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SOCIETY IN TRANSFORMATION: TRENDS AND IMPACTS

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Society in transformation: trends and impacts

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PRESENTATION

We live in an era of constant and profound transformations, where social, cultural and economic dynamics are intertwined, shaping a new reality. The book **Society in Transformation: Trends and Impacts** brings together a collection of articles that seek to understand this unique moment of change. More than a specific study, this book is an invitation to reflect on the paths that societies are taking and the consequences of these trajectories.

This book is not just for researchers and academics. It is a call to all those who wish to understand the phenomena that shape our times. Students, professionals from different fields and anyone interested in reflecting on the world around them will find this an enriching read. Each article offers a different perspective on the trends that influence the way we live, work and relate to each other, revealing how the major themes of our time - such as technology, globalization and climate change - impact on everyday life.

Throughout the chapters, we will explore the challenges and opportunities brought about by these transformations, with an accessible and comprehensive approach. In doing so, we hope not only to enlighten, but also to inspire new ways of thinking and acting, helping each reader to see their role in an ever-changing society through a new lens.

SUMMARY

CHAPTER 1

THE LETTERS REVEAL – ANALYZING THE EIGHTEEN HUNDREDS THROUGH CORRESPONDENCE

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ABSTRACT: The study of mail allows a detailed analysis that otherwise would escape the comprehension of historiography. The objective of this work is to analyse the behavior of a coffee grower from the the Valley of the Paraiba in Rio de Janeiro State, Manoel Antonio Esteves, from 1845 to 1879, who corresponded with several people and preserved this material. From the letters received and sent, through microanalysis, we can understand a little of the reality of the Brazilian eighteen hundreds, with especial emphasis to family matters, the creation and maintenance of social networks, and the political culture that characterized the area focused here. Letters are documents that are still little explored in historiography, however they keep information capable of reproducing new interpretations of an epoch. They may furthermore reveal a lot about the long nineteenth century in Brazil.

KEYWORDS: mail, social networks, family.

RESUMO: O estudo das cartas permite uma análise detalhada que de outra forma escaparia à compreensão da historiografia. O objetivo deste trabalho é analisar o comportamento de um cafeicultor do Vale do Paraíba no Estado do Rio de Janeiro, Manoel Antonio Esteves, de 1845 a 1879, que se correspondeu com diversas pessoas e preservou esse material. A partir das cartas recebidas e enviadas, por meio de microanálises, podemos compreender um pouco da realidade oitocentista brasileira, com especial destaque para as questões familiares, a criação e manutenção das redes sociais e a cultura política que caracterizou a área aqui focalizada. As cartas são documentos ainda pouco explorados na historiografia, porém guardam informações capazes de reproduzir novas interpretações de uma época. Além disso, podem revelar muito sobre o longo século XIX no Brasil.

PALAVRAS-CHAVE: correspondência, sociabilidade, família.

1. INTRODUCTION – LETTERS AS HISTORICAL SOURCES

Can personal letters be considered as historical sources? If so, to what extent can the information contained in it be valid for historical research and how can it be used? And, still, in the case of the eight hundred Brazilians, where the frontier between the public and the private was broken in not rare opportunities, how to separate merely personal information from that which may come to reveal something interesting for the work of the historian? As can be seen, the study of correspondence presents a series of inquiries that, nevertheless, go so far as to arouse a growing interest in the field of historical research, precisely because of the wealth of information that can be obtained in this peculiar type of source.

At the very beginning of the introduction of his work, Renato Lemos (2004) points to the more than forty-five expressions "in which the word `carte' is present" in one of the most consulted dictionaries of the Portuguese language, placing though that such presence is even more generalized "than the lexicographers manage to capture", even incorporating noble references, such as carta magna, carta regia and others, as well as prosaic ones, such as carta branca, "*carta aberta*" and others. But the so-called personal letter, defined by the author as something of the most trivial, is a vehicle of individual and restricted communication, written not for general knowledge or publication. And, even with technological development, which went from the telephone to e-mail and other communication networks, the letter is still something that presents a special fascination that goes from nostalgic romanticism to the scientific curiosity of the historian who analyzes the moment in which it was produced and the circumstances that surrounded it, passing, as Renato Lemos himself says, through voyeurism. After all, scrutinizing letters from others is an act resulting from this fascination exercised not only by correspondence but also by other types of personal papers such as diaries and notebooks. "Each card is jewel brimmed by the hand of the demanding goldsmith" (Abreu, 2002, p. 9). Lucien Febvre points to the vast sources available to the historian for his work (Febvre, 1953), going beyond traditional written documents, and states that "history is made with written documents, when they exist" (*In*: Cadiou *et al*., 2005, p. 120). But it can and must also be done with all the ingenuity of the historian. Letters, despite written sources, were not used as historical documents until recently. At most, they were regarded as secondary material. However, they reveal themselves as an instrument that demands all this ingenuity from the historian, for the complexity of the information that they contain, often hidden through codes or signs that it is up to the researcher to decipher, or, in the words of Marc Bloch, "... the texts or archeological documents, even the apparently clearest and most complacent, speak only when we know how to question them" (Bloch, 2001, p. 79).

The letter is something that, besides bringing people together, can reveal something about them and even about who receives them. It also makes it possible to evaluate the intensity of the relationship between them. "Focused on packs of letters of various temporalities (...), researchers from different countries and disciplinary traditions bring important contributions to the understanding of written culture" (Bastos; Cunha; Mignot, 2002, p. 6-7). In historiography, they already have the status of a document. "The ordinary correspondence, long abandoned on the side nave of history, also acquired the status of a document" (Idem, 2002: 75-76). According to Renato Lemos, "as a source, the letters concern what contains indicative information about the person, in the position of sender or receiver, and their circumstances" (Lemos, 2004, p. 18).

2. OBJECTIVES

Understand the letters as historical sources necessary for an understanding of a given historical period, in particular issues concerning private and social life.

In addition, demonstrate how the study of correspondence can reveal aspects that are not clear or defined in traditional documentation.

3. PRESENTATION OF THE MATERIAL ANALYZED AND THE CHARACTERS INVOLVED

The epistolary documentation that we are dealing with now constitutes an extremely vast collection with varied about the customs, attitudes and rules of behavior of the eighteenth century society of the Paraíba Fluminense Valley, a society that was guided by the construction of networks of sociability that sought to maintain power in the hands of a social group, namely the landowners, among others, this group to which our key personage, Manoel Antônio Esteves*, came to be part after a period as a prosperous businessman. The analysis of his correspondence reveals a series of pieces of information about his behavior, but not only: it also demonstrates the behavior of society in which he was inserted by the marriage with the daughter of a coffee grower, a Portuguese like himself, and, next, the construction of networks and strategies for power.

The epistolary material can be classified in different ways. Tiago Miranda, for example, quoting Heinecke, seeks to organize a classification. He tells us:

> With regard to the various types of letters, Heinecke tries to show that they form two main groups: on the one hand, those of a erudite nature, subdivided into philosophical, mathematical, philological, critical, theological, juridical and historical; on the other, family letters and those of `ceremony' (elaborationes). In this case, the former are intended for the conversations of momentarily separated individuals (inter absentes colloquium); the latter have their origin in a more specific purpose: according to him, they can be, for example, congratulatory, petitioner, commendatory, condolence or thanksgiving (Miranda apud Galvão; Gotlib, 2000, p. 53).

The correspondence of Manoel Esteves fits into the second case, being, a good part of them, familiar but, above all, of "ceremony". In this case we include those received by coffee commissioners, politicians, society figures and others. In a smaller quantity, but no less significant, one can find letters from Manoel Esteves himself, sent to the children who were studying in Rio de Janeiro and some of his wife, Maria Francisca, also for the children. It is the so-called self-writing, treated by Ângela Gomes, which arouses an increasing interest on the part of readers and historians, indicative of the documentary capacity of this kind of source. The author states that:

> Thus, one's writing practices can show very clearly how an individual path has a path that changes over time, which follows through succession. They can also show how the same period of a person's life can be ‘decomposed’ in times with different rhythms: a time at home, a time at work, etc. And this individual, who postulates an identity for himself and seeks to record his life, is no longer just the ‘great’ man, that is, the public man, the hero, who was allowed to leave his memory by the exceptionality of his deeds. To the extent that modern society has come to recognize the value of every individual and has made available instruments that allow the registration of his identity, (...)

* Manoel Antônio Esteves was born on September 27, 1813, in the Freguesia do Merufe, region of Rio Minho, north of Portugal, Termo da Monção, Archbishopric of Braga, being the legitimate son of Lourenço José Esteves and Domingas Gonçalves. It is not known, however, the exact date on which he came to Brazil and nor the reasons that brought him here, but, by the dates of the first letters found, already in 1845 he was established in the Parish of Nossa Senhora da Conceição da Vila de Vassouras with commercial house.

> it has opened up space for the legitimacy of the desire to record the memory of the `anonymous' man, of the `ordinary' individual, whose life is made up of day to day happenings, but no less fundamental from the point of view of the production of self' (Gomes, 2004, p. 13).

Manoel Esteves was not exactly an ordinary man. On the contrary, he stood out in the context in which he lived. However, his letters show certain personal details, intimate until, dissociating the head of the family from the public man, they present a father concerned with the formation and education of his children, with the maintenance of the good name in society through the payment of his debts and other characteristics that frame him, certainly, in this situation of the common and anonymous individual who, however, left part of his intimacy preserved in the texts he wrote and in the letters he received. By imposing himself in the face of a society different from the one in which he left, he managed to place himself in front of a political culture that was organized by well defined criteria of an aristocratic order and that was based on the possession of lands and slaves, generating a society of individuals who were looking for profitable alliances for themselves. It was this society that, in spite of structuring itself in the power of some individuals, closed to the great majority the possibility of affirming themselves as such, even those not slaves, which comes to highlight even more all the "scheme" used by Esteves, and which is revealed through the analysis of his correspondence, to assert itself and to stand out. In short, a well-structured master and slave society in terms of preventing thousands of men, through slavery, from using "the first of the indispensable requirements for action and the definition of individual interests: freedom" (Prado, 2001, p. 163-164). Since "sociability is another important dimension, in the perspective adopted for its relevance to political life" (Carvalho, 2007, p. 12), the strategies used by Manoel Esteves can easily be understood from his correspondence. In several of the letters we found respectful references used by several of the coffee commissioners who had business with him. Among these, we highlight two for their importance and periodicity of correspondence: the Viscount of Condiz[*] and Netto dos Reys[*]. The second

[*] João Maria Colaço de Magalhães Velasques Sarmento (1806-1871), first Viscount of Condiz, was a nobleman-knight of the Royal House, peer of the Kingdom, Commander of the Order of Our Lady of the Conception of Vila Viçosa, Knight of the Tower and Sword, Commander of the Order of the Rose in Brazil, administrator of the bond of Colaces in the field of Coimbra, dealer of gross treatment in the square of Rio de Janeiro, capitalist and great owner in Portugal. The title was granted in 1851 by Maria II.

[*] The family of the Netto dos Reys, of the Barons of Carapebus, had great influence on local politics in the region of Campos dos Goytacazes and was linked to a branch of the Nogueira da Gama. On such links see: Martins (2007).

contains the largest number of letters available – 175 and, of the first, 24. Esteves began to structure, from his marriage in 1850, an intricate network of sociabilities, connecting himself, besides his wife's family, from which he started to manage business for a time, to several other elements.

Marriage was one of the first strategies used by him, probably the main* one. Before, however, during the period in which he was established in Vassouras, he already had business with important landowners, as brothers Pedro and Laureano Corrêa e Castro, Baron Tinguá (in 1848) and Baron Campo Belo (in 1854), respectively, members of prestigious family in the aristocratic Vassourense society. He was, by this time, a merchant and usurer, trade being one of the favorite activities, as is already known, of the Portuguese immigrants, even in areas of agricultural frontier. After his transfer to Valença, and with his affirmation as owner of lands and slaves, a factor that projected him in the so-called "good society", we began to contextualize other forms of sociabilities, through links with important figures, among which stands out the friendship with Councilor Zacarias de Góis e Vasconcelos*, of which there are 6 letters; with local farmers and politicians, among which we find the Marquise of Valença, widow of Estevão Ribeiro de Rezende*, of which, besides a letter, we find references in several others about the fact that Esteves was taking care of business in the farms of it during his absence and even when she was in the region; the concern, already mentioned and shared by the family, in the formation of the children, sent to study in Rio de Janeiro. The elder, Francis, in one of his letters to his father clearly says that it is through study that he will "belong to society". Later on, the same part went to Pernambuco, with letters of reference from Zacarias de Góis e Vasconcelos, to study law, which proves what Tânia Bessone said:

> Many families had a tradition of sending their children to law schools as a way of allowing them to rise up in society or to create for them a vehicle of prestige, which

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* Manoel Esteves married on 4 October 1850 in the parish of Nossa Senhora da Glória de Valença Maria Francisca das Dores, legitimate daughter of Francisco Martins Pimentel, also of Portuguese origin, Azorean of São Miguel Island, and Clara Maria Dutra, landowners in the region of Vila de Valença. He received as a dowry of marriage the Fazenda Santo Antônio do Paiol, having ordered the construction of new headquarters for the same, which is ready in 1853, when he retired definitively from the Village of Vassouras, where he owned commercial house, to reside in his new property.

* On the role of Zacarias de Góes e Vasconcelos see, among others: Oliveira (2002) and Câmara dos Deputados (1979).

* On the importance of Estevão Ribeiro de Rezende, Marquis of Valença, see: Bittencourt, Prado and Janotti (2006, p. 81-97).

> with time extended to the other higher level courses in Brazil — those in medicine and engineering — although on a smaller scale (Bessone, 2008, p. 63).

Much more, therefore, than the family strategy, Esteves built up a whole network of sociabilities, taking advantage of the opportunities and a great administrative and commercial sense, as it appears analyzing his successful business, having left, when he died in 1879, not small fortune in land, goods, shares in the railway Union Valenciana, of which he was one of the creators, banks and others. All of this duly recorded in his correspondence and visualized by indications that point to the use of the micro-historiographic analysis of this very peculiar case. In Manoel Esteves, we understand that three ideas – sociability, citizenship and self-image – complement and intertwine, a fact that recurs in the period and that presents strong indications in his correspondence and in other sources of the period such as newspapers and information. José Murilo de Carvalho, at various moments, points out the mechanisms used in the eight hundred for obtaining citizenship rights, a condition restricted to a small portion of the population. Many were the strategies employed to achieve this condition and, in Manoel Esteves, we find an illustrative example of this demand for social prestige and rights coming from the fact of being a citizen, a condition that, according to Ilmar Mattos, needed two characteristics to be fulfilled:

> Therefore, Brazilian citizens were all those who had brought together two fundamental “characters”: nationality and freedom. And they were “strangers”, or “non-citizens”, those who did not possess such “characters”: foreigners and slaves. (...) A foreigner was not to be confused with a Brazilian because he was not born in Brazil (Mattos, 2005, p. 14).

The same author, quoting José Antônio Pimenta Bueno, Marquis of São Vicente, in a book published in 1857, explains that "...man can be a national and not enjoy political rights, but he cannot enjoy political rights without being a born or naturalized Brazilian" (Mattos, 2005, p. 15). Manoel Esteves has obtained naturalization and declares this condition in his will, and the decree that declared it is also filed in his old farm. It is in this context that the practices of sociability have been developed, the most varied strategies in search of citizenship and the enjoyment of the rights that have arisen from it. Those who acted in this way were individuals who sought self-affirmation, the construction of an image and even of a self-image. This search for self-image can be further exemplified by a close case: Joaquim Gomes Pimentel, brother-in-law of Esteves, made Visconde de Pimentel (Portuguese title) in 1864, responsible for the organization of an "Album of newspaper clippings and impressions of travelers from the Vista Alegre farm", his property, as Ana Mauad (Mauad, 1998: 212) informed, in which he collected the news published in the newspapers of the region and Rio de Janeiro about him, his deeds and his farm, building, according to the author, this self-image.

Returning to Esteves' letters, they potentially present themselves as being of great capacity for revealing something of the workings of the Brazilian nineteenth century. In this sense, we understand the importance of the elucidation of the mechanisms, whose clues are underlying in this material, so that the logic of them is specified and what it can reveal about the peculiarities of the society that generated it, in particular as far as social relations and power are concerned. The letters become a skillful and important vehicle for understanding how these relations were built, and they are, incidentally, in line with what Ângela Gomes says:

> (...) The personal letter "says" that the secret exists, explaining its limits, or makes believe that it does not exist and that the confession is full. For this reason, it is a discourse generally marked by care in the establishment of social relations. It can combine with great ease what comes from everyday/ordinary with what comes from wonderful/extraordinary. Nevertheless, it is a preferred space for the construction of networks and links that make it possible to conquer and maintain social, professional and affective positions (Gomes, 2004, p. 21).

The study of this material, which, as we have already mentioned, has been gaining increasing prominence as a historical source, "still has as its privileged object the letters exchanged between prominent figures, such as intellectuals or politicians" (Ferreira, 2004, p. 254). The author points to the small amount of work dedicated to the study of strictly personal correspondence, indicating, moreover, that this collection constitutes a rich instrument of historical analysis. "As a source, the letters concern what contains indicative information about the person, in the position of sender or receiver, and their circumstances" (Lemos, 2004, p. 18). Therefore, letters are tools and sources of information and can reveal much of the period in which they were produced.

4. THE LETTERS OF MANOEL ANTÔNIO ESTEVES – ANALYZING THE EIGHT HUNDRED THROUGH CORRESPONDENCE

Here, we purposely leave a few copies of this correspondence to illustrate what has been said so far.

First of all, we highlight the correspondence received from coffee[*] commissioners, such as this one from the Viscount of Condiz:

> My friend and Mr. included open remit a letter to his worthy father-in-law Mr. Francisco Martins Pimentel, from whom without any orders or authorization I cashed in Treasury tickets the balance that the same Mr. had here on 31 of the month ending, in order to go selling him some things, thus fulfilling our duty, looking for ways to give some interest to those who also help me. As it may be that Mr. Pimentel is not aware of what Treasury tickets are, I ask you to explain to him that there can be no obstacle in drawing when you want, because with the same tickets you will carry out the orders with the same discount for the time remaining, and always stay the prize for the time that has elapsed. Dealer hurts his heart seeing money standing still, and so I did this operation taking responsibility for not having any. Please introduce me with much respect to your Ilma. Ma'am, and answer my wishes for being with great esteem.
> From V. Sa.
> Friend
> Viscount of Condiz[*].

This letter makes it clear that Francisco Pimentel had little understanding of commercial and financial negotiations and that Manoel Esteves used his commercial knowledge to run his father-in-law's business. Even having retired to his new property, later we still see Esteves busy with the business of his wife's family, a fact that is proved by letters sent by other commissioners, Netto dos Reys and Manoel Joaquim Alves Machado, in 1863 and 1864, respectively:

> (...) Regarding the account of Mrs. your mother-in-law, we send the copy that you can: as for the acceptance and signing of the letter by the balance of the account of the same Mrs. cannot be done by her current husband, Mr. José Martins do Valle, because of the special clauses of the contract of your marriage. Consulting the lawyer in this regard, he told us that the only way would be to pass Mrs. Mr. D. Clara had given a power of attorney to Mr. José Miz, by means of which he was authorized to accept on her behalf the letters which we presented to him by current account balance... We wish to agree with you in the best way of reconciling things in this respect, but without forgetting what is indispensable for the legality of any act, in which we know that you are in perfect agreement"[*].

[*] The transcript of the letters of Manoel Esteves will be used in the current spelling.
[*] Correspondence of Manoel Antônio Esteves – number 03, box 01, 1853.
[*] Correspondence of Manoel Antônio Esteves – number 07, box 01, 1863.

and

> (...) I see what you say regarding the charge you took in the management of the farm of your brother-in-law Poyares, because I duly evaluate the important services that you are providing him and at your loss, because you do not lack in what to occupy in your farms (...)*.

