theories. More specifically, the relationship could be with the ontological consequences on the nature of reality and, to a lesser degree, with the epistemological consequences of some interpretations of QP especially discussed by individuals such as Arthur Eddington and David Bohm, who Chopra makes a point of quoting indirectly, without

ever indicating the primary source from which he extracted the utterances of these scientists, revealing authorial intentions that seek to persuade through the appeal to authority.

Despite this, we consider it much more accurate to interpret *Quantum Healing* as an alternative theory, that is, as a group of ideas with a great possibility of distancing itself completely from the original scientific theory to which it refers. The category of alternative theories we use here can be understood as any set of abstract formalisms, correspondence rules, or interpretations that predicts new results and empirical data (in Chopra's case, there are his predictions about how the mind influences the health of the body through its supposed quantum essence) or that explains such results and predictions by mobilizing concepts with different meanings in relation to their scientific origins. Alternative theories are often related to “modifying” interpretations of scientific concepts because they depend on alterations or omissions in the components of the original theory. Furthermore, it is possible to interpret *Quantum Healing* not just as an alternative theory, but as a group of ideas with a dangerous potential for misinformation. For example, by transforming popular terms among the scientific community, such as “Planck scale” or “Planck length” into “quantum zone” or “quantum level”, Chopra completely ignores that the Planck unit system, to which the first terms are associated, has considerably specific meanings, especially related to what types of physical phenomena can be mostly observed from certain time intervals, lengths or amounts of energy, as well as to the scale at which the ways of describing subatomic phenomena that we currently know become inadequate or incomplete. By ignoring this, the author reduces these concepts and confuses them with some terms that would describe length and energy scales in which quantum phenomena take place.

More specifically, we can show how Chopra uses the terms “wakefulness”, “state of consciousness”, “subjective awareness” and “positive” or “negative mood” as metaphors for the concepts of “energy state” and “unified field” (CHOPRA, 1989, p. 207). The properties related to the concepts of “intelligence” and “memory”, which the author sees in the human body, are manifested in these “states” and also in the “quantum level”. Based on these ideas, the author seeks to establish the need to recreate the common sense regarding what “body” is. The term the author considers appropriate for this is “quantum mechanical body”.

The “quantum mechanical body” has few concrete connections to QP, being instead closer to Chopra's interpretation on the state of the art of medical knowledge on neuropeptides in the 1980s. Chopra believes that the dual nature of the phenomenon that turns thoughts into biophysical reactions (that are therefore reflected on corporeal acts) and vice-versa is exactly the same nature that the scientific community describes when dealing with the wave-particle duality. When we say “exactly”, we are not exaggerating the author's argument:

*The neuropeptide isn't a thought, but it moves with thought, serving as a point of transformation. The quantum does **exactly** the same thing, except that the body in question is the universe, or nature as a whole (CHOPRA, 1989, p. 91, highlight by the authors).*

Chopra's argument in this quote can be partially understood as a result of a type of misleading inductive thinking, in which “if x does z, and if y does z, then x has exactly the same nature as y”, and this is essential to the way in which he generates his metaphors and references to QP. We highlight this because we defend the hypothesis that through the understanding of how the author creates his arguments and references the fundamentals of QP, we can see the real differences between scientific knowledge and the knowledge about which Chopra speaks.

Despite being closer to the concept of “neuropeptide” than to “quantum”, the idea of “quantum mechanical body” can also be understood as a defense of theses, according to the proposal by Pessoa Jr. (2011), such as those that state that “*Consciousness is an essentially quantum phenomenon*” and “*In the dualism between soul and body, the interaction between the two happens through quantum processes*”, with the remark that instead of “soul”, Chopra prefers to focus on the concepts of “consciousness”, “memory” and “intelligence”.

As we tried to demonstrate in this section, it is important to understand how the content of *Quantum Healing* turns this utterance into something completely different from formal philosophical discussions on the fundamentals of QP. However, as we tried to demonstrate in previous sections, it is also essential to clarify, for students and even for professors who are not familiar with the work, what are the historical and material conditions that gave rise to the book and sustained it as an utterance of long-lasting influence in the public debate.

V. Final considerations

In this paper, we sought to build a metalinguistic analysis of how Deepak Chopra, based on his professional training as a physician and on his cultural background as a promoter of mind-body medicine during a *zeitgeist* that was significantly favorable to his ideas (as discussed in section IV.1.2), constructed a concrete linguistic material that deeply infused itself in popular imagination, *Quantum Healing*, focused on the idea of “cure” as “holistic overcoming of physical or mental disorders” (section IV.1.1). We also sought to demonstrate how Chopra contributed to several changes in the way people use concepts from Quantum Physics in daily communicative acts on the internet (section II). His non-fictional self-help work (section IV.2) is directed to a specific audience, but with a popular and “transnational” approach (section IV.3) that uses arbitrary references to concepts by individuals such as Arthur Eddington, Albert Einstein, and Maharishi Mahesh Yogi (section IV.4) All of this is done through a style (section IV.5) in which concepts such as “intelligence”, “memory”, and “body” are redefined and used excessively, based on inconsistent mixes of mystical and alternative worldviews (Ayurveda and mind-body medicine) and scientific worldviews (Modern and Contemporary Physics); in which the author does not avoid incoherent metaphors and grave contradictions, often highlighting them.