In the first excerpt we see that the commissioner sends to Manoel Esteves a copy of the letter he had already sent to his mother-in-law, making it clear that he was in perfect agreement in solving the problems described. In the second passage, the commissioner speaks of the "burden" that Esteves had taken on for managing his brother-in-law's farm, rendering important services to him, even at his loss. Both passages make it clear that Manoel Esteves was still deeply involved in the family and commercial issues of his wife's family.

As for Esteves' children who were studying in Rio de Janeiro, Francisco and Lúcio, we find several references in letters sent by coffee commissioners, who also fulfilled the function of looking after the children of the landowners and even answering for them before the school in which they studied. Esteves' children were studying at Santo Antônio College and in one of the letters, the Commissioner talks almost exclusively of the two:

> Rio de Janeiro, November 7, 1864
> Ilmo. Mr. Manoel Antônio Esteves
> "Valença"
> My good friend and Mr.
> I confirm my last on 28 of the past, and I accuse the receipt of his order of the same date, which drew upon me the favor of Poyares Lacerda and Cia., of the amount of 2.600 $ 000, that was presented to me on 5 of the current and that date fulfilled as you will see the receipt together, which is debited to you account. As I told you in my last of 28 of the past, I went on day 1 of the current to the College, to fetch their two dear children to have them make the two seedlings of black clothing, and brought them to this your house where they spent the 2 days, for being sanctified days, and on day 3 I took to the College where they were fully satisfied and during the time they spent here very happy and are well nourished and I declare that I found them very early, both one and the other, but especially Chico is a rare talent and by the letter written by him to his dear Father, will see my friend that he has known to enjoy the time and therefore accepted Congratulations, and on my part, I'd like to introduce you to your dear Mrs. for having such good children.
> As always I am at your disposal, I am in all esteem.
> From V. Sa.
> Friend
> Manoel Joaquim Alves Machado*.

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* Correspondence of Manoel Antônio Esteves – number 28, box 01, 1864.
* Correspondence of Manoel Antônio Esteves – number 40, box 01, 1864.

Manoel Joaquim Alves Machado was established commissioner at Rua do Hospício, number 26. In his letter, besides the customary rendering of accounts in relation to withdrawals and debits, he gives details about the family favors that he used to do to his friend and client: he looked for his two children in high school, had them put on two clothes seedlings and then took them to his house, where they spent two holy days. After the holiday, he took them back to school and gives several compliments on their school progress. This family relationship that the coffee commissioners maintained with their customers also reveals another detail of the political culture of the period, showing these elements very close to the coffee growers. As for Esteves' friendship with Zacarias de Góis e Vasconcelos*, in a letter dated 1872, we find a clear proof of Esteves' esteem and consideration:

> Rio, January 18, 1872
> Ilmo. Mr. Commander Manoel Antonio Esteves
> I write to V. S. this letter that Mr. Vicente Antonio Paulino is carrying, who goes to this city to deal with a business of his, whose success will be safe if V. S. takes it under his protection. I beg you to protect him.
> His
> Friend
> Z. de Góes e Vasconcellos*.

In a short text, Zacharias demonstrates complete confidence in his friend and believes that his protection will be sufficient for the success of another person's business. In another letter, from July 1873, the same Zacarias recommended to Manoel Esteves another friend, Francisco Manuel Grijó Quintanilha, "appointed Municipal Judge of the Term of this city", wishing that Esteves "treat him as if it were me"*. Such confidence demonstrates the prestige that Esteves had achieved. Esteves and his wife, Maria Francisca, were concerned about the upbringing of their children objectively in their letters to their eldest son and from him to their parents. Francisco Martins Esteves shows the same concern that his parents have about studying as a means of belonging to "good society", as we have already reported, and in the letter he sent to his mother, responding to her concerns about her youngest son, Lúcio, Francisco affirmed:

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* Zacarias was a lawyer for the Commissioner House of Manuel Soares da Rocha, with whom Manoel Esteves also maintained business relations and friendship, and it was through this commissioner that he befriended the counselor.

* Correspondence of Manoel Antônio Esteves – box 01, 1872.

* Correspondence of Manoel Antônio Esteves – box 01, 1873.

> My dear Mother
> (...)
> Lucius is well continuing his studies in the same way, just as I always weep this time of absence that I pass away from you, at the same time reflecting that if it were not so, someday I will never belong to society, and therefore there is no other resource but to study and always advance and with all the forces that my intelligence allows[*].

And Manoel Esteves, in a letter sent to his son, reveals what really interests him: "... from the heart as Father, I need nothing, only his advances in his studies, and pay what I owe as I have already told everyone to be arranged,..."[*] Francisco ended up graduating from the Recife School of Law, one of the most prestigious in the Empire and replaced his father, after his death, in the administration of his properties, in spite of not possessing the same administrative sense. He was also appointed tutor to the younger brothers and married Zachary's daughter, Anna Carolina, having lived for some time in Paris in the 1880s. Leaving for Recife, he sent another letter to his parents, in 1873, informing them about the trip and the letters of recommendation that it was taking. Among the comments, he says:

> I was also at the home of Councilor Zacharias this afternoon. (...) The Counselor is still very much our friend. He promised to send letters of recommendation to Pernambuco[*].

His second son, Lucius, became a politician, and was elected councilor in Valencia.

5. FINAL CONSIDERATIONS

Finally, we find that someone who so clearly delineated their social networks, excelling in the local scenario and projecting their figure beyond the frontiers of the Paraíba Valley in Rio de Janeiro, ended up relatively forgotten by historiography, even in the report of local memorialists. The only reference to Manoel Esteves is in the work of the Valencian historian Leoni Iório, when he comments about the reception by Esteves of the Order of the Rose for the work developed for the construction of the railway União Valenciana (Iório, 1953, p. 222). His correspondence, however, is

[*] Correspondence of Manoel Antônio Esteves – box 01, 1873.
[*] Correspondence of Manoel Antônio Esteves – box 01, 1871.
[*] Correspondence of Manoel Antônio Esteves – box 01, 1873.

capable of revealing much of his life and the historical reality in which he lived. It constitutes an archive that really can clarify important details about the Brazilian nineteenth century period and becomes important for containing material vestiges of the private, social and public life of the focalized region, in which the historical process of an influential coffee family took place in the nineteenth century, constituting the local "good society". The behavior and attitudes of this society can be seen between the lines of the correspondence of Manoel Esteves, which allows us to use the statement of Manoel Luiz Salgado Guimarães, justifying his reflection on the nineteenth century culture in Brazil:

> Our sources, for us to remain with the perspective that governs the work of the historian in this culture of the eight hundred, are, therefore, texts that allow us to reconstitute, in the terms in which it was formulated, a past message. In our case, and in accordance with our interest, this `message' to be reconstituted by the life of this textual production matters in the definition of the terms in which a history of Brazil was conceived (Guimarães, 2007, p. 99).

It is from the rediscovery of these sources that a re-reading of nineteenth century Brazil may become possible, starting from the assumption that the mentality of a historical individual is precisely what he has in common with other men of his time. That is, it is the study of this particular case that we can reveal the beliefs and attitudes common to the society of the time, taking into account the particularities of the different social groups and their relations among themselves, in the construction of this vast network of sociability. In this way, the letters still have much to reveal.

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CHAPTER 2

TOXIC LEADERSHIP AND DEVIANT BEHAVIOR IN ORGANIZATIONS: DYNAMICS IN WORK RELATIONSHIPS

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ABSTRACT: This chapter provides a theoretical analysis of the relationship between toxic leadership and deviant behavior in the workplace. Through a bibliographic review, it is proposed that toxic leaders directly affect the behavior of their leaders, generating what we call an "organizational deviation chain". The reactions of the leaders to the presence of a toxic leader may occur by identification, submission, or opposition. Toxic leadership, therefore, moderates the tendency to deviant behavior among its subordinates, establishing a deviation dynamic within the organization.

KEYWORDS: toxic leadership, organizations, work.

RESUMO: Este capítulo realiza uma análise teórica da relação entre liderança tóxica e comportamento desviante no ambiente de trabalho. Através de uma revisão bibliográfica, propõe-se que líderes tóxicos afetam diretamente o comportamento de seus liderados, gerando o que chamamos de "cadeia de desvio organizacional". As reações dos liderados à presença de um líder tóxico podem ocorrer por identificação, submissão ou oposição. A liderança tóxica, portanto, modera a tendência ao comportamento desviante entre seus subordinados, estabelecendo uma dinâmica de desvio dentro da organização.

PALAVRAS-CHAVE: liderança tóxica, organizações, trabalho.

1. INTRODUCTION

In the contemporary organizational setting, companies have constantly sought to institute good practices through codes of conduct, standards and rules, with the aim of minimizing conflicts and promoting an environment favorable to employees' performance. The leader, in this context, plays a central role in connecting the organization with its employees. A good leader is able to extract the best from every employee. However, the presence of toxic leadership, coupled with unethical and abusive behavior, can distort the function of leadership, resulting in organizational dysfunctions, as noted by Lipman-Blumen (2005). The impact of such leadership is reflected in damage to subordinates and to the very structure of the company (Goldman, 2008), leading to the creation of what we call the "chain of organizational deviation", where the leader's toxic behavior directly influences the behavior of the leaders.

This chapter aims to explore how toxic leadership affects deviant behavior in the workplace, considering the dynamics of submission, opposition, or identification that subordinates can adopt in the face of such leadership. In proposing this relationship, the chapter also aims to offer a deeper understanding of the organizational deviation chain and its implications.

2. TOXIC LEADERSHIP

As opposed to traditional studies that focus on positive aspects of leadership, there is increasing attention to destructive leadership, which includes unethical and dysfunctional behaviors. Einarsen, Aasland and Skogstad (2007) argue that these leaders compromise organizational policies by exercising control through coercion and intimidation.

The concept of toxic leader, according to Lipman-Blumen (2005), is characterized by the imposition of behaviors that cause lasting harm to the leaders, whether intentional or not. Lipman-Blumen (2014) expands this discussion by introducing the idea of "situational toxicity", where the intensity of the toxic impact varies according to the organizational context and the individuals involved.

In addition, Kellerman (2014) discusses the need to include bad leadership as an integral part of leadership studies, proposing a categorization that divides toxic leaders into two types: ineffective leaders, who fail to promote change and innovation, and unethical leaders, who promote corruption and abuse within the organization. This typology provides a basis for understanding how such leaders perpetuate dysfunctional behavior, often forming alliances within the organization that underpin their destructive practices.

3. DEVIANT BEHAVIOR AND RESPONSIVE LOGIC

Deviant behavior at work (CDT) emerges as a response to the organizational environment, often influenced by toxic leaders. This behavior can manifest itself both at individual levels, such as abuses between colleagues or supervisors, and at the organizational level, such as theft or destruction of property (Khumalo, 2019; Stefano; Scrima; Parry, 2017).

Goldman (2008) points out that the presence of toxic leaders can infect the entire organization, spreading negative behaviors that compromise the organizational structure. Bennett and Robinson (2000) also highlight this spread, pointing out that deviant behavior can arise both in interpersonal relationships and in the organizational process itself.

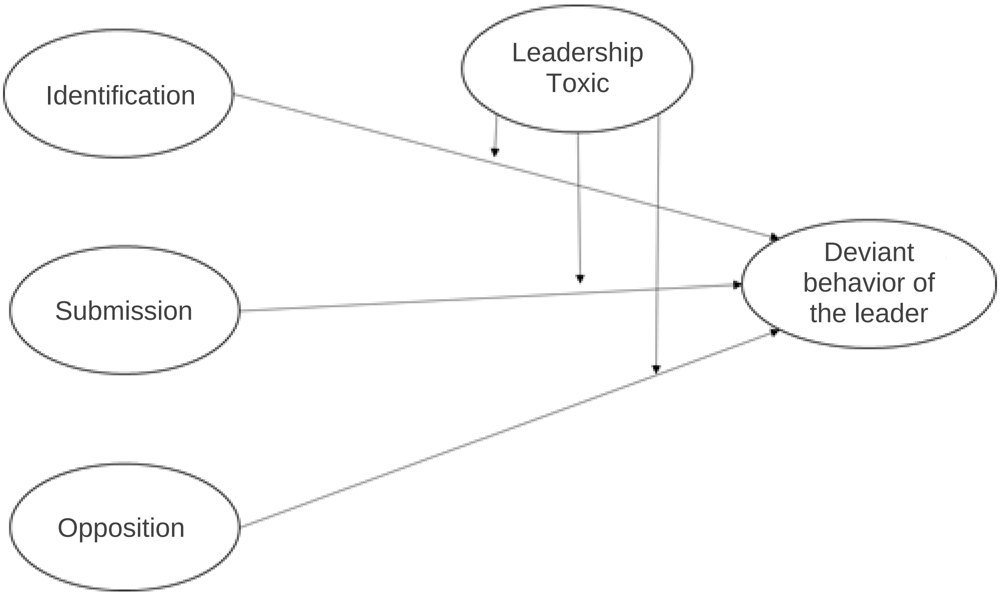
The concept of the "toxic triangle", introduced by Padilla, Hogan and Kaiser (2007), reinforces the idea that destructive leaders, passive followers and supportive environments constitute a vicious cycle that harms the organization. In this scenario, the leaders can react in three ways: identifying themselves with the toxic leader, submitting themselves to fear or retaliation, or resisting by means of deviations that denounce or expose the leader.

These behaviors constitute what we call an "organizational deviation chain," where toxic leadership acts as a catalyst for the deviant behavior of subordinates.

4. DISCUSSION

This chapter proposes that the deviant behavior of those led can be moderated by toxic leadership in three ways: identification, submission, and retaliation. Each of these responses creates a cycle of deviation within the organization, with impacts that extend both to individuals and to the organizational structure as a whole. As suggested by Barbuto (2000), the behavior of conforming to toxic leaders can be explained by several triggers, including manipulation and legitimacy of function.

Figure 1 – Organizational Deviation Chain Model



Source: Prepared by the author (2024)

The model proposed in this chapter suggests that the response of those led to toxic leadership creates a diversion dynamic that can be mitigated by organizational interventions such as clear ethical policies and reporting mechanisms.

5. CONCLUDING CONSIDERATIONS

This chapter has shown that toxic leadership can have an impact on the deviant behavior of leaders, creating a chain of organizational deviation. To mitigate this effect, it is essential that organizations implement policies that promote ethical conduct and establish mechanisms to identify and eliminate toxic leaders. With this, the organization is expected to be able to minimize damage and create a healthier and more productive work environment.

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CHAPTER 3

ANIMAL EXPERIMENTATION AND SOCIAL CONTROL: AN ANALYSIS OF BRAZILIAN NORMS

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ABSTRACT: Animal experimentation is controversial. Characterized, from a biomedical sciences point of view, as an important link between scientific claims and results, is also criticized as an abominable practice by groups related to the animal right's movement, in a debate involving diverse interests. There is a clear need to establish limits for its practices. This study sought to compare the two main Brazilian recent attempts to impose such limits: the Código de Proteção aos Animais do Estado de São Paulo and the 11.794/2008 national law. The analysis and comparison of scientific policies and their criticism is an important research tool about the interactions between science, politics and society, and can help to point out ways and solutions to be considered. It was concluded that the experience of São Paulo could have served as an important example for the formulation of the national law, but seems to have been ignored.

KEYWORDS: animal experimentation, social control, policy making, science and society, ethics of science.

RESUMO: A experimentação animal é controversa. Caracterizada, sob o ponto de vista das ciências biomédicas, como um importante elo entre as pretensões científicas e os resultados, é também criticada como uma prática abominável pelos grupos ligados ao direito animal, em um debate que envolve interesses diversos. É clara a necessidade de estabelecer limites para sua realização. Este trabalho procurou comparar as duas principais tentativas brasileiras recentes de impor tais limites: o Código de Proteção aos Animais do Estado de São Paulo e a Lei Nº 11.794/2008, de abrangência nacional. A análise e comparação de políticas científicas e suas críticas é uma importante ferramenta de investigação das interações entre ciência, política e sociedade, e pode ajudar a apontar caminhos e soluções a serem consideradas. Concluiu-se que a experiência de São Paulo poderia ter servido como um importante exemplo para a formulação da lei nacional, mas parece ter sido ignorada.

PALAVRAS-CHAVE: experimentação animal, controle social, elaboração de políticas, ciência e sociedade, ética da ciência.

1. INTRODUCTION

We are currently witnessing the expansion of biomedicine*, supported by technical and scientific developments accumulated over the last forty years, such as new vaccines, anesthetics and antibiotics. Molecular Biology and Genetics have brought new possibilities, such as the insertion of genetic material or the transplantation of tissues between different species, as well as cloning; scientific practices that use, on a greater or lesser scale, live guinea pigs. Basic or fundamental research includes experiments* that aim to understand physiological systems at the cellular, molecular and genetic level, as well as studies of the functioning of organs or even of the whole animal body. Also in applied research, animals are used in various ways. In some cases, certain species are considered faithful models of the effect of some diseases that affect humans, and the experiments consist of the guinea pig's exposure to the studied disease, for the development of therapeutic and prevention techniques.

In other applied studies, the removal of organs from guinea pigs is necessary, or animals are used to test the efficiency and safety of new vaccines. The development of the polio vaccine is a good example. Certain species of monkeys, which could contract the disease, were widely used in research for the development of the vaccine, and for its production, the animals' kidneys were needed for large-scale cultivation of the virus. While many guinea pigs were sacrificed for their kidneys, others needed to be kept alive for vaccine safety testing (Monamy, 2009).

Genetic research involving animals has also grown extraordinarily in the last few years, with an emphasis on the areas of transgenics and cloning. Generally speaking, genetic modification consists of altering the genetic code of an organism in order to induce a mutation that makes it possible to study genetic function. Animals carrying such induced genetic modifications are widely used in research on the pathology of various human diseases, such as arthritis, cancer, diabetes, and heart conditions. In 1992, genetic research accounted for about one percent of total animal

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* The term "biomedicine" refers to the biological scientific aspects increasingly present in clinical medicine practices, i.e. the joining of basic life science techno-scientific practices and applied clinical medicine (Clarke *et al*., 2003).

* Law No. 11,794/2008 defines experiments as "procedures carried out on live animals, aiming at the elucidation of physiological or pathological phenomena, through specific and pre-established techniques" (Art. 3).

experimentation. In 2001, this number grew to about twenty percent. In 2005, approximately one million procedures involved the use of genetically modified animals, accounting for one third of research involving animal experimentation. The most used guinea pigs are rodents, which correspond to 98% of the total animals used in such research, and complex genetic engineering programs are necessary to guarantee the generation of the quantity of genetically modified guinea pigs that the laboratories demand (Monamy, 2009), which shows the emergence of new ethical and moral concerns.

Animal experiments are therefore considered an important link between biomedical scientific claims and actual results. However, this knowledge-building process is fraught with conflict. With the weakening of Cartesian[*] doctrine and religious[*] anthropocentrism that marked experimental scientific research until the end of the 18th century, new moral philosophical theories began to emerge that challenged the indiscriminate use of animals for human needs, including for scientific experiments. Non-human[*] beings have come to be seen as possessing their own interests and suffering, and therefore deserve some kind of consideration.

2. STRENGTHENING THE MORAL ISSUE

The number of animals used in experiments grew until the second half of the 20th century, showing a fall only from the beginning of the 1980s, mainly due to the public's awareness of the issue of animal rights (Baumans, 2004). The philosopher Peter Singer may be considered one of the major culprits of such a phenomenon. His book *Animal Liberation*, published in 1975, gave intellectual credibility to what was previously labeled mere sentimentality. The author's approach is based on criticism of traditional Western ethics, which holds that all human life is equal, and more precious

[*] A philosophy created by René Descartes, which described all animals as complex machines, whose reactions could not be characterized as pain, but rather as a mere reflection, an automatic response to the stimuli of the environment (Descartes, 1996).

[*] Even the religious Order created by Francis of Assisi, which in some respects went against the practices adopted by the majority of religious of his time, and sought to adopt an active and peaceful attitude towards the animal world, considered it "inferior", for believing in the human species as the only one created under the image of God. This direct connection of man with his Creator referred not only to the form of the body, but also to the spiritual element present in his human soul, non-existent in other creatures (Gonçalves, 2016).

[*] The term 'non-human beings' and 'animals' is used here as synonyms.

than any non-human life. According to these principles, patients in a permanent vegetative state and anencephalic infants should have their lives extended indefinitely, which does not occur. That is why Singer argues that living beings should be treated in accordance with their ethically relevant characteristics, such as their capacity for interaction with other individuals and with the environment, and to have preferences as to whether to live or die. And, still according to Singer, only human arrogance would prevent us from seeing that more sophisticated animals have a mental and emotional life that is on a par with, and sometimes superior to, that of mentally disabled human beings. Like race and sex, the species should not therefore be a reason for differences in values (Singer, 1995). Speciesism is used in analogy to racism[*] to designate those who prefer the interests of their own species to those of others.

This gives rise to the main aspects addressed by the author: the principle of equal interests and criticism of speciesism. Singer argues that all beings capable of suffering deserve equal consideration. Inclusion in the moral sphere must be based on the interests of those affected by a given action, regardless of race, gender or degree of intelligence. Including in this sphere only human beings, with all the differences that exist between them, characterizes speciesism. The attribution of rights should not be based on human characteristics such as rationality, self-awareness, reciprocity or verbal communication, as it would exclude human beings who do not possess such qualities. It is the interests that must be taken into account and, on this point, the ability to experience pain and suffering makes animals with interests equal to those of humans. They are able to experience suffering, sensory and emotionally, and they crave the end of pain. Thus, the mere exploitation of other species, without taking into account the ability to feel not only pain, but also pleasure, is not morally justifiable, because it characterizes speciesism, which, compared to racism, reflects a prejudice as unfounded as that which one day led the Caucasian slave owners not to take the interests of African slaves seriously enough:

> Racists of European descent generally did not accept that pain counts as much when it is felt by Africans, for example, as when it is felt by Europeans. Likewise, those whom I call specialists attach greater weight to the interests of members of

[*] It is interesting to point out that there is currently an academic discussion about the pertinence of the analogy between speciesism and racism. On the one hand, it can help to problematize the categories "human" and "animal", based on biological markers, denaturalizing such categories. On the other hand, the assimilation of situations of racism and human/animal enslavement tends to trivialize sufferings and experiences, by disregarding the specificities and historical experiences of enslaved people (Lemle, 2022).

> their own species when there is a conflict between these interests and those of other species. Human experts do not accept that the pain felt by pigs or rats is as bad as the pain felt by humans (Singer, 2000, p. 44).

Singer argues that if a being suffers, there can be no moral justification for refusing to take this suffering into account. Whatever the nature of being, the principle of equal consideration of interests requires that suffering be taken into account, in terms of equality with the similar suffering of any other being.

Tom Regan's contribution is also noteworthy. The philosopher argues that every being, regardless of sex, race, religion, or place of birth, has value as an individual, as a subject of oneself, termed "inherent value". It is respect for the equality of inherent value that prevents the practice of injustices such as slavery or sexual discrimination, and it would be wrong to limit this value only to human beings based on their abilities. Like animals, many humans do not possess the standard requirements of intelligence, autonomy, or reason, but nevertheless have no less inherent value, less right to be treated with respect. Because we are, each, the subject of the experience of a life, a conscious creature with an individual well-being that matters to us, even if we are not useful to others (Reagan, 1983). This also applies to animals, they should also be seen as subjects experiencing a life, with inherent value of their own. They all have an intrinsic value for what they are, not for their potential contribution to the improvement of the world. This value cannot be withdrawn, transferred or translated in terms of good or bad.

Regan's moral theory preaches irreducible concepts of right and wrong, which precede and are independent of any notion of good or bad. One cannot justify wrong action simply by the fact that it produces more good than bad consequences. The moral property of right/wrong functions as a kind of impenetrable barrier, which disregards the consequences of actions. Torture is wrong, regardless of the usefulness of the information that can be obtained through it. Similarly, research using live guinea pigs is morally wrong, regardless of the benefit it can bring to human life.

Although they differ in some specific respects, Singer and Regan's moral theories agree on one point: animals, especially sentient and autonomous animals (able to feel pleasure and pain, and to possess preferences and the ability to pursue them), possess significant moral status.

3. THE CURRENT DEBATE

The consolidation of animal experimentation as a scientific practice, on the one hand, and the growing public concern about animal rights, on the other, are responsible for a debate that is currently affecting the whole of the Western world. While the scientific community seeks to protect its methods of knowledge production, social movements concerned with the situation of laboratory guinea pigs, in particular groups linked to the ideology of animal "welfare" and abolitionist groups, struggle for greater social control of such scientific methods. The protagonists of the controversy accuse their counterpart, on the one hand, of promoting radical and illegitimate protests and actions, based on mistaken notions of equality, with deep insensitivity to human needs and to the progress of science; or, on the other hand, of being blindly insensitive to animal suffering, and of worrying only, in a selfish way, about human interests.

The defense of experimental science is essentially based on the benefits supposedly obtained, not only for human health, but also for animals, from animal testing. Examples of these benefits are the discovery of blood circulation, understanding of infectious diseases, discovery of antibiotics, mechanisms of the nervous system, understanding of embryonic development, discovery of antibodies, improvements in surgical techniques, and the development of bacteriology and immunology. Modern anesthetics for surgery, pacemakers and replacement of heart valves, heart transplantation, suture enhancement, and life support system for premature infants are also cited as advances in the medical field only possible through animal research.

The animal welfare movement, on the other hand, criticizes the unnecessary cruelty in dealing with animals, following the ethical precept that all kinds of suffering should be avoided. It does not discuss the issue of animal rights, it only seeks to ensure that they are treated as 'humane' as possible. It condemns unnecessary cruelty in experiments, but accepts the idea that the benefits arising from research using animals outweigh the damage imposed on them. Considers therefore the use of animals in scientific experiments to be understandable and justifiable, provided that everything possible is done to reduce their suffering to the maximum, an objective that would be achieved through the principle of the "3Rs", referring to *reduction* (reduction, related to the number of animals used for an experiment to produce precise and definitive information), *refinement* (refinement, referring to the modification of the processes involving sentient animals to minimize their suffering, not only during the experiment, but throughout the period in which the animal remains in captivity), and the "replacement", which aims to eliminate, whenever possible, the use of vertebrates in certain of experiments, either by the use of non-sentient living things, or of non-living material) (Russell; Burch, 1959).

Finally, abolitionist animal rights groups completely reject the use of guinea pigs in scientific research. They consider it a methodological error to suppose that different species react in a similar way to certain drugs or substances. There are differences between individuals regarding habits, ways of locomotion, responses to stimuli, reasoning, body and cellular structure, reactions to diseases, among other factors, which are ignored by animal experimentation; these differences generate, among species, different responses to drugs. They also argue that alternative methods can completely replace the use of sentient beings, citing as examples mechanical models and simulators, often cheaper than the cost of maintaining an animal; interactive films and videos, whose durability, repeatability and richness of detail cannot be achieved by living models; computerized simulations and virtual reality, which make it possible to use high-quality imaging techniques in diagnostics; and *in vitro* experiments, such as tissue, cell or microorganism cultures (Greif; Tréz, 2000).

In general, mistreatment and unnecessary violence began to be increasingly condemned by civil society, and moral theories about animal rights became strong enough in the late 20th century to put political pressure on rulers to take legal action. In the case of animal experimentation, the formulation of such measures is particularly complex, since it needs to seek to reconcile antagonistic interests: on the one hand, the scientific pretensions of the Research Institutes; and on the other, the demands of the groups that fight for the recognition of the moral status of animals[*].

In Brazil, two legal norms are worthy of note: the Animal Protection Code of the State of São Paulo, at the state level, and Law No. 11,794/2008, also known as the Arouca Law, of national scope.

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[*] An episode illustrating the situation occurred in 2013 at the Royal Institute, in São Roque (SP/Brazil), from where 178 beagle dogs used in scientific experiments were taken by animal rights activists. Treated as a "rescue" or a "liberation" by organizations that criticize animal experimentation (Lourenço, 2015), the same episode was characterized by the Brazilian Society for the Progress of Science (SBPC) as an "invasion" that harmed a decade of research by destroying study materials, an act that represents "a mourning for science" (SBPC, 2013).

4. THE ANIMAL PROTECTION CODE OF THE STATE OF SÃO PAULO

Approved on August 25, 2005, state law Nº 11,977, or the Code for the Protection of Animals of the State of São Paulo, was the first initiative, at the state level, to impose limits on animal experimentation. But it can be considered a step backwards when compared with Federal Law No. 9,605/98, known as the Environmental Crimes Law. While the São Paulo code allows, in its Art. 32, procedures that "may come to cause pain, stress or discomfort of medium or high intensity" provided that adequate anesthesia is administered, Art. 32 §1 of Law 9.605/98 prohibits any painful procedure in live animals for which there is an alternative method, independent from the use of anesthetics. Although it gives priority, in its Art. 37, to the use of alternative methods, the São Paulo law does not attribute them to the character of obligatory, making useless the – until then – main legal argument against vivisection[*], or that is to say, the obligatory replacement of the animal by alternative resources, in accordance with the Law on Environmental Crimes.

Social control, the greater demand of organizations that fight for the rights of animals, is restricted to the prior examination and inspection of the procedures to be carried out in the researches, done through the committees of ethics in the use of animals (IACUCs) established by Art. 25. The IACUCs are integrated into five categories, with respect for the equality of the number of members in each one of them: Veterinary doctors and biologists; Teachers and students; Researchers in the specific area; Representatives of legally constituted animal protection and welfare associations; and Representatives of the community. They are therefore made up mainly of the scientific community, which represents three of the five categories mentioned. And, like the majority of researchers, they do not encounter great difficulties in approving their projects and guaranteeing their interests.

Another criticism is that the IACUCs do not serve to control the realization of vivisection, but rather to confer legitimacy on the various procedures to which the guinea pigs are submitted. Such an argument is based on the existence of ethics committees in the main research institutions prior to the formulation of the Code. As early as 1985, under pressure from animal rights organizations, the Council of

[*] 'Animal experimentation' and 'vivisection' are synonyms.

International Organizations of Medical Sciences (*CIOMS*) prioritized, in its "International Principles for Biomedical Research Involving Animals", the creation of ethics commissions (Paixão, 2001) that, rather than guaranteeing humanitarian standards in breeding and care of guinea pigs, sought to ensure public visibility.

Popular pressure has already been noted in international editorial policies, and scientific magazines, previously concerned with scientific merit without questioning the ethical aspects, the suffering and the damage caused to animals, have been continuously modifying their parameters. The editorial policies currently accepted by most journals linked to the areas of medicine and biology highlight respect for the standards of care and use of laboratory animals. Many of them specifically require the approval of the local ethics committees for the articles to be published.

Researchers who do not conduct their experiments in accordance with the defined ethical criteria have difficulty in publishing their work, and the consent of the committees guarantees, at least theoretically, respect for the current norms. The IACUCs have never been on the agenda of the demands of the groups linked to animal rights, but they are of central importance for the scientific community. Far more than guaranteeing some control over animal experimentation, they provide not only legal approval for its continuity, but also a guarantee of the publication of the results and the continuation of research funding.

Therefore, according to the critics, the Code of Protection of Animals of the State of São Paulo benefits only the scientific community, which, besides maintaining the right to continue to carry out one of its most controversial practices, was recognized, by law, as the sole responsible for its control, according to Art. 24, which stipulates the supervision of "professionals of a higher level in the related areas duly registered in their class Councils and in the competent bodies".

However, the São Paulo Code cannot be regarded merely as a step backwards. First, because it deals with the cosmetics industry, a case that presents greater popular contestation, guaranteeing, in Art. 29, the possibility of tax benefits to industries that do not practice tests with animals. Second, because it deals with the right to Conscience Objection, guaranteeing students and researchers legal protection to refrain from practices connected with animal experimentation in accordance with their philosophical conviction. And, third, by prohibiting, in Art. 31, the "use of live animals coming from the organs of control of municipal zoonoses or kennels, or similar public or private, outsourced or not, in animal testing procedures".

5. THE AROUCA LAW AND DECREE NO 6.899/2009, WHICH REGULATES

Adopted on October 8, 2008, Law No. 11,794 was the first legal norm to deal specifically and comprehensively with the social control of animal experimentation at the national* level. It arose in a scenario where the use of animals for scientific research was intensifying, at the same time that there was no regulation aimed specifically at vivisectionist practices in animals with a didactic or scientific purpose. It was the result of the concentration of debates on the use of animals in scientific research since the 1990s in Brazil (Guimarães *et al.,* 2016). However, it suffered similar criticisms to those made of the Animal Protection Code of the State of São Paulo, since, according to many of the societies that defend animal rights, it also benefits only the scientific community, bringing no benefit to the guinea pigs. The Arouca Law recognizes the research community as the sole responsible for supervising animal experimentation: "Every scientific research project or teaching activity will be supervised by a professional of higher level, graduate or postgraduate in the biomedical area, linked to the entity of teaching or research [...]" (Art. 16).

According to Krell and Lima (2015), Law 11,794 is more permissive than the previous legislation, Law 6,638/79, which only allowed scientific experiments with animals in higher education establishments, while the new law allows them in educational activities and also in "technical vocational education establishments of medium level of the biomedical area" (Art. 1° §1), which can increase the number of animals used.

Comparing with the aforementioned Environmental Crimes Law, which makes the performance of painful experiments in guinea pigs conditional on the absence of alternative methods, Law No. 11,794 is even less restrictive than the Animal Protection Code of the State of São Paulo, not only allowing the performance of experiments that

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* The country had only Law 6638 of 1979, which dealt in a very detailed manner with the permits and procedures for the practice of animal experimentation, and which never received the due normatization, without the legal attribution of the competent body responsible for overseeing compliance with the norms and registration of the institutions dedicated to the use and raising of animals with a didactic and scientific purpose. There was also no specification on the environmental conditions or bodies responsible for the supervision of vivariums and research laboratories (Guimarães *et al.,* 2016).

may cause pain or distress, provided that they are accompanied by the use of adequate sedation, analgesia or anesthesia; but also admitting the performance of scientific procedures whose own purpose is the study of the processes related to pain and distress, provided that there is specific authorization from the ethics commission (Art. 14, § 6). There is no obligation to search for alternative replacement or to ban procedures with laboratory animals where alternative resources already exist. Abolitionist groups argue that if animal suffering was to be truly minimized, it would require the use of methods that replace vivisection, as these exist, and that there would be many more if part of the resources devoted to animal experimentation were reverted to research methods that could replace it.

But the Arouca Law reserves only a small passage to the subject, within the remit of the National Council for the Control of Animal Experimentation (CONCEA, created by the law and the object of all of its second chapter): "to monitor and evaluate the introduction of alternative techniques that substitute the use of animals in teaching and research" (Art. 5). Far from making alternative methods compulsory, the passage does not even seem to prioritize them. On the contrary, the alternatives are viewed with a certain amount of suspicion, and it is up to CONCEA to control them. There is talk of 'monitoring' and 'evaluating', rather than encouraging.

Some lawyers associated with the animal rights movement even consider the law unconstitutional, since cruelty to animals is prohibited by the Federal Constitution. The fact that the animals are capable of suffering and being aware of the world around them, coupled with updated information on alternative methods of investigation, makes the experiments an intentional harm caused to vulnerable subjects (the guinea pigs), which would characterize as unconstitutional, careless or, at least, outdated Law No. 11,794/2008 (Bonella, 2009). Article 225, §6, VII of the Constitution of 1988, which aims to fence cruel practices against animals, is understood as a rule that immediately describes prohibited conduct, and not as a principle that refers to a state of affairs to be promoted or achieved. Once it has been established that the treatment to which the animal has been subjected is considered cruel, it must necessarily be prohibited or sanctioned. Contrary to the principles, the rules do not allow for weighting with constitutional values. Regardless of whether there is a law whose object is identified with this prohibition or sanction, the express constitutional commandment, in this case, would be sufficient to be applied autonomously (Krell; Lima, 2015).

Correia (2013, p. 162) defended a similar position, characterizing the practice of animal experiments as a "cruel, criminal, unconstitutional and demoralizing" act, the target of numerous national and world protests. And no law should attempt to regulate cruelty. Dalben and Emmel (2013) consider the Arouca Law a step backwards, the approval of which has neglected the fight for animal rights, the viability of alternative methods and the contrary expression of public opinion. They argue that the rights of animals guaranteed in the Federal Constitution are violated in teaching and scientific research procedures, since there is no experiment that does not imply some kind of cruelty to the guinea pig. But Law 11,794 seems to take into consideration only animal suffering, not cruelty, restricting the sense of the constitutional rule. As Krell and Lima explain (2015) suffering is only one element that makes it a cruel act, but cruelty can give up suffering and come before the guinea pig feels any physical or psychic pain, also encompassing the feeling that can arise from the consequences of any act or external behavior, independent of the loss of the animal's well-being. In comparison, the authors understand that Federal Law No. 9.605/98 prohibits any experiment that carries out acts of abuse, ill-treatment, injury, mutilation or any acts that provoke a feeling of cruelty and/or that are naturally cruel, regardless of the condition of suffering, with the sole exception of the absence of alternative resources. Such a differentiated treatment of the same subject matter causes logical inconsistency in the system, undermining the principle of legal certainty. And they go even further, going so far as to ponder if the very fundamental right to an ecologically balanced environment is not being disrespected, on account of an exaggerated literal use of the Arouca Law.

Social control remains restricted to ethics commissions, which occupy an entire chapter of the law in question. And, once again, the criticisms are similar to those suffered by the Animal Protection Code of the State of São Paulo, that they would not have sufficient power to veto the carrying out of procedures regarded as cruel or painful and to supervise in an efficient manner the carrying out of the approved experiments, and not even the intention of doing so. Firstly, because they are made up mainly by the scientific community, they have only one member coming from animal protection societies, all the other members must be obligatorily veterinary doctors, biologists, teachers or researchers. And the Decree n° 6.899/2009, which regulates the Arouca Law, further limited the participation of civil society, stating in its Art. 43 that the IACUCs must be fully constituted by "Brazilian citizens of recognized technical competence and notorious knowledge, of higher level, graduate or postgraduate level, and with outstanding professional activity in areas related to the scope of the Law N° 11.794, of 2008". With the total control of the ethics commissions, the researchers do not encounter great difficulties in approving their projects and guaranteeing their interests. The approval of the research protocols takes place by a simple majority, that is, the vote of the eventual representative of civil society, a minority, would not succeed in failing or approving any project.

Furthermore, the law seems to privilege the importance of scientific research to the detriment of its control, protecting them, in its Art. 10 §4, from the possible intrusion of the IACUCs through the intimidation of its members: "The members of the IACUCs will answer for the damages that, by deceit, they cause to the researches in progress". The very use of the term "ethics" in the nomenclature of committees is problematized. Using the example of the ethics committees for human experimentation, where all individuals submitted to experiments are volunteers or patients duly informed about the possible risks they will run, abolitionists state that animals do not volunteer and are certainly not informed about the risks. They argue that, just as experimentation on human prisoners in concentration camps cannot be considered ethical, there is no ethics in animal experimentation (Greif, 2007).

From the formal point of view, Law 11,794 and Decree 6,899 hardly establish well-defined material criteria for the authorization of experiments, but limit themselves to creating rules and procedural rules on the composition and functioning of the competent bodies (Krell; Lima, 2015). The lack of guidance on which aspects should be covered by research projects and assessed by the IACUCs is also criticized. Aspects such as species identification, the number of guinea pigs to be used and their proper justification, the detailed description of the proposed use of the animals and the procedures intended to minimize their pain and discomfort, as well as the methods of euthanasia to be used are necessary for the standardization and reliability of the judgments of ethics commissions, but ignored by the law. Besides not requiring any justification for carrying out experiments with animals, it also does not consider the relevance of the research, whether for human or animal health, or even for the advancement of knowledge (Filipecki, 2012). And there are still important questions about aspects related to the discretion of the IACUCs in the evaluation of what could be considered cruel behavior; the setting of criteria that make it possible to measure whether the suffering of an animal is light, medium or intense; the determination of what would be the minimum possible of guinea pigs for the purpose of the research; and even about the corrective action of the commissions, as to the requirement of the use of the recommended methods and procedures (Krell; Lima, 2015).