His interpretations on the fundamentals of QP consists mostly of defending the existence of something essentially “quantum” in the human body, in its biophysical workings and in a supposed “transcendental” or purely “immaterial” component that exists in every person, in a way that is superficial and tangential to Physics. These conceptions are so well-known and criticized that Osvaldo Pessoa Jr. opens his classic paper on quantum mysticism with a clear attempt to "demystify" them through an analogy that might be an efficient counterpoint:

To explain how a bicycle works, for example, it is not necessary to use the Quantum Theory, even though it can be argued that, in principle, a quantum description of the bicycle is possible. Thus, we can say that quantum physics is not “necessary”, it is not “essential” to explain a bicycle, in the sense that classical physics provides a good enough explanation for this means of locomotion (PESSOA JR., 2011, p. 281).

Instead of being perplexed when we hear from our students or colleagues any mention of “quantum” products, we can use this analogy. With it, we can contribute to the understanding that no product or service such as a mattress or health treatment, for example, that is of good origin (coming directly from official research and development institutions, for example) would necessarily need to be explained, manufactured, or completely reworked by Quantum Physics.

The Education field has for years been discussing the need to establish epistemological foundations and to address Modern and Contemporary Physics more in basic education and in different stages of higher education. However, the MCP that is present in textbooks or in traditional educational methodologies hardly provides the necessary conditions for students to take a stand on topics such as the one discussed in this paper. Therefore, we reinforce the need of teaching MCP that aids the understanding of sociocultural issues, as it is highly likely that students encounter these themes, both during in their education and after it, and as specialists in Science Education, we are considerably responsible for the ways in which books like *Quantum Healing*, and especially the ideas and cultural phenomena it represents, will be understood and assimilated, since it is precisely the kind of knowledge we teach that this work tries to relate to.

We also defend that the Educational Research should contribute not only to technical knowledge, but also to the development of a broader culture that allows students and teachers to understand how concepts and theories are reinterpreted in different contexts, and the inclusion of topics and approaches related to the Nature of Science and to the History and Philosophy of Science serves just that. These topics and approaches frequently require discussions on the demarcation problem (differentiating what is valid scientific knowledge from what is not). However, it is to provide a consistent educational and scientific development that, based on the foundations and contemporary epistemological consensus, it is necessary to show clearly to students not only the thematic content of what we do not consider scientific, but also its sociocultural dimensions. In the case of *Quantum Healing*,

which tries so clearly to approach the foundations of QP and its legitimacy, but is arguably not the result of scientific work, we have an utterance that is considerably adequate for these discussions. That is why we sought to highlight through a metalinguistic interpretation not only what the work says, but how it says it, to whom it responds and to whom it says it. This is how we defend that a set of ideas as controversial as Deepak Chopra's *Quantum Healing* can be approached by professors, showing not only what is different, but where the difference comes from, what is its structure and style and how it circulates in society.

Therefore, as an alternative or complement, what we can do specifically in the field of Science Studies and Science Education is to continue investing in reflections on the limitations of human perception and of our immediate experiences, governed by Classical Physics, as well as on their influences on how we communicate in light of the conceptual and philosophical development of Quantum Physics, as did Werner Heisenberg (1995, 1996), Erwin Schrödinger (1997), Niels Bohr (1995), Fritjof Capra (1989) and many others through different approaches (BURWELL, 2018; FREIRE JR., 2015; FREIRE JR.; PESSOA JR.; BROMBERG, 2011), vigorously seeking to expand the sociocultural reach of these reflections. We can even go further, recognizing the need for a philosophical framework that is capable of encompassing our models and representations, which exist in a language based on Classical Physics, as well as our knowledge of Quantum Physics and other knowledge of modern sciences (CAPRA, 1989; SANTOS, 2008); a philosophical framework that does not deny or omit the conceptual, philosophical, and sociocultural development of the most diverse areas of knowledge and that is capable of analyzing concrete linguistic materials, even alternative knowledge, in an ethical, phenomenological, historical and sociological way that is constantly evolving. We hope to have made clear the usefulness of this alternative by presenting discussions that not only facilitate empathy with individuals who happen to be familiarized with Quantum Physics only in a tangential and superficial way, but also facilitate the pedagogical overcoming of these narrow understandings.

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