CONCEA has also received similar criticism. According to Art. 7 of the Arouca Law, only two of the fourteen members of the Council represent the societies protecting animals. This participation, which was already limited enough, was further restricted by Decree No. 6.899/2009, whose Art. 9 stipulates that all members must possess "doctor's degree or equivalent, in the areas of agrarian and biological sciences, human and animal health, biotechnology, biochemistry or ethics, of notorious scientific performance and knowledge and with outstanding professional activity in these areas"; and by Art. 11, which takes away the power of civil societies to choose their own representatives within CONCEA, transferring the power of choice to the Minister of State for Science and Technology, from a list drawn up by commission ad hoc, also exclusively comprised of individuals with a doctoral degree or equivalent, in addition to "proven professional experience of at least five years in activities related to the ethical use of animals for teaching and scientific research purposes". They are therefore linked to the scientific community, without the representation of civil society.

It is important to point out that, although it does not explicitly cite the doctrine of the 3Rs, Law No. 11.794/2008 is largely based on it, especially the notions of Reduction and Refinement. Article 14 sets out the care that should be given to animals before, during and after experiments, and establishes that the guinea pig should be sacrificed, whenever technically recommended or in case of a high level of suffering, at the end of its participation in the experiment.

Also in article 14, the idea of Reduction is present, in a mild way, in §3, which seeks to avoid unnecessary repetition of didactic procedures with animals through their filming or recording, "whenever possible", so that they can be reproduced in future practices without new guinea pigs being used. It is bland because in the doctrine of the 3Rs there is no mere repetition of experiments with results already cataloged for didactic demonstration, and the use of the term "whenever possible" offers scope for this repetition (Krell; Lima, 2015). Reduction is also the basis of §4°, which stipulates that the number of animals used must be the minimum necessary for conclusive results to be achieved; and §9°, which allows the execution of several procedures in the same guinea pig during teaching processes, provided that they are carried out during the duration of a single anesthetic, preventing several animals from being used in diverse processes that can be carried out in a single individual.

The notion of refinement is present in §5, which requires the use of adequate sedation, analgesia or anesthesia in procedures that may cause pain or distress; in §7, which prohibits the use of neuromuscular blockers or muscle relaxants in substitution of sedative, analgesic or anesthetic substances; in §8, which prohibits the reuse of the same guinea pig after the main objective of the experiment has been achieved; and in §10, which considers the safety conditions and standards recommended by international bodies for carrying out work on breeding and testing animals in closed systems.

The substitution is present only in the competences of CONCEA, responsible for monitoring and evaluating the introduction of alternative techniques that substitute the use of animals in teaching and research. With regard to this, Quintilio and Trói (2023), in their pioneering study on the number of animals authorized for use in research in Brazil, found an increase in the number of guinea pigs between 2018 and 2021, a sign that ethics committees and institutions have failed in the search for the construction of alternative techniques. The very difficulty in accessing information about the use of animals in laboratories (which ought to be public) is pointed out as a barrier to encouraging debate and inspection of scientific practices. The authors see a mixture of taboo, corporatism and resistance with regard to animal experimentation, which can only be overcome with transparency and public disclosure.

Concern for the life and physical and mental integrity of the guinea pigs does not seem to be a priority within the context of the law, since there is no real incentive for the search for alternative methods of research that do not require the use of animals. In practice, only complementary methods are applied, the definitive requirements relate only to the well-being and reduction, as far as possible, of the suffering of the animal, aspects linked only to the principle of refinement (Krell; Lima, 2015). A regulation that does not seek the total banning of the use of animals, but allows them to be widely used, provided that "their suffering is reduced", ends up acting as a brake to the stimulus of the development of alternatives (Quintilius and Troy, 2023).

And the criticisms are not limited only to the IACUCs and CONCEA, being expanded to the very principle of the 3Rs and all the well-being doctrine that forms the basis of the Arouca Law. According to abolitionists, such measures do nothing to help abolish animal experimentation. On the contrary, terms such as "humanitarian death" or "improvement in the conditions of hygiene and comfort" end up passing a false impression that the consideration for the well-being of the guinea pigs is above its purpose as a scientific object, generating popular acceptance of a practice that they consider cruel and unnecessary. In the words of the philosopher and law professor at *Rutgers University School of Law* in the United States, Gary L. Francione:

> We have had animal welfare laws for 200 years and there is absolutely no evidence that welfare reforms will lead to the abolition of animal farming. In fact, today we explore more animals, and in even more horrendous ways, than we have ever done in any time in human history. Moreover, as far as the public believes that animals are being treated more 'humanely', this tends to encourage continued exploitation (Francione, 2008, non-paginated).

As to the use of stray animals, the São Paulo Code prohibited the use of animals originating from the organs of control of zoonoses or municipal kennels as scientific guinea pigs, but neither Law No. 11,794/2008 nor Decree No. 6,899/2009 even dealt with the question.

Finally, the law does not deal with issues considered important, such as the cosmetics industry, a case that presents greater popular contestation (currently under consideration by the Chamber of Deputies Bill No. 70 of 2014; that changes arts. 14, 17 and 18 of the Arouca Law to provide on the prohibition of the use of animals in teaching activities, research and laboratory tests with substances for the development of cosmetic products in humans, and increase the fine values in cases of violation of their devices), or the excusation of conscience, which is also not even cited in the wording of the Arouca Law, although it is an important instrument for students who do not wish to participate in vivisection practices. Although Section VIII of Article 5 of the Federal Constitution of 1988 already stipulates that no one may be deprived of rights because of religious belief or philosophical or political conviction, making it possible to exercise conscientious objection to animal experimentation, many students and researchers feel pressured by the authority of teachers to participate in practices involving vivisection, sometimes under threat of academic damage (Sales, 2014), and do not perceive the link between the freedom of philosophical conviction provided for in the Constitution and animal experimentation; and the law should address the matter clearly and objectively. It may seem like a secondary issue, as it is already guaranteed in the Federal Constitution, but an example reported by Filipecki shows its importance:

> An exemplary case for illustrating the tensions experienced within research laboratories is the story of the young researcher Joseph Harris. Harris was working at the Queen's Medical Center in Nottingham, UK using animal models for his research into gastrointestinal cancer. After the work, he would commit acts of vandalism against companies associated with research animals. Harris served one year in prison for the four sabotage crimes he committed. His explanation for this behavior of extreme ambivalence is associated with the lack of freedom he had to decide not to work with animals. He always made it clear within the department that he was working that he was opposed to the use of animals in research. His doctorate was carried out with models *in vitro* and *in silico,* however, he was later obliged to work with animals, under pressure from the head of the laboratory. Harris's case may be a singular and extreme record, but it certainly reflects the conflicts experienced in everyday research that arise from the tensions between animal welfare and biomedical research practices (Filipecki, 2012, p. 113).

6. CONCLUDING CONSIDERATIONS

It is impossible to deny that the formulation of scientific policies is complex. In addition to conflicts of interest and the normal difficulties in any process of creating and implementing public policies, one must take into account that science and politics work at different times. Politics, pressured by public opinion, agglomerates ethical and scientific aspects into processes that need to be decided quickly, while science works at a slow and prudent pace. And political decisions need to be made, generally, before a scientific consensus has been reached.

We live in an era where well-informed citizens increasingly demand control not only of the technological changes that affect their well-being and prosperity, but also of the risks that certain surveys present. And this audience waits for conclusive truths, but science points to provisional theses and hypotheses, which can be confirmed, refuted, or transformed as scientific knowledge is constructed; and political decisions often cannot wait until this process is completed. For this reason, the laws sometimes need to be incremental, take advantage of the positive points of their predecessors, and correct the most criticized.

With regard to animal experimentation, the efforts are political in the sense that they aim to regulate the production and distribution of possible benefits and risks to society, but they are also cultural, because, by interfering with nature, such research impacts on social meanings, identities, and the way we relate to life forms (Jasanoff, 2005). The case of the State of São Paulo could have served as an important experiment for the formulation of national legislation, but it seems to have been ignored. The Arouca Law not only repeated, without significant changes, the most criticized aspects of the São Paulo Code approved three years before, but also disregarded and omitted important points that had already been dealt with in it.

Both legal norms have been criticized as being instruments whose sole purpose is to legitimize and even strengthen animal experimentation, benefiting only the interests of research institutions, to the detriment of the demands of groups that fight for the rights of animals. It is interesting to point out that the greatest pressures for the approval of the Arouca Law came precisely from the scientific community. The State of São Paulo had already approved its Animal Protection Code, which dealt with animal experimentation. In the same year, the City Council of Rio de Janeiro was presented with Bill 325/2005 (which aimed to prohibit the vivisection and use of animals in experimental practices that cause physical or psychological suffering, regardless of the purpose, be it pedagogical, industrial, commercial or scientific research), authored by councilman Cláudio Cavalcanti, an animal rights defender. In 2006, the City Council of Florianópolis received Bill No. 12.029/2006, written by Councilman Deglaber Goulart, also suggesting the prohibition of the use of animals in experimental practices that would trigger physical or psychological suffering (Filipecki, 2012). Before the various instances of power of the federative pact could establish their own regulatory landmarks, the scientific institutions rushed the National Congress to approve a national policy that would guide the didactic-scientific use of animals.

Besides not presenting new solutions for the most criticized points of the São Paulo Code, the Arouca Law and Decree No. 6,899/2009 seem to restrict even more the social control of research using live guinea pigs, a greater demand from groups concerned with the rights of animals. Participation in both IACUCs and CONCEA is limited to individuals with a tertiary level, graduate or postgraduate level. Such a restriction is a selection criterion at least questionable for a democratic state of law, since the role of representatives of animal protection societies in the IACUCs should be to bring different perspectives from those advocated by members of the scientific community (Filipecki, 2012). Certainly the absence of these people undermines the correct application of animal protection rules aimed at curbing cruel practices (Krell; Lima, 2015).

The participation of animal protection societies in CONCEA and in the IACUCs should give voice to all those who are concerned with the moral status of animals, should bring political, ethical and cultural visions different from those defended by the scientific community. However, rather than an active member and committed to the interests of civil society, the legislation requires professionals with academic backgrounds linked to research institutions (Filipecki *et al.,* 2014). Real popular participation is replaced by selective and exclusionary participation, restricting the debate about the use of live guinea pigs in scientific research, making it difficult to produce effective norms, and fueling public mistrust about the legitimacy of scientific research and institutions that use laboratory animals.

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CHAPTER 4

PSYCHOPATHY UNDER THE GAZE OF PSYCHOANALYSIS

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ABSTRACT: It is known that the term psychopathy has Greek origin, psyche = mind, pathos = disease, and that it has several concepts and definitions, which tend to punctuate and define the personality of the psychopathic individual. For Freud, psychopaths have a level of cognitive development that makes them act in a compensated and partial way and results in the lack of good internal objects. This may be linked to the promotion of self-limitation and limitation of the perception of reality. The present study portrays being incipient, through the multiple attributes such as antisocial, intractable, manipulative, among others, leads to a setback in several clinical studiesof the researchers, resulting in an incapacity in the face of some cases pointed out as the most complex and contesting. However, it becomes exceptionally important to distinguish the dynamics of the personality characteristics of the psychopathic individual, the understanding ofpsychoanalysis related to the psychic structure of the subject, so that through studies the professionals are more apt to develop rehabilitation to these patients and treatments. This articleaims to analyze the characteristics and forms of behavior of the so-called psychopaths from thepsychoanalytic view; identify personality traits through research; Behaviors; specific characteristics present in the subject; symptoms and diagnoses. This is a research of exploratory and qualitative approach, based on bibliographical research and study of examples related to the theme. It is considered that for the Freudian approach the term Psychopathy is not used, butrather, Perversion; It is also understood that it can be subdivided into several types, since it is atype of subjective structuring, related to desire and fantasy.

KEYWORDS: psychopathy, psychoanalysis, antisocial disorder, psychopathic behaviors.

RESUMO: Sabe-se que o termo psicopatia tem origem grega, psique = mente, páthos= doença, e que possuivários conceitos e definições, que tendem a pontuar e definir a personalidade do indivíduo psicopata. Para Freud, os psicopatas apresentam um nível de desenvolvimento cognitivo que osfaz agir de forma compensada e parcial e resulta na falta de bons objetos internos. Isso pode estar ligado à promoção da autolimitação e limitação da percepção da realidade. O presente estudo retrata ser incipiente, por meio dos múltiplos atributos como antissocial, intratável, manipulador, entre outros, acarreta um retrocesso em diversos estudos clínicos dos pesquisadores, resultando em uma incapacidade diante de alguns casos apontados como os mais complexos e contestadores. Contudo, torna-se excepcionalmente importante distinguir a dinâmica das características da personalidade do indivíduo psicopata, a compreensão da psicanálise relacionada a estrutura psíquica do sujeito, para que através de estudos os profissionais estejam mais aptos a desenvolver reabilitação a esses pacientes e tratamentos. Este artigo tem como objetivo analisar as características e formas de comportamento dos chamados psicopatas a partir da visão psicanalítica; identificar traços de personalidade por meio de pesquisas; comportamentos; características específicas presentes no sujeito; sintomas e diagnósticos. Trata-se de uma pesquisa de abordagem exploratória e qualitativa, baseada em pesquisa bibliográfica e estudo de exemplos relacionados ao tema. Considera-se que para a abordagem freudiana não se utiliza o termo Psicopatia, mas sim, Perversão; entende-se, também, que ele pode ser subdividido em vários tipos, pois se trata de um tipo de estruturação subjetiva, relacionada ao desejo e à fantasia.

PALAVRAS-CHAVE: psicopatia, psicanálise, transtorno antissocial, comportamentos psicopata.

1. INTRODUCTION

Psychopathy is currently classified as a type of personality disorder, characterized as dissociative, sociopathic, and antisocial. For psychoanalysis, it is common to have some specific behaviors that start in childhood, that have a relationship with the paternal and maternal function; such behaviors are structured and tend to last throughout the life of this individual. A psychopath usually presents lack of empathy, aggressiveness, total absence of guilt, absence of feeling of remorse, impulsiveness in the face of social relationships (Vasconcellos *et al*., 2017).

In this way, Anna Freud and Aichhorn (1966) spoke about the relationship between the identifications of the disturbances of the child's emotional bond, arising from the relationship with the parents. From this, several factors related to the disturbances of the process of socialization were elucidated: disintegration of identification, deficiency in the development of the superego, incorporation of dissociability with parents through separation, rejection etc. Psychopaths have high levels of impulsivity, irresponsibility for their acts, intensity and exaggerated changes in emotional states, superficiality and romanticism of loving relationships. They have no planning; no estimation of the consequences; they show that they are unable to learn from experience and have no practical estimation of time.

For Joseph (1973 apud Gonçalves, 2021), psychopaths have characteristics subdivided into three aspects: first, they are individuals incapable of dealing with frustrations and anxiety; second, they usually present an objective relationship dominated by feelings persecutory; and lastly, its defense mechanisms are based on dissociation, introjective and projective identification, and omnipotence.

According to Filho (2006 apud Silva, 2015), the media, in some cases, has a completely distorted view about the term psychopathy and about psychopaths, associating them with people with a double personality, individuals without compassion or even serial killers and cold-blooded. It is understandable that in some cases these aspects may be present, but they do not constitute a rule, nor do they characterize the majority. What should be mentioned and taken into consideration is that not every psychopath is a murderer.

According to Henriques (2009), the individual psychopath does not act in an antisocial manner at all times, i.e., an alternation in his behavior, in his socially accepted and valued conduct - he can, for example, in a certain period of his life, attend work regularly, pay his bills on time, and at other times ignore various opportunities to commit "illicit" acts.

For Silva (2010), there are some characteristics that can be observed in the behavior of a psychopathic individual, for example, above-average intelligence, extreme ease in manipulating people, accountability to others for their own acts, lack of compassion and inability to deal with punishment.

According to Henriques (2009), the psychopath has above-average intelligence, but cannot actually learn from his mistakes. In no case is punishment for him possible. Even with above-average intelligence, it is not possible to make him change his ways of acting or thinking, from his experiences.

In the International Classification of Diseases, ICD 10, psychopathy belongs to a group known as Dissocial Personality (F60.2), which is related to personality disorder, social contempt and extreme lack of empathy towards third parties (Rodrigues, 2019).

According to Sabbatini and Cardoso (2002 apud Nascimento, 2006), they carried out research in which they identified a type of fault between the bond in the limbic system and the prefrontal cortex, which is the place where emotions are processed and the planning of the individual's consciousness. They also concluded that psychopaths have a precentral gray matter deficit, which may be related to loss of moral judgment and impulsivity; they also pointed out that these characteristics may be linked to genetic components (Rodrigues, 2019).

In the current classification of the Statistical Manual and Diagnosis of Mental Disorders (DSM-V), psychopathy is considered to be an Antisocial Personality Disorder, in which you can see the difficulty in adjusting to social norms, high level of impulsivity, showing disregard for yourself and others.

For psychoanalysis, the psychopath was defined by Freud as a completely perverse and antisocial subject, who is always related to contraventions and crimes, who does not concretize any learning from their experiences or punishments, and who has no real relationship with any person (Silva, 2016).

According to Gomes (2013), Philippe Pinel found that his patients demonstrated self-destructive behaviors, impulsive acts, even recognizing and understanding the real situation. Pinel pointed out that, in specific cases like this, "Insanity without any indication of delirium" can be verified.

However, for Forensic Psychology, and according to Ambiel (2006), psychopathy is understood as a set of traits and alterations that manifests in the conduct of the individual and aggravates their behavioral alterations. Normally the forensic psychologist will use as a method of evaluation, tests of projections and interviews to assist in the recognition of psychic aspects of the subject.

According to Hare (2013), inmates in the prison complex have completely hidden personality traits, which tend to deceive people who perform some kind of function in that environment and even their own cellmates. Crimes committed by psychopaths must be systematically analyzed to identify guilt, and only in this way, in fact, could guilt be reduced.

In our country, according to Art. 26 of the Decree Law 2848/40 it is possible to state that the psychopath is considered semi-imputable. It is noted that he is able to fully understand the illicit character of his own conduct, but does not present the ability to make moral judgment with regard to his will.

Thus, faced with the characterizations of the various areas, the question problem of this study was outlined: what are the specific characteristics and behaviors present in the individual psychopath, from the psychoanalytic view? What are the personality traits, symptoms, and diagnoses?

2. THEORETICAL FRAME

2.1 PSYCHOPATHY

Psychopathy can be understood as a set of personality traits, related to guilt absence, low empathy, and impulsiveness, have a high degree of social dominance, which can be expressed through the ability to manipulate other individuals (Vasconcellos *et al*., 2017).

According to Pinel (2007), the characteristics present in the psychopathic subject, in other times, belonged to constructs that resemble the current concept of psychopathy, like certain denominations such as moral madness or mania without delusions. For this author, individuals who did not show any intellectual lesions, but only affective ones, would also show an instinctive fury and a greater propensity to violence. Concepts of this nature, as well as considerations about the work of more recent authors, which are based on the use of scales that evaluate the disorder, make it possible to consider that the very capacity for manipulation in the interpersonal context may be at the heart of the picture.

2.2 PSYCHOANALYTIC VIEW OF PSYCHOPATHY

Psychopathy is defined by Freud as a perversion, which occurs in a way that comes from man. Considered clinically as a psychic structure. According to his deeper studies on perversion, it is observed that the subject is not born perverse, it is possible to become one by being somehow mistreated, neglected, unconscious identifications, various traumas. The way this individual will pursue his life with the perversion he carries within him that will be prevalent over him: sublimation, overcoming, self-destruction and crimes (Roudinesco, 1998).

Silva (2015) distinguishes psychopathy from perversion, as perversion is a psychic structure that can present several divisions, among them, antisocial personality disorder. It also deals with the various clinical conditions that can show similar characteristics without, in fact, being a case of antisocial personality disorder.

According to Santos (2015), the individual psychopath is a perverse, calculating person who only thinks about himself, possesses a high degree of coldness and cruelty, completely manipulative, and with extreme insensitivity towards third parties.

For Bertoldi (2014), psychopaths have distorted behaviors, when analyzing acts committed by themselves, tend to generate cruel processes in a given situation. For Gonzalez and Aquotti (2015), psychopaths are not born criminals, but rather with a greater capacity to act violently; the author also mentions the importance of understanding what the environment in which this individual is or was inserted, as was his creation. All of these factors contribute to an understanding of what classification levels this individual tends to fall into.

As already described in literature, for Silva (2016), psychopathy permeates the subject's entire life and, especially in the adult phase, tends to prevail, being more evident in males than females; moreover, for the same author, in men may occur the earlier perception, even before the age of 15, already in women, can go unnoticed for longer.

For Castro and Campos (2011), the biggest problem associated with psychopathy would be the treatment, since there is not, until today, one that has been proven effective. Within the psychoanalytic bias, psychoanalysis does not agree to segregate or much less exclude the subject for disciplinary knowledge, it is observed that some frameworks used as classificatory that aims to abduct the possibilities of a possible intervention.

2.3 SYMPTOMS AND DIAGNOSIS

According to Monteiro e Rocha (2007), the symptoms are the forms of manifestation of narcissistic alterations in interpersonal and social relations, which within the psychoanalytic perception constitute in the understanding of the psychopathological phenomenon. Freud characterizes the symptom, in the perception of free association, which determines an analysis of language, since the symptom itself is structured, from which speech must be liberated.

According to Henriques (2009), psychopathy for Kraepelin may manifest at some point in the individual's life, and may also be related to the institutional environment in which it is inserted. It should be noted that there may be an association of the two conditions in the same person, since psychopathy never extends to a psychosis.

For Pinel (2007), the psychopath can only be considered as a carrier of psychopathy, if diagnosed after reaching the age of majority. Even if the traits were observed during childhood, it is understood that it is inserted in a phase of personality development, in a process of constant changes. In addition, in order to be diagnosed, the subject must be evaluated by experts from the medical area, who have explored mental health examinations and will issue reports.

According to Hare (1996), a widely used instrument for the evaluation of antisocial personality disorder, it is a clinical evaluation scale known as PCL-R, a tool of extreme importance.

For Gunderson (2003), the Roschach test is a projective instrument that is based on the interpretations carried out by the individual's responses on ten boards with spots of symmetrical paints. Specifically used to assessthepathologicalof the

3. METHODOLOGY

This study constitutes a research of exploratory and qualitative approach, based on bibliographic research and analysis of examples related to the theme. Gil (2010), defines bibliographic research as that which is drawn up on the basis of material already published with the objective of analyzing different positions in relation to a given subject.

The material selection was conducted from May 2022 to March 2023. The search strategy relied on extensive research in articles published in the databases of Scientific Electronic Library Online (SciELO) and in Google Academic. The descriptors were Psychopathy, Psychoanalysis, Antisocial Disorder, Characteristics and behaviors. (Psychopathy, Psychoanalysis, Antisocial Disorder, Characteristics and Behaviors).

As inclusion criteria, review articles were found that addressed the topic in question; articles available free of charge in Portuguese and articles published in the period of twelve (12) years, i.e. from 2009 to 2021.

As exclusion criteria, articles that did not meet the objectives of the work were disregarded, or when they appear repeatedly, in more than one database.

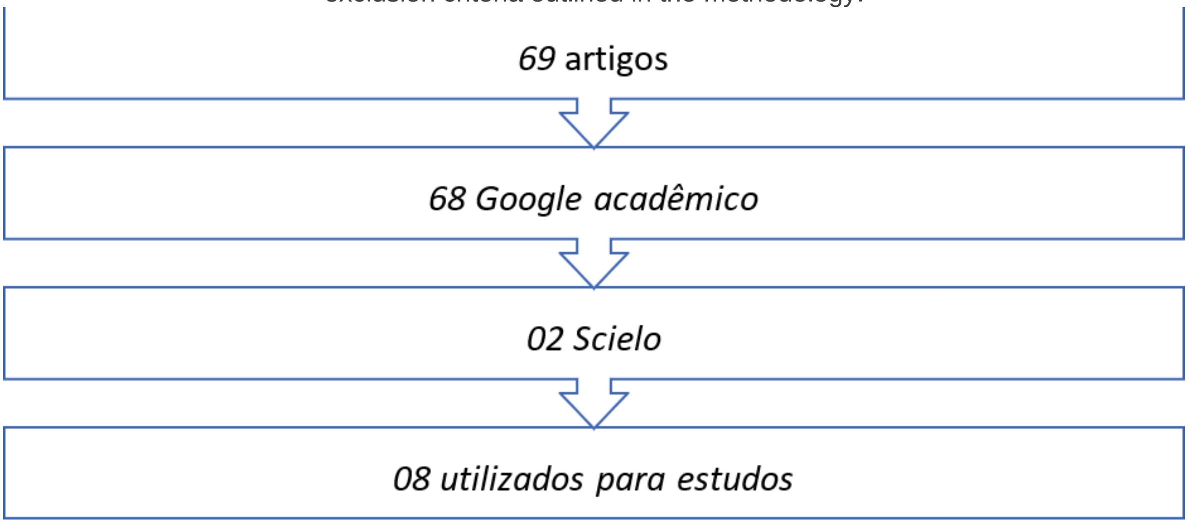
For the analysis of the data, a tool in the format of a table, drawn up by the researcher, was used to evaluate the selected publications. This instrument covers the following items: author and year of publication, objectives, methodology and main results.

The studies were explored and the data entered in the Microsoft Excel 2013 database. Next, they were organized in a framework for the synthesis of the information in the periodicals.

4. RESULTS

69 articles were found, 68 in the Google Academic database, 02 in Scielo, and, according to the inclusion and exclusion criteria, 08 were used for the studies, as shown in Figure 1.

Figure 1: Flowchart with study search statement in the databases, according to the inclusion and exclusion criteria outlined in the methodology.



Source: Prepared by the author, 2023.

The articles that deal with psychopathy under the gaze of psychoanalysis are to be found in Tables 1(one), 2 (two) and 3 (three).

The table shows the authors and year of publication, the objectives, the methodology, describes and summarizes the main findings.

Table 1: Statement of researched articles related to antisocial behavior.

Author/Year	Purpose	Methods	Results
Garcia (2018)	Analyze the epistemological organization of explanatory theories of antisocial behavior.	Integrative literature review.	Antisocial behavior is a construct that is distinguished by its multiplicity of causes and consequences. It relates to various risk and protection factors and is characterized by a variety of forms of presentation and emergency contexts.
Almeida (2021)	Examine the different proposed interventions for aggressive behavior in subjects deprived of liberty.	It brings together knowledge of how aggressive behavior in subjects deprived of liberty is addressed in scientific production.	. Aggressive behavior in subjects deprived of liberty is often analyzed in conjunction with variables such as anger, impulsivity and personality, attributed to multiple motivations and also to the dichotomy between reactive aggression and proactive
Santos (2014)	Distinguish the concepts of antisocial behavior and criminal behavior, as well as the various typologies of crimes associated with these types of individuals.	A more in-depth analysis is carried out on the criminal behavior perpetrated by the individual psychopath or the absence thereof, focusing essentially on the integrated psychopath and the criminal psychopath.	The author portrays the relationship between psychopathy and criminal behavior, investigating the gaps in the literature that could be filled in future investigations. It is important to stress that not all psychopathic individuals are criminals, just as not all criminals are psychopaths.

Source: The author (2023)

Table 2: Demonstration of researched articles related to the characteristics present in the individual with the antisocial disorder.

Author/Year	Purpose	Methods	Results
Freitas and Schlosser, (2021)	Explore, in the literature, the subject of antisocial personality disorder.	Integrative literature review of indexed articles in the following databases: LILACS (Latin American Literature), Scielo (Scientific Electronic Library Online) and BVSPSI (Virtual Library of Psychology of Brazil), de 2010 to September 2020.	The author depicts some of the striking features of antisocial personality disorder: seduction, manipulation, and the absence of empathy, narcissistic traits, and the search for positions of power and social prestige. Due to the findings it was possible to understand the importance of psychological tools for the supervision of these people and the reduction of harm to the population.
Masnini and Macedo (2019)	Discuss the characteristics and seek the relationship between the disorder and genetic, biological and psychosocial factors.	Integrative review conducted in 2018, with research in the databases: Scientific Electronic Library Online (SCIELO), and Latin American and Caribbean Literature in Health Sciences (LILACS).	Psychopathy and sociopathy are two disorders that are harmful to the subject. Causes of psychopathy can be genetic (heredity is discussed), biological (changes in the prefrontal lobe responsible for emotions and social behaviors), or psychosocial (parental neglect, physical or mental abuse, exposure to negative environments) situations).
Moreira (2020)	Investigate the association between exposure to child abuse and psychopathic traits in adolescents.	Meta-analysis based on 20 independent studies, containing 24 non-overlapping samples and 7,688 participants.	Childhood abuse was significantly associated with psychopathic traits in adolescents; however, analysis of specific types of abuse reveals a history of physical and emotional neglect.

Source: The author (2023)

Table 3: Statement of researched articles related to diagnosis.

Author/Year	Purpose	Methods	Results
Alvarenga (2009);	Make a brief journey on the conceptual development of one of the most evident psychological constructs in the present day, namely: antisocial personality disorder (TPAS).	Literary review on the evolution and evaluation of the construct associated with empirical research consulted in the main books and periodicals of international recognition in the area.	Diagnosis of TPAS is based on categorical and non-dimensional criteria. This means that the system is unable to predict a priori the variability (intensity) of the traits of this disorder, because it is the DSM developed in the recognition of symptoms and syndromes.
Gomes (2019)	To address the historical, clinical and theoretical aspects related to the alternative model of evaluation of personality disorders, set out in the fifth edition of the DSM.	Bibliographic review of text books and articles researched in the PubMed and Scielo database.	Important failures well described in the literature were identified in relation to the current categorical diagnostic model: diagnostic comorbidity, imprecise limits, coverage inadequate, heterogeneity, poor scientific basis, inability to portray the specificity of disorders assessment of severity.

Source: The author (2023)

5. DISCUSSION

With regard to antisocial behavior one perceives a construct that can be defined as something created by the human mind itself, in which it cannot be definitively observed, but which can be inferred from its most latent manifestations. Thus, numerous risk factors and also protection are related (Garcia, 2018).

The author mentions several risk and protection factors, constituting a set of personal, group, family and even social characteristics that allow, in some situation, to predict the development of antisocial behaviors.

However, in this sense, it is argued that both factors should be understood in a dimension in which it refers to a higher and non-deterministic probability index: risk factors make a mention of the aspects that tend to predict about antisocial behaviors from the increase in the probability of their occurrence, making individuals exposed to them more vulnerable. The protection factors refer to aspects that reduce the probability of emergence of such behaviors, in which it aims to become less vulnerable individuals, but cannot be considered the mere absence of risk factors (Garcia, 2018).

Aggressive behavior in subjects deprived of liberty is frequently analyzed in conjunction with variables such as anger, impulsivity and personality, attributed to multiple motivations and also to the dichotomy between reactive and proactive aggression (Almeida, 2021).

It may make it possible that impulsivity would be another construct frequently addressed, but that also has to be differentiated, since it results in different impacts when in conjunction with other variables, while at the same time it has a significant association with aggressiveness.

Subjects with psychopathic traits inserted in a violence reduction program in a Maximum Security Prison System experienced a reduction in impulsivity, a construct that, associated with aggressivity, had relevance in three other studies, in which they found their mediating role in the perpetration of aggression and deregulation of emotion and the importance of developing programs in anger management. (2021).

In view of the necessary studies, it is important to point out that not all psychopathic individuals are criminals, just as not all criminals are psychopaths. It is observed that psychopaths can assume the role of successful and well integrated individuals in society. It can be verified, about the problems, correlations and interconnections between psychopathy and criminal behavior, and elucidate gaps in the literature that tend to be filled in future investigations (Santos, 2014).

They also consider the psychopath non-criminal (those who never commit crimes), in which psychopathy should be conceptualized in terms of latent personality traits that all individuals possess, but in different amplitudes, and not in behaviors characteristic of population groups.

In the light of several studies by the illustrious Sigmund Freud (1856-1939), the father of Psychoanalysis, The author explains that the criminal and the antisocial behavior, are stemming from an imbalance between the ego, the superego and the id, these three parts that constitute the individual personality. According to this theory, if the superego - which represents the internalization of society's moral code - is too weak, the individual cannot repress his id - his natural instincts and desires - violating social norms and committing a crime (Santos, 2014).

In the light of the results obtained, it was possible to observe some of the marked characteristics of the antisocial personality disorder: seduction, manipulation and the absence of empathy, narcissistic traits and the search for positions of power and social prestige. Due to the findings it was possible to understand the importance of psychological tools for the supervision of these people and the reduction of harm to the population (Freitas; Scholosser, 2021).

It has been shown that child abuse is significantly associated with psychopathic traits in adolescents, however, analysis of specific types of abuse reveals that this relationship remained significant only for the history of physical neglect and emotional neglect (Moreira, 2020).

Studies have shown that child abuse still has a major impact on the mechanism of moral disengagement, which allows individuals to commit immoral acts without apparent guilt or self-censorship. This effect is conditioned by the justification that individuals learn by observing negative parental behavior, so that in an environment of mistreatment they consider repression as abuse or neglect as a reasonable way to deal with differences (Moreira, 2020).

It is important to measure that psychopathic traits are a strong association and stability throughout adult life when they manifest early, in childhood or adolescence. However, antisocial behavior can be favored, it is a fact well known by the investigations carried out in recent decades that the age of onset and the persistence of infractions committed by adolescents are important predictors of the severity and continuity of delinquent practice, being the best predictor of antisocial behavior past the future antisocial behavior (Moreira, 2020).

Psychopathy and sociopathy are two disorders that are harmful to the subject. The causes of psychopathy can be genetic (heredity is discussed), biological (alterations in the prefrontal lobe responsible for emotions and social behaviors) or psychosocial; parental neglect, physical or mental abuse, exposure to negative environments and conflictual situations (Masnini; Macedo, 2019).

Correlation to the studies pointed out in the research, antisocial personality disorder (TPAS) may be associated with other personality disorders, but there are differences between that clinical condition and the other disorders. For example, criminal behavior, violence, manipulation to gain advantages for yourself and a history of conduct problems beginning in childhood and adolescence are very striking and definitive features in TPAS. According to Alvarenga (2009), it is mentioned that the diagnosis of antisocial personality disorder is based on categorical and non-dimensional criteria, which it can be said that it would be unpredictable to analyze or conclude from previous elements.

Given that individuals with antisocial personality disorder, the DSM-V's dimensional model better portrays the gradations of these disorders. Indicators were evidenced in the literature, which point out that the use of clinical dimensional evaluations in personality disorders has a reasonable degree of reliability, and can contribute in an important way in the integration between psychiatric diagnoses and research in the field of psychology, besides providing a broader and more precise view of personality disorders.

However, the study by Gomes (2019) highlighted the identifications about the shortcomings well described in the literature in relation to the current categorical diagnostic model: diagnostic comorbidity, imprecise limits, inadequate coverage, heterogeneity, deficient scientific basis, in which it presents inability to portray the specificity of personality disorders, inefficient assessment of severity.

6. CONCLUSION

Through research in several articles and magazines, the concept of Psychopathy on the part of Psychoanalysis was verified. Although the Freudian approach does not use the term Psychopathy, but Perversion, it is understood that it can be subdivided into several types and, as mentioned, for Freud, perversion is a type of subjective structuring, related to desire and fantasy.

Psychoanalysis points, as a very specific point, the principle that childhood sexuality has the characteristics of being perverse, for the fact of exaggerating, exploiting and even to transgress the different ways of adhering to their satisfaction. In the adult perversion, though, there is a differentiation due to its character of fixity and also by the way in which its subjetive function is disauthorized from the law. Perversion is said to appear as a form of denial or through a denial of castration and the appearance of a form of fixation in child sexuality.

For psychoanalysis, the division of the structures of the mental apparatus are subdivided into three, each one of which has a fundamental role in the interaction of the individual with respect to others, in which he would take care of our personality. The ID, represents the reservoir of psychic energy in which the pulses of life and also of death are located. These characteristics are attributed to the unconscious system. It is rigid by the principle of pleasure. The Superego is related to the Oedipus complex, through the internalization of prohibitions and limits. Finally the Ego, which acts in the establishment to maintain the balance between the demands of the id, the demands of reality and the orders of the superego.

According to Ferreira and Menezes (2011 apud Silva, 2015), perversion is characterized by the fixation of desire, and by the exclusivity of its practice. Sexuality was crystallized, because of some damage to the structure of the Oedipus in the life of a child. The perverse to Freud knows what he wants, and also knows what his focus is on his desire, but manages to deny the root from which he originated, so he considers reality and at the same time denies, seeking substitution by his own desire.

According to the authors Castro and Campos (2011), one of the biggest problems associated with psychopathy, which in the Freudian approach named as perversion, would be the treatment of this individual, because as mentioned by them, there is still not that has been effective in fact.

The authors Gonzalez and Aquotti (2015), talk about the emergence of psychopathy in the individual, according to the studies pointed out by them, psychopaths are not born criminals, but rather with a greater capacity to act in a disguised and even violent manner, it is also worth emphasizing the importance of understanding how is the environment that this individual is or was inserted, as was his childhood, creation, etc. The authors cite that all these factors tend to contribute in some way to the understanding in which levels of classification this individual tends to fit.

The study of the term psychopathy is of extreme importance, because through various research, one can break existing paradigms against these perverses. Thus demonstrating to society that the individual psychopath is not considered a patient who transforms himself into a *serial Killer*, but rather is someone whose personality structure, which begins from childhood, suffers biological influences and comes from the environment in which lives to maturity. As an adult one can find the distinction of perversion to "normality".

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CHAPTER 5

MUDANDO O MUNDO NOS ANOS 20: 5 VETORES DE TRANSIÇÃO E SUAS IMPLICAÇÕES PARA OS CONTEXTOS ECONÓMICOS E SOCIAIS GLOBAIS

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RESUMO: Este artigo investiga os principais vetores da transição – Transição Verde, Transição Digital, Nova Globalização, Economia de Guerra e Gestão de Crises Habitacionais – que devem remodelar as paisagens econômicas e sociais globais até 2030 e além. Utilizando uma metodologia abrangente, desenvolvemos escalas especializadas para medir o progresso de vários países dentro de cada vetor. Essas escalas integram métricas quantitativas como consumo de energia renovável, qualidade da infraestrutura digital, diversificação comercial, gastos com defesa e acessibilidade habitacional, entre outros. Nossos resultados revelam interconexões significativas entre esses vetores, mostrando como os avanços em uma área podem influenciar os resultados em outras. Por exemplo, os avanços digitais não só impulsionam a transição digital, mas também apoiam a transição verde, melhorando a eficiência energética. Da mesma forma, a dinâmica da Nova Globalização é influenciada por mudanças na segurança global sob a Economia de Guerra, impactando o comércio internacional e as políticas econômicas. As implicações deste estudo são profundas, sugerindo que os decisores políticos e os líderes empresariais devem adotar estratégias integradas que considerem estas interdependências para navegar eficazmente nos desafios futuros. As escalas aqui desenvolvidas fornecem um quadro sólido para a avaliação contínua, permitindo aos países avaliar comparativamente os seus progressos e identificar áreas que necessitam de foco estratégico. Ao compreender os efeitos cumulativos destas transições, as partes interessadas globais podem preparar-se melhor para um mundo em rápida evolução, garantindo um crescimento sustentável e equitativo. Este artigo contribui para o discurso acadêmico sobre a mudança global, fornecendo insights acionáveis e uma abordagem metodológica para avaliar e se adaptar a essas transformações inevitáveis.

PALAVRAS-CHAVE: transição global, transição verde, transição digital, nova globalização, economia de guerra, crise habitacional, política económica, dinâmica geopolítica.

ABSTRACT: This article investigates the key transition vectors - Green Transition, Digital Transition, New Globalization, War Economy and Housing Crisis Management - that are expected to reshape global economic and social landscapes by 2030 and beyond. Using a comprehensive methodology, we have developed specialized scales to measure the progress of various countries within each vector. These scales integrate quantitative metrics such as renewable energy consumption, digital infrastructure quality, trade diversification, defense spending and housing affordability, among others. Our results reveal significant interconnections between these vectors, showing how advances in one area can influence results in others. For example, digital advances not only drive the digital transition, but also support the green transition by improving energy efficiency. Similarly, the dynamics of the New Globalization are influenced by changes in global security under the War Economy, impacting international trade and economic policies. The implications of this study are profound, suggesting that policymakers and business leaders must adopt integrated strategies that consider these interdependencies in order to effectively navigate future challenges. The scales developed here provide a solid framework for ongoing assessment, allowing countries to benchmark their progress and identify areas that need strategic focus. By understanding the cumulative effects of these transitions, global stakeholders can better prepare for a rapidly evolving world, ensuring sustainable and equitable growth. This article contributes to the academic discourse on global change by providing actionable insights and a methodological approach to assessing and adapting to these inevitable transformations.

KEYWORDS: global transition, green transition, digital transition, new globalization, war economy, housing crisis, economic policy, geopolitical dynamics.

1. INTRODUÇÃO

1.1 CONTEXTO E IMPORTÂNCIA

No âmbito da política global, particularmente na União Europeia, o termo "transição dupla" refere-se à abordagem integrada para transformações verdes e digitais prevista pela Comissão Europeia. Este conceito, que enfatiza o avanço interconectado da sustentabilidade ambiental e da digitalização, serve como uma pedra angular para enfrentar os desafios multifacetados de nossa era. Ampliando este fundamento, a ideia de "vetores de transição" emerge como um quadro mais amplo, englobando não só a dupla transição, mas também abrangendo outras dimensões críticas, como a transição para uma Economia de Guerra, a Transição para uma Nova Globalização e a Gestão de Crises Habitacionais. Esses vetores de transição fornecem uma lente abrangente através da qual podemos ver as mudanças rápidas e profundas que afetam nossas sociedades e economias, destacando as relações simbióticas e muitas vezes complexas entre avanço tecnológico, gestão ambiental, estratégias econômicas e dinâmicas sociais. Também é importante notar que nenhuma dessas mudanças são efeitos de "muito longo prazo" que podem vir em um futuro "como ficção científica". Todos eles estão ligados para mostrar mudanças drásticas nas nossas sociedades na presente década.

1.2 OBJETIVO

O objetivo principal deste artigo é avaliar e analisar criticamente esses vetores de transição, focando especificamente os papéis e impactos das Transições Verde e Digital, juntamente com as dinâmicas emergentes da Economia de Guerra, os padrões evolutivos da Globalização e os desafios urgentes apresentados pela Gestão de Crises Habitacionais. Ao fazê-lo, este estudo procura delinear como essas forças não estão apenas remodelando a paisagem do nosso sistema global atual, mas também definindo a trajetória para o futuro. Esta análise explorará as implicações destas transições, identificará as sinergias e os conflitos entre elas e fornecerá informações sobre a forma como podem ser aproveitadas ou atenuadas para promover uma sociedade global resiliente e sustentável até 2030 e mais além. Através desta exploração, o artigo pretende contribuir para o discurso académico sobre a mudança global e fornecer insights acionáveis para decisores políticos, líderes da indústria e comunidades que navegam nestes tempos transformadores.

A melhor contribuição que o artigo pretende dar é a definição de métricas, indicadores para avaliar o progresso (ou a falta de) em cada um desses vetores, permitindo-nos acompanhar o progresso que diferentes países estão fazendo ao longo dos cinco.

2. REVISÃO DA LITERATURA

2.1 INVESTIGAÇÃO EM CURSO

O trabalho académico existente sobre os vetores da transição apresenta um corpo de literatura diversificado e multifacetado, particularmente robusto nas áreas das Transições Verde e Digital. O quadro de transição dupla da Comissão Europeia estimulou uma quantidade significativa de investigação, examinando as sinergias e os compromissos entre a sustentabilidade ambiental e a transformação digital. Estudos como o *Relatório Prospetivo Estratégico de 2022* da Comissão Europeia (Comissão Europeia, 2022) delineiam as direções políticas e os impactos previstos destas transições à escala europeia e mundial. Da mesma forma, as pesquisas sobre Economia de Guerra, Nova Globalização e Gestão de Crises Habitacionais são cada vez mais pertinentes. O ressurgimento da economia militar, conforme discutido em fontes como o *Global Risks Report 2023* do Fórum Econômico Mundial (Fórum Econômico Mundial, 2023), analisa as implicações econômicas do aumento dos gastos com defesa e realinhamentos estratégicos. A pesquisa sobre Nova Globalização se concentra na reconfiguração do comércio global e dos sistemas econômicos em resposta às recentes crises globais, conforme detalhado no *Relatório do Comércio Mundial 2023* (Organização Mundial do Comércio, 2023). No domínio da Gestão de Crises Habitacionais, soluções inovadoras para a escassez de habitação urbana são exploradas em trabalhos como os publicados pelo Fórum Económico Mundial, que abordam os desafios da acessibilidade e sustentabilidade em ambientes de rápida urbanização (Fórum Económico Mundial, 2022).

2.2 REFERENCIAL TEÓRICO

A análise desses vetores de transição está enquadrada em vários constructos teóricos extraídos de estudos de economia, ciência ambiental e tecnologia digital. Do ponto de vista econômico, as teorias da mudança estrutural e do desenvolvimento econômico são fundamentais para a compreensão das mudanças induzidas por essas transições, particularmente através das lentes da economia schumpeteriana, que enfatiza o papel da inovação e da atividade empresarial na transformação econômica. As teorias da ciência ambiental, incluindo os conceitos de desenvolvimento sustentável e modernização ecológica, são fundamentais na análise da Transição Verde. Essas teorias oferecem insights sobre como as economias podem evoluir para a sustentabilidade sem comprometer o crescimento e o desenvolvimento (Meadows *et al*., 2004; Mol, 2002). No domínio da tecnologia digital, a teoria da difusão das inovações (Rogers, 2003) é utilizada para compreender a penetração e o impacto das tecnologias digitais em diferentes setores. Essa teoria ajuda a elucidar a dinâmica de como as inovações digitais se espalham e são adotadas pelas sociedades, influenciando as estruturas econômicas e sociais. Adicionalmente, a teoria dos efeitos de rede (Katz e Shapiro, 1985) é relevante no contexto das transições Digital e da Nova Globalização, explicando como o valor de um produto ou serviço aumenta com o número dos seus utilizadores, particularmente pertinente para as plataformas digitais e redes de comércio global.

Este quadro teórico abrangente permite uma análise matizada de como cada vetor não só influencia resultados económicos e ambientais específicos, mas também interage com tendências sociais e tecnológicas mais amplas, moldando a paisagem global de formas profundas. Ao integrar essas teorias, o artigo visa fornecer uma compreensão aprofundada dos processos transformadores em curso e suas implicações de longo prazo para o desenvolvimento global.

3. METODOLOGIA

3.1 FONTES DE DADOS

A base empírica desta pesquisa é construída sobre uma gama diversificada de fontes de dados que ressaltam a amplitude e profundidade dos vetores de transição. O principal deles é o *Relatório de Prospetiva Estratégica de 2022* da Comissão Europeia, que fornece informações cruciais sobre as transições verde e digital (Comissão Europeia, 2022). Outras contribuições significativas vêm de fóruns econômicos internacionais, como o *Relatório de Riscos Globais 2023 do Fórum Econômico Mundial*, que oferece dados sobre a Economia de Guerra e suas implicações globais (Fórum Econômico Mundial, 2023). Para perspetivas sobre a Nova Globalização, esta pesquisa utiliza o *World Trade Report 2023* da Organização Mundial do Comércio, que inclui dados extensivos sobre mudanças na dinâmica do comércio global (Organização Mundial do Comércio, 2023). A análise do vetor Gestão da Crise Habitacional é enriquecida por dados das discussões do Fórum Econômico Mundial sobre estratégias de desenvolvimento urbano e habitação (Fórum Econômico Mundial, 2022).

3.2 ABORDAGEM ANALÍTICA

A abordagem analítica desta pesquisa é quantitativa e qualitativa, visando captar os impactos multifacetados de cada vetor. Quantitativamente, a pesquisa emprega métodos estatísticos para analisar tendências e padrões de dados. Isso inclui o uso de modelagem econométrica para prever potenciais impactos econômicos e análise de cenários para avaliar diferentes resultados futuros com base em diferentes níveis de intervenção em cada vetor. Qualitativamente, o estudo incorpora análise temática de documentos políticos e entrevistas com peritos para compreender as perspetivas matizadas e as respostas estratégicas das principais partes interessadas.

Por exemplo, a avaliação da Transição Verde baseia-se em indicadores como as taxas de consumo de energias renováveis e as intensidades de emissão de carbono, provenientes da Agência Internacional de Energia e do Banco Mundial

(Agência Internacional de Energia, 2023; Banco Mundial, 2023). A análise da Transição Digital examina as taxas de penetração da Internet e a qualidade da infraestrutura digital, utilizando dados da União Internacional de Telecomunicações (União Internacional de Telecomunicações, 2023). Estas medidas quantitativas são complementadas por avaliações qualitativas através de análises políticas e entrevistas a peritos que fornecem informações mais aprofundadas sobre as iniciativas estratégicas e os desafios enfrentados pelas diferentes regiões.

Esta combinação metodológica permite uma avaliação abrangente de como os vetores de transição estão moldando as paisagens econômicas e sociais globais, fornecendo uma compreensão fundamentada que apoia conclusões e recomendações robustas.

4. ANÁLISE

Esta seção do artigo aprofunda cada um dos cinco vetores de transição identificados, examinando seu status atual, dinâmica, implicações e eles serão estudados em fases posteriores deste projeto de pesquisa. Ao analisar cada vetor individualmente, esta pesquisa lança luz sobre como eles estão influenciando única e coletivamente as paisagens econômicas e sociais globais. Cada vetor deve ser avaliado com base em um conjunto de critérios, incluindo tendências de dados históricos e atuais, respostas políticas e impactos projetados. A análise está estruturada para fornecer uma visão abrangente do papel de cada vetor na transição global para 2030.

4.1 TRANSIÇÃO VERDE

A Transição Verde tem fundamentalmente a ver com a mudança dos padrões globais de produção e consumo de energia para práticas mais sustentáveis. Esta transição não é apenas um imperativo ambiental, mas também um importante motor económico e social, tal como delineado no *Relatório Prospetivo Estratégico de 2022* da Comissão Europeia (Comissão Europeia, 2022). Os indicadores-chave utilizados para avaliar este vetor incluem a percentagem de consumo de energia derivada de fontes renováveis e as emissões de CO2 por unidade do PIB, que são métricas essenciais fornecidas pela Agência Internacional de Energia e pelo Banco Mundial, respetivamente (Agência Internacional de Energia, 2023; Banco Mundial, 2023).

A pesquisa começará com uma visão geral das atuais taxas globais de adoção de energia renovável, destacando as regiões líderes na implementação de energia verde e as que estão atrasadas. Também examinará as tendências de investimento em tecnologias verdes, utilizando dados do Programa das Nações Unidas para o Meio Ambiente, que refletem o envolvimento dos setores público e privado em iniciativas de sustentabilidade ambiental (Programa das Nações Unidas para o Meio Ambiente, 2023).

Mais pesquisas devem explorar as implicações das políticas verdes nas estruturas econômicas, mercados de trabalho e normas sociais. Deve discutir os desafios da transição para uma economia verde, como a deslocação de indústrias tradicionais e os custos económicos da implementação de práticas sustentáveis. Além disso, a análise deve considerar o papel das políticas governamentais para facilitar ou dificultar essa transição, baseando-se em exemplos de quadros políticos bem-sucedidos e malsucedidos.

Esta exploração detalhada da Transição Verde visa fornecer informações sobre como está a remodelar o tecido económico e social das sociedades em todo o mundo, identificando tanto as oportunidades de crescimento e inovação como os riscos e desafios que precisam de ser geridos.

4.1.1 Escala de transição verde

Objetivo: Medir o progresso de um país no sentido da sustentabilidade ambiental.

Indicadores:

- Consumo de Energia Renovável: Percentagem do consumo total de energia proveniente de fontes renováveis.
- Intensidade das emissões de carbono: emissões de CO_2 por unidade do PIB.
- Investimento verde: Investimento público e privado total em proteção ambiental e infraestruturas de energias renováveis em percentagem do PIB.
- Eficiência energética: Utilização de energia por unidade do PIB.
- Alteração da Cobertura Florestal: Variação anual da área florestal (aumento ou diminuição).

Pontuação: Cada indicador é pontuado de 0 a 10, onde 0 indica desempenho ruim e 10 indica desempenho excecional em relação a uma referência ou meta internacional, como as metas do Acordo de Paris. As pontuações são calculadas em média para produzir uma Pontuação de Transição Verde composta para cada país.

4.2 TRANSIÇÃO DIGITAL

A Transição Digital representa a integração das tecnologias digitais em todos os aspetos da sociedade humana e a sua profunda influência nos sistemas económicos, nas estruturas de governação e na vida quotidiana. Este vetor é examinado através de indicadores como a taxa de penetração da Internet, a qualidade da infraestrutura digital e a contribuição dos setores digitais para o PIB, com dados provenientes da União Internacional de Telecomunicações e de vários institutos nacionais de estatística (União Internacional de Telecomunicações, 2023; OCDE, 2023).

Devemos começar por avaliar o estado atual da infraestrutura digital a nível mundial, observando as disparidades entre regiões desenvolvidas e em desenvolvimento. A análise inclui uma revisão dos avanços na conectividade digital e seus impactos na acessibilidade do mercado, educação e prestação de cuidados de saúde. Deve ser dada especial atenção ao papel dos serviços de administração pública em linha na melhoria da transparência e da participação cívica, apoiada por dados do Inquérito das Nações Unidas sobre a Administração Pública em Linha (Nações Unidas, 2023).

Além disso, esta análise explorará as implicações econômicas da transformação digital, destacando como a digitalização levou à criação de novas indústrias e à disrupção das tradicionais (Junge, 2019). Discute a mudança nos mercados de trabalho devido à automação e à inteligência artificial, citando estudos sobre o futuro do trabalho e a lacuna de competências. Além disso, será examinado o potencial das tecnologias digitais para reforçar a sustentabilidade através de uma melhor gestão dos recursos e de um impacto ambiental reduzido, ilustrando a convergência das transições digital e ecológica.

A subsecção deve abordar os desafios do fosso digital, que agrava as desigualdades sociais e dificulta o desenvolvimento económico em comunidades menos conectadas. Reflete sobre as medidas políticas e a cooperação internacional necessárias para assegurar que os benefícios das tecnologias digitais sejam distribuídos de forma ampla e equitativa.

Este exame detalhado visa sublinhar o poder transformador das tecnologias digitais e a sua capacidade para remodelar as paisagens económicas globais, melhorar a eficiência do setor público e redefinir a vida pessoal e profissional.

4.2.1 Escala de transição digital

Objetivo: Avaliar a integração e o impacto das tecnologias digitais num país.

Indicadores:

- Taxa de Penetração da Internet: Percentagem da população com acesso regular à Internet.
- Qualidade da infraestrutura digital: qualidade e disponibilidade da infraestrutura digital, incluindo redes móveis e de banda larga.
- Índice de Desenvolvimento da Administração Pública em Linha: Avaliação dos serviços digitais governamentais e da sua utilização pelo público.
- Integração da economia digital: contribuição do setor digital para o PIB.
- Competências e educação no domínio das TIC: disponibilidade das competências necessárias para a economia digital, medida pelos níveis de ensino das TIC e pelas competências da mão de obra.

Pontuação: Cada indicador é classificado numa escala de 0 a 10, com 10 a representar o mais alto nível de integração digital e acessibilidade. A média dessas pontuações forma a pontuação geral da transição digital para cada país.

4.3 TRANSIÇÃO PARA UMA NOVA GLOBALIZAÇÃO

O vetor da Nova Globalização examina a natureza evolutiva da interconexão global, concentrando-se nas mudanças econômicas, políticas e culturais que redefinem as relações internacionais. Esta análise utiliza métricas como a diversificação comercial, os fluxos de investimento direto estrangeiro (IDE) e a extensão da integração do comércio digital, baseando-se em dados da Organização Mundial do Comércio e da Conferência das Nações Unidas sobre Comércio e Desenvolvimento (UNCTAD) (Organização Mundial do Comércio, 2023; CNUCED, 2023).

Esta subsecção deve centrar-se na exploração da dinâmica em mudança do comércio global, enfatizando como os padrões tradicionais de comércio estão a ser alterados por tecnologias emergentes e mudanças geopolíticas. Deve considerar o impacto de grandes eventos globais, como pandemias e conflitos geopolíticos, na estrutura das cadeias de abastecimento globais e na cooperação internacional. A análise discute naturalmente como a resiliência e a sustentabilidade se tornaram cruciais em novos acordos comerciais e parcerias económicas, apontando para uma mudança da interdependência global para estratégias económicas mais regionalizadas.

Além disso, a investigação examinará o papel das plataformas digitais na reformulação do comércio, destacando como o comércio eletrónico e os serviços digitais estão a criar novas oportunidades e desafios para as empresas e economias tradicionais. A difusão das tecnologias digitais facilita transações transfronteiras mais rápidas e eficientes, mas também levanta questões relacionadas com a cibersegurança e a regulamentação dos espaços digitais.

A subseção também aborda as dimensões culturais da Nova Globalização, analisando como a tecnologia da informação permite uma troca mais rápida de produtos e ideias culturais, influenciando assim as normas sociais e as identidades individuais. Avalia as implicações deste intercâmbio cultural para a identidade nacional e a coesão social, baseando-se em exemplos dos fluxos mediáticos globais e da diplomacia cultural.

Ao aprofundar estas facetas, o projeto de investigação pretende fornecer uma visão abrangente de como a Nova Globalização está a moldar o mundo, identificando tanto as oportunidades para uma cooperação reforçada e inovação, como os riscos associados ao aumento da fragmentação e da disparidade económica.

4.3.1 Nova escala de globalização

Objetivo: Avaliar a adaptação e a influência de um país às novas formas de globalização económica.

Indicadores:

- Diversificação comercial: Diversidade e equilíbrio de parceiros comerciais e gamas de produtos.

- Fluxos de Investimento Direto Estrangeiro (IDE): IDE de entrada e de saída em percentagem do PIB.
- Integração do comércio digital: medida em que as plataformas e tecnologias digitais são utilizadas para o comércio internacional.
- Conectividade da Política Económica: Adoção de acordos multilaterais e participação em políticas económicas internacionais.
- Intercâmbio cultural e de informações: mede o fluxo transfronteiras de produtos culturais e de informações.

Pontuação: Os indicadores são pontuados de 0 a 10 com base no seu alinhamento com as tendências da globalização que enfatizam a resiliência e o desenvolvimento sustentável. As pontuações são calculadas em média para calcular uma Pontuação de Transição de Globalização para cada país.

4.4 TRANSIÇÃO PARA UMA ECONOMIA DE GUERRA

O vetor Economia da Guerra investiga as implicações econômicas do aumento dos riscos de segurança global e dos compromissos militares, concentrando-se em como as tensões geopolíticas estão influenciando a política econômica, a atividade industrial e as relações internacionais. As métricas críticas para esta análise incluem gastos com defesa como porcentagem do PIB, investimentos em tecnologia militar e índices de segurança global, com dados provenientes do Instituto Internacional de Pesquisa para a Paz de Estocolmo (SIPRI) e do Instituto de Economia e Paz (SIPRI, 2023; Instituto de Economia e Paz, 2023).

Esta subseção se concentrará em discutir as tendências atuais nos gastos globais com defesa, destacando regiões com investimentos militares significativos e os fatores que impulsionam esses gastos. Explora os efeitos económicos da militarização, incluindo o impacto nos orçamentos nacionais, na alocação de recursos e no emprego nas indústrias relacionadas com a defesa. O projeto de pesquisa também considera como o foco em capacidades militares pode desviar fundos de programas sociais e desenvolvimento de infraestrutura, afetando o crescimento econômico e a estabilidade a longo prazo.

Em uma perspetiva de longo prazo, também é considerada a ideia de que garantir a paz envolve se preparar para a guerra, então os países devem construir musculatura militar se quiserem evitar entrar em conflitos no futuro com vizinhos predatórios.

Além disso, a pesquisa examinará os avanços tecnológicos na guerra, como as capacidades cibernéticas e os sistemas não tripulados, que redefinem as noções tradicionais de segurança e combate. Avaliará a natureza de dupla utilização de muitas tecnologias modernas, que podem ter aplicações civis e militares, influenciando assim sectores económicos mais vastos.

A discussão estender-se-á às dimensões internacionais da Economia de Guerra, analisando como as alianças e os conflitos moldam o comércio global e as relações políticas. Esta secção também avalia o papel dos tratados internacionais e dos acordos de controlo de armas na moderação dos impactos da escalada militar na estabilidade global.

Esta exploração abrangente da Economia de Guerra visa fornecer informações sobre como as preocupações de segurança e a dinâmica militar estão intrinsecamente ligadas às políticas econômicas e às tendências do mercado global, afetando, em última análise, a prosperidade nacional e internacional.

4.4.1 Escala de Transição da Economia de Guerra

Objetivo: Medir o impacto de considerações militares e de defesa na economia de um país e na postura de segurança global.

Indicadores:

- Gastos com Defesa: Percentagem do PIB destinada à defesa.
- Inovação e Tecnologia Militar: Investimentos em tecnologia militar e adoção de tecnologias de guerra avançadas.
- Índice de Segurança Global: Um índice composto que reflete a paz, os incidentes de segurança e a estabilidade.
- Alianças e Tratados Internacionais: Número e força das alianças e tratados internacionais de defesa.
- Influência geopolítica: medida da capacidade de um país influenciar políticas e medidas de segurança globais.

Pontuação: Cada indicador recebe uma pontuação de 0 a 10, onde pontuações mais altas refletem uma posição de defesa mais forte e estável sem comprometer a estabilidade econômica. A média dessas pontuações forma o *War Economy Transition Score.*

4.5 GESTÃO DE CRISES HABITACIONAIS

O vetor Housing Crisis Management aborda os desafios da escassez de habitação urbana, acessibilidade e sustentabilidade, particularmente em regiões globais em rápida urbanização. Esta análise tira partido de indicadores como o rácio entre os preços medianos das casas e o rendimento mediano das famílias, a despesa pública em habitação pública em percentagem do PIB e a taxa de construção de novas unidades habitacionais per capita. As fontes de dados incluem autoridades nacionais de habitação e relatórios do mercado imobiliário, complementados por estudos internacionais de habitação (Fórum Económico Mundial, 2023; Nações Unidas, 2023).

Esta subsecção centra-se na análise do estado atual dos mercados imobiliários a nível mundial, identificando tendências na acessibilidade da habitação e os fatores que contribuem para as crises habitacionais em vários países. Discute o impacto do crescimento da população urbana na procura de habitação e a subsequente pressão sobre as infraestruturas e serviços existentes. A investigação irá também destacar abordagens inovadoras ao planeamento urbano e à construção que estão a ser implementadas para enfrentar estes desafios, tais como práticas de construção ecológica e a integração de tecnologias de cidades inteligentes.

Além disso, a análise explorará o papel das políticas governamentais na gestão da crise habitacional, incluindo iniciativas de habitação pública, leis de zoneamento e mecanismos financeiros projetados para apoiar os mercados de propriedade e aluguel. Deve considerar os efeitos destas políticas nos diferentes segmentos da população, em particular nos grupos vulneráveis que são desproporcionadamente afetados pela insegurança habitacional.

O debate estender-se-á às implicações sociais da instabilidade habitacional, tais como os efeitos na saúde, na educação e na coesão social. Ao fornecer um exame detalhado de como várias partes interessadas, incluindo governos, desenvolvedores privados e organizações comunitárias, estão abordando as complexidades da gestão da habitação, esta subseção visa delinear estratégias eficazes e recomendações políticas para mitigar a crise habitacional.

Esta exploração aprofundada da Gestão de Crises Habitacionais visa elucidar a natureza multifacetada das questões habitacionais e as suas implicações para o desenvolvimento urbano, a estabilidade económica e a equidade social, fornecendo uma base para a elaboração de políticas informadas e para a ação comunitária.

4.5.1 Escala de Gestão de Crises Habitacionais

Objetivo: Avaliar a eficácia com que um país está a gerir os desafios do sector da habitação.

Indicadores:

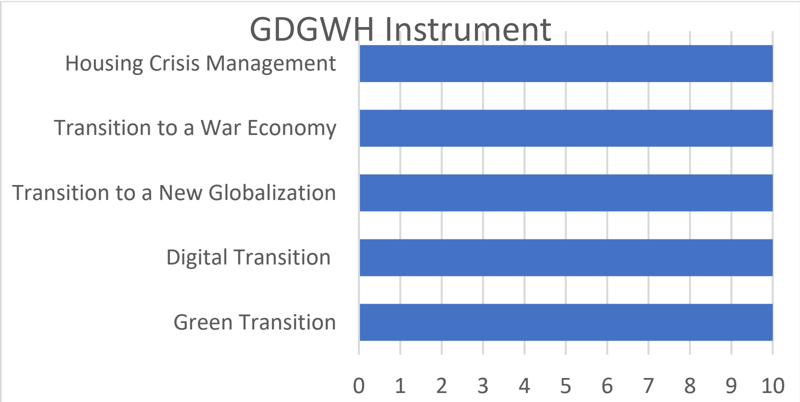
- Acessibilidade da habitação: Rácio entre os preços medianos das casas e o rendimento mediano das famílias.
- Investimento em Habitação Pública: Despesa pública em projetos de habitação pública em percentagem do PIB.
- Taxa de Oferta de Habitação: Número de novas unidades habitacionais construídas por 1.000 habitantes por ano.
- Taxa de sem-abrigo: Número de sem-abrigo por 10.000 habitantes.
- Regulação do Mercado de Aluguel: Força e aplicação das leis de proteção ao inquilino e controles de preços de aluguel.

Pontuação: Cada indicador é avaliado numa escala de 0 a 10, com 10 a indicar uma gestão ótima das questões relacionadas com a habitação. As pontuações são então calculadas em média para obter uma pontuação global de Gestão de Crise Habitacional para cada país.

5. DISCUSSÃO

5.1 SÍNTESE DOS RESULTADOS

A análise abrangente dos cinco vetores de transição – Transição Verde, Transição Digital, Nova Globalização, Economia de Guerra e Gestão de Crises Habitacionais – revela interconexões intrincadas que influenciam significativamente as paisagens econômicas e sociais globais. Os resultados sublinham os efeitos cumulativos desses vetores, ilustrando como eles não operam isoladamente, mas sim em um sistema complexo de feedback e influência.



Fonte: elaborada pelo autor (2024)

As Transições Verde e Digital, por exemplo, muitas vezes se cruzam, com avanços tecnológicos que permitem uma adoção mais eficiente e generalizada de práticas verdes, acelerando assim os esforços de sustentabilidade ambiental (Comissão Europeia, 2022; Agência Internacional de Energia, 2023). Por outro lado, o impulso para a digitalização aumenta as demandas de energia, o que pode estimular mais investimentos em fontes de energia renováveis ou exacerbar os desafios ambientais atuais, dependendo das fontes de energia utilizadas (União Internacional de Telecomunicações, 2023).

Da mesma forma, a Nova Globalização impacta e é impactada pela Economia de Guerra, pois mudanças no comércio global e nas alianças econômicas podem alterar os equilíbrios de poder geopolítico e influenciar a dinâmica de segurança internacional (Organização Mundial do Comércio, 2023; SIPRI, 2023). A Gestão da Crise Habitacional cruza-se com todos os vetores, uma vez que o desenvolvimento urbano precisa considerar a sustentabilidade, a infraestrutura tecnológica, a estabilidade económica e as preocupações de segurança, moldando e sendo moldado por transições sociais mais amplas (Fórum Económico Mundial, 2023).

5.2 IMPLICAÇÕES

As implicações práticas destes resultados são multifacetadas. Para os decisores políticos, existe uma clara necessidade de desenvolver estratégias integradas que considerem as interdependências destes vetores. As políticas destinadas a promover a digitalização, por exemplo, devem incorporar considerações de sustentabilidade energética para apoiar a transição verde. Além disso, a cooperação internacional torna-se primordial na gestão dos efeitos da Nova Globalização e da Economia de Guerra, exigindo esforços coordenados para garantir a estabilidade global e o crescimento econômico equitativo.

Para as empresas, a análise sugere a importância da agilidade e da previsão na navegação por essas transições. As empresas devem adaptar-se às tecnologias em rápida mutação, às condições económicas em mudança e à evolução dos ambientes regulamentares. Existe também uma oportunidade significativa para as empresas liderarem a inovação, em particular nas tecnologias verdes e no desenvolvimento urbano sustentável, que são áreas críticas de necessidade e crescimento.

As comunidades globais também devem se preparar para os impactos dessas transições. As iniciativas lideradas pela comunidade em matéria de sustentabilidade, literacia digital e desenvolvimento económico local podem aumentar a resiliência e garantir que os benefícios das alterações globais são partilhados equitativamente.

5.3 DESAFIOS E OPORTUNIDADES

Cada vetor apresenta desafios e oportunidades específicos. A transição verde, embora seja essencial para a sustentabilidade, enfrenta desafios de escalabilidade e integração com os sistemas energéticos existentes. No entanto, também oferece oportunidades de crescimento económico através de novas tecnologias e indústrias verdes (Programa das Nações Unidas para o Ambiente, 2023).

A transição digital oferece um enorme potencial para melhorar a conectividade e os serviços, mas suscita preocupações quanto ao fosso digital e às questões de privacidade. Para enfrentar estes desafios, são necessárias políticas e investimentos sólidos em infraestruturas digitais e na educação, a fim de garantir benefícios inclusivos (OCDE, 2023).

A nova globalização introduz oportunidades para diversificar as conexões econômicas e reduzir a dependência dos mercados únicos, mas também apresenta riscos relacionados ao protecionismo e à soberania econômica (UNCTAD, 2023).

A Economia de Guerra requer uma gestão cuidadosa para equilibrar as necessidades de defesa com uma estabilidade econômica e social mais ampla, oferecendo oportunidades de avanço em tecnologias de defesa que poderiam ter aplicações pacíficas (Institute for Economics & Peace, 2023).

Finalmente, a Gestão de Crise Habitacional é desafiada pela rápida urbanização e recursos limitados, mas também apresenta oportunidades para soluções inovadoras de habitação e planejamento urbano que podem melhorar a habitabilidade e a sustentabilidade (Nações Unidas, 2023).

De um modo geral, embora os vetores de transição apresentem desafios significativos, também oferecem oportunidades sem precedentes para remodelar o futuro global de formas sustentáveis, seguras e inovadoras.

5.4 PERSPETIVAS PARA O FUTURO

Olhando para além de 2030, prevê-se que estes vetores continuem a evoluir, influenciados por avanços tecnológicos, desafios ambientais e cenários geopolíticos em mudança. Como tal, torna-se imperativo estabelecer mecanismos robustos para medir continuamente os progressos que cada país está a fazer nestas áreas. Esta avaliação contínua permitirá aos decisores políticos, às empresas e às comunidades adaptar as estratégias em resposta às tendências e desafios emergentes.

O quadro de indicadores proposto para cada vetor fornece uma abordagem estruturada para acompanhar e avaliar os progressos de forma abrangente no presente e no futuro:

Tabela: Resumo dos Indicadores para Avaliação de Vetores de Transição

Vetor	Indicadores	Fontes de dados
Transição verde	Consumo de Energias Renováveis Intensidade de Emissão de Carbono Investimento Verde Eficiência energética Mudança na cobertura florestal	Avaliação Mundial dos Recursos Florestais da FAO Banco Mundial Agência Internacional de Energia (AIE) Estatísticas nacionais Programa das Nações Unidas para o Ambiente
Transição digital	Taxa de penetração da Internet Qualidade da infraestrutura digital Índice de Desenvolvimento da Administração Pública em Linha Integração da economia digital Competências e educação no domínio das TIC	União Internacional das Telecomunicações Inquéritos de competências da OCDE, UNESCO Banco Mundial, Estatísticas nacionais da educação Autoridades nacionais de telecomunicações Inquérito das Nações Unidas sobre a administração pública electrónica
Nova Globalização	Diversificação do comércio Fluxos de Investimento Direto Estrangeiro Integração do comércio digital Conectividade da política económica Intercâmbio cultural e de informações	Organização Mundial do Comércio Estatísticas nacionais, FMI, UNESCO Conferência das Nações Unidas sobre Comércio e Desenvolvimento (CNUCED) União Internacional das Telecomunicações
Economia de Guerra	Gastos com defesa Inovação e Tecnologia Militar Índice de Segurança Global Alianças e Tratados Internacionais Influência geopolítica	SIPRI, Instituto de Economia e Paz Estatísticas nacionais Índice Global da Paz Registo dos tratados das Nações Unidas dados de alianças internacionais de segurança.
Gestão de Crises Habitacionais	Acessibilidade da habitação Investimento em Habitação Pública Taxa de Oferta de Habitação Taxa de sem-abrigo Regulamento do Mercado de Arrendamento	Nações Unidas, Autoridades Nacionais de Habitação Relatórios da indústria da construção Estatísticas nacionais

Fonte: elaborada pelo autor (2024)

Esta tabela servirá como uma ferramenta fundamental para rastrear e impulsionar as transições necessárias em direção a um futuro global mais sustentável, seguro e inclusivo.

5.5 APELO À AÇÃO

Para navegar melhor nestas transições, é necessária mais investigação em várias áreas fundamentais. Em primeiro lugar, estudos interdisciplinares que exploram as interações entre esses vetores podem fornecer insights mais profundos sobre seus impactos combinados na estabilidade e no desenvolvimento globais. Além disso, a investigação de mecanismos políticos inovadores e soluções tecnológicas que respondam aos desafios identificados em cada vetor é crucial. Por exemplo, explorar políticas económicas que possam impulsionar simultaneamente transições verdes e digitais, ou modelos de planeamento urbano que integrem habitação, sustentabilidade e tecnologia, seria particularmente valioso.

Por último, é vital reforçar a colaboração internacional na investigação e formulação de políticas, a fim de assegurar que as soluções sejam globalmente inclusivas e respondam eficazmente à natureza interligada destes desafios globais.

6. CONCLUSÃO

Este artigo examinou os vetores significativos da transição que moldam nosso cenário global: Transição Verde, Transição Digital, Nova Globalização, Economia de Guerra e Gestão de Crises Habitacionais. Através de uma análise integrada, tornou-se evidente que estes vetores estão profundamente interligados, com os seus efeitos cumulativos preparados para redefinir as estruturas económicas e sociais em todo o mundo.

A **Transição Verde** foi identificada como crucial para o desenvolvimento sustentável, com indicadores-chave como o consumo de energias renováveis e a intensidade das emissões de carbono a orientarem a nossa avaliação (Agência Internacional da Energia, 2023; Banco Mundial, 2023). A **transição digital** está a remodelar as indústrias e as interações sociais, medidas pelas taxas de penetração da Internet e pela qualidade da infraestrutura digital (União Internacional das Telecomunicações, 2023). **A nova globalização** está alterando a dinâmica do comércio global e da cooperação econômica, com a diversificação comercial e a integração do comércio digital como métricas centrais (Organização Mundial do Comércio, 2023; CNUCED, 2023). A **Economia de Guerra** enfatiza a importância do monitoramento dos gastos com defesa e dos avanços tecnológicos nas capacidades militares (SIPRI, 2023). Finalmente, **a Gestão da Crise da Habitação** é crucial para garantir a sustentabilidade urbana e a acessibilidade, avaliada através de métricas como a acessibilidade da habitação e o investimento em habitação pública (Nações Unidas, 2023).

A análise sublinhou a importância destes vetores na condução das mudanças globais e destacou a necessidade de uma gestão estratégica para aproveitar os seus potenciais benefícios e, ao mesmo tempo, mitigar os riscos associados.

Esperemos que, por altura da conferência, as avaliações do Instrumento GDGWH estejam disponíveis para cada país da UE.

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CHAPTER 6

MEMORY AS THE FOUNDATION OF THE CONSTRUCTION OF SOCIAL IDENTITY IN O VENIDOR DE PASSADOS, BY JOSÉ EDUARDO AGUALUSA

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RESUMO: A memória é um componente organizador das lembranças passadas e um ícone formador da identidade social de um indivíduo. Consoante a isso, o trabalho em questão foi objetivado para destacar os efeitos de memória e a história social para a formação de novas identidades para os personagens do romance **O Vendedor de Passados**, do escritor africano José Eduardo Agualusa.

PALAVRAS-CHAVE: memória, identidade, história, sociedade.

ABSTRACT: Memory is an organizing component of past memories and an icon shaping an individual's social identity. Depending on this, the work in question was aimed at highlighting the effects of memory and social history for the formation of new identities for the characters of the novel **O Venidor de Passados**, by the African writer José Eduardo Agualusa.

PALAVRAS-CHAVE: memory, identity, history, society.

1. INTRODUCTION

José Eduardo Agualusa[1], writing *A salesman of the Past,* did not attempt to simply bring out a character who had the profession of creating pasts, but mainly to criticize the emerging Angolan society of that time, which was seeking appreciation or even self-affirmation as it emerged two years ago from a civil war that had devastated the country, affecting mainly its economy. Agualusa in his book portrays this need to assert the way of life of an outcropping society (economically speaking) and, at the same time, criticizes this behavior with reflections made in the course of the plot. In order to analyze this process not only of structuring social identity but also of the importance of memory for all this concatenation present in the book *The Vendor of* Past we use the *textsMemory and History,* by Jaques Le Goff[*],The construction of the social identity *of Odir Berlato*[*] *and*Memory, history and subject: substrates of the identity of Lucilia de Almeida Neves[*] that allows us not only a detailed work but also a very conclusive perception about the category designated for our analysis. The relevance of memory for the composition of social identity is sometimes left aside because we do not consider memory as part of the legitimation of the social being, if at birth we are already part of history (how much social being), we also start the constant process of production and seizure of memories. Le Goff (1990), in general terms, does a detailed summary about memory, although it delves into memory as it emerges in the historical sciences and in collective and individual memory, which is what interests us most. Neves (1999) treats memory as a "[...]way of preserving and retaining time, saving it from oblivion" which leads us to agree, stating that memory does not only portray what we once were, what we have lived, but also brings all the historical social context in which we have been. We also supported ourselves in Berlatto (2009) which states that "The social identity of an individual is characterized by the set of its bonds in a social system [...] and allows the individual to be located in a social system and be located socially" since for the formation of social and historical individuality, the pertinence of memory should not be ignored since, it legitimizes our

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[*] Jacques Le Goff, a French historian and member of the Annales School, was employed in the historical anthropology of the medieval West.
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participation in history both as a patient (possessor of memories) and as an agent (driver of memories) what makes us not part of memory, memory itself.

2. MEMORY, HISTORY AND IDENTITY BUILDING IN "THE PAST SELLER"

History establishes relationships with memory. The memory, according to Jacques Le Gooff (1990), is where information concerning psychic functions is kept that allows the individual to update or reinterpret past impressions or information. Founded on the words of Neves (1999), "history can be identified as a food of memory and, simultaneously, memory can be taken as one of the sources of information for the construction of historical knowledge." PAGE 111. The historical knowledge on which fiction was based, unlike all the rest of the narrative, is true and is situated in the context of the fall of the European colonial empires, and in the case of O Venador de Passados, especially, the changes in Angola that ceased to be a Portuguese colony and undergoes a process of social transformation, which post-modern literature has highlighted quite nowadays.The proof of this historical knowledge linked to the identity of the characters of the novel is built on the imagination of Albino, which creates pasts that allow the affirmation to the current social life of post-modernity Angolan citizens.

In this context, we can highlight the majority of the characters in the novel, who seek to enter the new Angolan society by buying new pasts. This acquisition implies not only in the past, but in new social identities.

Freud was the first scholar to develop studies on human memory, highlighting its distinctive character, namely that "we remember things in a partial way, from external stimuli, and we choose memories."[*]. Memory plays an important role in constructing the identity of the individual. It has the past as a mechanism for confirming and preserving the facts and stories narrated by the subjects over time. This redemption in distant memory serves as support for the present and can be considered as an object of updating the past.

In this same relational context between memory and history, what Odir Berlatto (2009) highlights as an individual or collective social identity is governed. Studies about collective identity arose from oral history and has particularities, since they revolve

[*] LE GOFF (1990). Memory and History. Available at: http://memorial.trt11.jus.br/wpcontent/uploads/Hist%C3%B3ria-e-Mem%C3%B3ria.pdf. Accessed: 18/11/2015

around the recollections of the day to day life of the group and tend to "idealize the past".Collective memory also underpins the identity of the group, but it is generally attached to facts considered to be founders. So, simplifying all the rest of the past, and can constantly rework the past. This identity results from the dialectic between subject and society and can be both inclusive "because only those who are identical in a certain point of view- and exclusion- are part of the group, since from the same point of view they are different from the others" (BERLATO, 2009 p. 142).

It can be said then, according to the above, that the characters of the novel underwent identity crises that put them in a stage of exclusion. These crises were solved by Félix Ventura through his work, done on identity strategies.

Consider the case of the Minister who had a social identity of exclusion which was replaced by an identity of inclusion through identity strategies built by Félix Ventura:

> ‘... This is his paternal grandfather, Alexandre Torres dos Santos Correia de Sá e Benevides, a direct descendant of Salvador Correia de Sá e Benevides, a Rio de Janeiro illustrious who in 1648 freed Luanda from Dutch rule... I have documents proving that you are descended from Mutuya Kevela himself, from N'Gola Quiluange, even from Queen Ginga. Do you prefer?
> — No, no, I'll stay with the Brazilian himself. Was the guy rich?..."

By assuming the position of minister in the new Luandan society, the subject needed a well-founded family history, mainly in big names and consequently possessing great wealth to power, so could fit into the standards demanded or expected by the newly independent society. We see in the figure of the minister, the need for a new social past instigated by the need to be well regarded in the eyes of present-day Luandan society. This realization served more to assert a social than a personal identity. He needed it to be socially accepted.

According to Berlatto (2009), individuals who live in various cultures can create their own identity by synthesizing different materials. In this way any individual can acquire a syncretic identity, which is understood by two identities for a single person. Even if this is possible, it is not what happens in The Past Seller. In it, the characters do not want to maintain two identities, which is an escape from themselves.

In Agualusa's novel (2008), the role of identity builder is played by Albino, a genealogist who undertakes to bring new social identities to life for all his clients through strategies harvested from his work object. The strategy used by Albino is to create a past by setting up a family tree of the new individual where his whole life is explained according to facts of a real past, researched and taken from the countless files and video cassettes that he collects as an object of work. Let's see:

> Félix Ventura studies the newspapers while he is having dinner, he leafs over them attentively, and if any article interests him, he indicates it in lilac ink with a pen. Finish eating and then cut it carefully and store it in a file. On one of the bookshelves there are dozens of these files. Hundreds of video tapes sleep in one another. Félix likes to record news, important political events, everything that may be useful to him one day. The cassettes shall be sorted alphabetically by the name of the person or event to which they relate. (Agualusa, 2008, p. 27).

These files then become all past memories of the individuals created by Ventura. Lee Goff (1990) discusses ethnic memory—the memory that is constructed from orality, from the memories of a people who probably did not have a developed writing system, and memory written down—memory recorded by the people, which thus perpetuates itself through the records. In the novel, we cannot make a distinction about the types of memory, we can only say that the memory that will permeate the life of someone who buys a past, will be introduced into his mind through the oral modality, configuring itself as an ethnic memory, and that will be reproduced by him by an ethnic memory that can be "proven" through documents and or printed media, recorded in written form, as for example the headlines of newspapers, and still recorded in the oral modality, through audio files.

From these creations we then move on to the relationship of acceptance and recognition of identity, which is present in the book and which according to Neves (1999) is constructed in all the ways of sharing history, even in the conflicting moments. From this process of sharing the subject recognizes the similarities and differences in relation to the social groups that surround it. Regarding social groups, which are the result of historically structured elements, Le Goff (1990) says that social memory is one of the best ways to address problems in time and history.

In the work, the process of recognition and acceptance is done in a natural way, without there being any kind of barrier or difficulty. This fact is a component of power, as it ensures the likelihood of the text. Note in the two quotes:

> So let's go back to José Buchmann. I'm not suggesting that within a few days it burst out of him, shaking large, multi-colored wings, a huge butterfly. I am referring to more subtle amendments. First of all, he's changing his accent. He lost, he has lost, that pronunciation between Slavic and Brazilian, a bit

> sweet, a bit hissing, which at first so disconcerted me. It is now used a Luandan rhythm, matching the silk shirts and the sports shoes that she started to wear. I think it's also more expansive. Laughing, he's already Angolan. Besides, he took off his mustache, got younger. He showed up here tonight, after almost a week's absence, and as soon as the albino opened his door, he shot... (Agualusa, 2008, p. 75-76)

> José Buchmann, don't you understand?, he took the body of the foreigner. It becomes more truthful with each passing day. The other, what was before, that night guy who came in through our house eight months ago, as if he came, I don't even say from another PIS, but from another time, where is he? (Agualusa, 2008, p. 89-90)

The above excerpt is part of the narrative of Osga, the character narrator of the novel. He, Eulalio, expresses his vision of astonishment in relation to the first and the last visit that José Buchmann made to Felix Ventura. This demonstrates the great change in habits, modes and styles of the foreigner by acquiring the identity of José Buchmann, created by Ventura. At that time, acceptance and recognition were realized with a focus on Pedro Gouveia's goal, José Buchmann's true identity and who suffered from an excluded social identity, and who feared to be recognized by the war fighters who kept him imprisoned for years while searching for his daughter, Ângela Lúcia. In the light of the above, one can highlight in the figure of Pedro Gouveia or José Buchmann a predisposition to syncretic identity, for the fact that he had lived in different places and had known several different cultures, which directly or indirectly contributed to the acceptance of the new identity, even if it arose from a memory other than his own.

In addition to his clients, Felix also lives according to false pasts that he himself created and which he lives so intensely that he himself believes in his own lie, claiming that it really exists. Just as he creates for his customers, Félix Ventura also has one or several different pasts, living with such intensity that even he himself starts to believe that that really exists. Passages of this fact are observed both in Osga's narratives. The fact can be seen in Osga's narratives, set out below:

> I like listening. Felix speaks of his childhood as if he had lived it... (Agualusa, 2008, p. 114)

> I envy his childhood. It could be fake. I still envy her. (Agualusa, 2008, p. 118)

As well as Ventura's own narrative, which reveals to us the possibility of the character passing through flows of memory and being aware of this. Notice:

> ... Excluding the portrait, the story I told you is authentic. Anyway, at least as much as I remember. (Agualusa, 2008, p. 148)

What characterizes what Félix talks about his past, are the flows of memory that happen constantly in the life of the seller of pasts.The naturalness with which these flows happen makes the character end up transposing events or symbolic objects that were part of his past, whether it be real or imagined. We note better in the quotation below in which Félix Ventura, in telling José Buchmann who was his mother, introduces the mirrors, a symbolic object in the youth of Albino, in another incarnation, and that may have appeared unconsciously in the constitution of the past of Eva Miller, Buchmann's mother, but that unfortunately does not allow us to be certain as a consequence of the memory flows of Felix. The other incarnation refers to Osga's human materialization, which she refers to repeatedly throughout the narrative also in moments of memory activation. We'll see below.

> Eva Miller worked as an interior decorator. She lived in Manhattan, alone, in a small apartment overlooking Central Park. The walls of the tiny room, the walls of the single room, the walls of the narrow corridor, were covered with mirrors. (Agualusa, 2008, p. 60)
>
> ... Yes, I had turned eighteen, and I had never had a woman. Dagmar led me by the hand through a maze of corridors and when I realized it was, we were both in a huge room haunted by grave mirrors (...) It was a lightning flash, a revelation, I saw it, multiplied by mirrors, let go of the dress and let go of the breasts... (Agualusa, 2008, p. 49-50)

Memory provides us with links to the past based on the moments we have gone through for a long or short time. According to Neves (1999), in contemporary times there has been much discussion about remembering and remembering, what happens in the quotes above, and it is important to highlight what Marilena Chauí calls social or historical memory that constitutes an active social process and is essential both from new points of view and from existing points of view. There is no spontaneous memory, so men feed the past to build places that can be rooted in the memory of eternity and in social memory. We see this rooting in the memories of the characters Ventura and Eulálio as they bring elements of another life. Please note:

> ... I remember my human name without pleasure, without pain as well. I don't miss you. It wasn't me. (Agualusa, 2008, p. 59)

The quotation lets us note that what was said by Eulalius was recovered in memory from the mechanism of recollection. What was narrated represents a fact. But one notices the presence of an identity of exclusion, or the non-acceptance of the identity, represented at this moment by the irrelevance of being remembered the name of the individual that consequently leads to unpleasant moments in the past, which the individual prefers to leave in oblivion, denying aspects of the identity. Deepening the focus on the construction and recognition of identity that according to Neves (1999) "is what motivates men to pore over the past in search of temporal or spatial landmarks that constitute the real references of remembrance." p. 112 is of great value to observe the negation by discomfort caused by remembrance.

In relation to this we introduced what Berlatto (2009) calls stigma. In other words, stigma are negative concepts assigned to a species or individual by itself or by others. According to Goffman the stigma can be identified as

> ... individual guilt, perceived as weak will, tyrannical or unnatural passions, false beliefs from known accounts of, for example, mental disorder, imprisonment, alcohol addiction, homosexuality, unemployment, suicide attempts and radical political behavior. (Berlatto, 2009, p. 146)

Starting from the above, we will use facts from Osga's memory, Eulalio to prove the presence of an identity stigma specific to her when in her human materialization, we see:

> I liked women. I used to hang out with one or other close friend on long walks. I embraced them at their farewell, and the perfume of their hair, the contact with their hard breasts, excited me. However, if anyone took the initiative to kiss me, or to propose something bolder than a kiss, I would remember Dagmar (Aurora, Alba, Lúcia) and would panic. I've lived long years as a prisoner of that terror. (Agualusa, 2008, p. 180)

The demonstration of a dissatisfaction with the identity exposed above is closely linked to what Berlatto defined as stigma, or stigmatized individual. The construction of the identity of the stigmatized individual is due to the distance between the virtual identity - that attributed to individuals by others, and the real identity - the true identity of the individual. The individual not being satisfied with his identity will not trigger with pleasure the memory so that the memories are constituted that will confirm his social identity, which will be denied in some way. Osga suffers stigma disorders resulting from an individual character guilt that may have arisen from an unnatural passion he developed for Dagmar in his teens. All this can be proven by the quotations already used in the work, in which we quote the name of Dagmar and an account of the experience between her and Eulalius when in his supposed human state.

However, identity can be constructed, deconstructed and reconstructed. Still based on Berlatto (2009) and what the same talks about the construction of identity, there are changing frontiers that any change in the social, economic or political situation can cause the displacement of these frontiers. These boundaries are symbolic and are therefore seen as social demarcations that can be renewed by exchanges. Bringing this into the sphere of romance, we have the exchanges, represented by the reincarnation attributed to Eulalius and Ventura. Ventura! The two identities, though of the "same soul", differ in many respects. One aspect and perhaps the most important are the epoch and the social reality in which each of them was inserted during their human materialization, which allows us to accept and understand the strange divergences of the reptile. We will use the quotes below to make a comparison between the two personalities. Please note:

> I liked women. I used to hang out with one or other close friend on long walks. I embraced them at their farewell, and the perfume of their hair, the contact with their hard breasts, excited me. However, if anyone took the initiative to kiss me, or to propose something bolder than a kiss, I would remember Dagmar (Aurora, Alba, Lúcia) and would panic. I've lived long years as a prisoner of that terror. (Agualusa, 2008, p. 180)
>
> Felix turned to his wife and kissed her on the lips. I saw her, not without awe closing my eyes and accepting the kiss. I heard her moan. The albino tried to undress his shirt. She stopped him. ... My friend sighed. (Agualusa, 2008, p. 196)

We conclude that from the human condition of Eulalio until the reincarnation in Félix Ventura there were several, or at least one frontier(s), which were renewed through the evolution of time and in consequence of the social, cultural and political transformations found in each era of exchange, and which provided fuel for the renewal of identity during each exchange and dilution of Eulalio's identity stigma, and resulting in its evolution, since Eulalio speaks of Ventura with satisfaction, esteem and sometimes with envy. This evolution allowed the dilution of the stigma infiltrated in the identity of Eulalio, who thus failed to stigmatize the identity of Félix Ventura.

3. FINAL CONSIDERATIONS

It is therefore important to point out that the social identities of individuals arise from the dialogs between the subject, society and the historical manifestations, and from the inter- and intra-personal memories which even allow this individuality to go through setbacks. The formation of the social identity of the characters of *The salesman of pasts* is given from a social context of complete dissatisfaction in which the characters seek a self-portrayal to feel inserted in certain social conjunctures grounded in society through collective memory and history, as well we can observe in the theories used, which is notoriously related to the changes observed in the social, political and economic structure of the country that has just come out of a civil war and becomes independent. These transformations were propelling for the formation of new identities that were forged to correspond not only to a desire for social inclusion (in the Angolan national context) but also a way of personal fulfillment.

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CHAPTER 7

COMPUTATIONAL MODELING OF LOCALIZED CORROSION IN STEEL PIPELINES SUPPORTED BY COMPOSITE SLEEVES

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ABSTRACT: Pitting corrosion is a worrying phenomenon in the oil industry representing a major threat that can lead to the reduction of the structural integrity of pipeline transportation networks. To prevent this corrosion risk, active cathodic protection with a potential maintained at – 850 mV Cu/CuSO4 is used as a coating protection system based on bituminous binders to isolate the steel from the corrosive soil environment in hydrocarbon transportation pipelines. In this work, we examine the clock spring repair method by applying composite paths including a numerical simulation on corroded tubes using ANSYS software. The approach involves analyzing the structure under three scenarios: without defects, after the introduction of elliptical simulated corrosion pits, and following repair with multilayer reinforcement using a composite sleeve. The results indicate that the stress distribution varies across each scenario. In the case of a structure with parabolic corrosion defects, the Von Mises stresses are unevenly distributed. The defect exhibits a peak stress that could lead to the propagation of corrosion pits, necessitating repair. Conversely, in the scenario where the corroded structure is reinforced with a composite sleeve, the maximum Von Mises stress is decreased to levels comparable to those of an uncorroded pipe, demonstrating the necessity and effectiveness of using composite sleeve reinforcement.

KEYWORDS: localized corrosion, API steel, pitting corrosion, numerical simulations, composite sleeve.

RESUMO: A corrosão por pites é um fenômeno preocupante na indústria do petróleo, representando uma grande ameaça que pode levar à redução da integridade estrutural das redes de transporte por dutos. Para evitar esse risco de corrosão, a proteção catódica ativa com potencial mantido em – 850 mV Cu/CuSO4 é usada como um sistema de proteção de revestimento baseado em ligantes betuminosos para isolar o aço do ambiente corrosivo do solo em tubulações de transporte de hidrocarbonetos. Neste trabalho, examinamos o método de reparo de molas de relógio aplicando caminhos compostos incluindo uma simulação numérica em tubos corroídos usando o software ANSYS. A abordagem envolve a análise da estrutura em três cenários: sem defeitos, após a introdução de poços de corrosão simulados elípticos, e após reparo com reforço multicamadas usando uma luva composta. Os resultados indicam que a distribuição do estresse varia em cada cenário. No caso de uma estrutura com defeitos de corrosão parabólica, as tensões de Von Mises são distribuídas de forma desigual. O defeito apresenta um pico de tensão que pode levar à propagação de poços de corrosão, necessitando de reparo. Por outro lado, no cenário em que a estrutura corroída é reforçada com uma manga composta, a tensão máxima de Von Mises diminui para níveis comparáveis aos de um tubo não corroído, demonstrando a necessidade e eficácia da utilização de reforço de manga composta.

PALAVRAS-CHAVE: corrosão localizada, aço API, corrosão por pite, simulações numéricas, luva composta.

1. INTRODUCTION

The transportation of hydrocarbons is carried out using steel pipelines, which can be either buried or above ground. These steel pipes are manufactured according to the American Petroleum Institute (API) standard X60 [API SPECIFICATION 5L (SPEC 5L)], which specifies certain mechanical properties and limits for the chemical composition of four elements: carbon, manganese, phosphorus, and sulfur. To prevent corrosion, the steel is coated with bitumen-based materials and protected through cathodic protection (CP), maintaining a potential of -850 mV Cu/CuSO4 to isolate the steel from the surrounding soil. However, under specific conditions, corrosion issues can arise, leading to pitting corrosion [A. BENMOUSSAT, M. HADJEL AND M. TRAISNEL]. These metallic structures are particularly vulnerable to corrosion and geometric instability due to minor shape imperfections [D. LANDOLT]. Such corrosion typically occurs in areas where the soil is corrosive and protective measures fail, resulting in pitting failures linked to the interaction between the steel and corrosive soil parameters. The primary failure causes include pitting corrosion and corrosion cracking. The corrosion process in soil is influenced by various physicochemical factors such as soil composition, resistivity, and the chemical makeup of the steel.

Corrosion risks such as external chemical interaction are preoccupying phenomena in oil industry and the major threats that can reduce the structural integrity of pipelines transmission system. It is a consequence of electrochemical interaction between materials steel and soil environment in order to return in oxide state form thermodynamically more stable. It can be seen in its overall shape as a spontaneous reaction of electron exchange at the metal / environment interface. Their sizing is done by using simplified rules; this approach is generally conservative. The design is usually based on the knowledge of the real or perceived initial state. However, this configuration evolves over time; there is generally an adding of new deformities due to the operation, but also to the loss of material located in the corroded areas.

The goal of applying external steel protection through coating, especially in cases of pitting corrosion, is to identify effective repair methods that facilitate a quick restart and minimize production downtime. Our research focuses on reinforcing steel with composite material fibers (glass or carbon) applied in one or more layers. This study will explore these reinforcements as an attachment to the metal surface. The aim is to enhance our understanding of steel's durability, reduce pitting corrosion during operation, maintain the structural integrity, and improve maintenance practices. Literature indicates that the load-bearing capacity of reinforced structures significantly increases when specific construction guidelines for the composite reinforcement layers are applied [TAVAKKOLIZADEH, M. AND SAADATMANESH, H., J. STRUCT GIRDERS].

Authors [ADAMS, R.D., ATKINS, R.W., HARRIS, J.A. AND KINLOCH, A.J.,] nano-particles have been considered at the interface between the composite patch and the metallic structure. Carbon nano-tubes conduct electricity as well as can improve the interface bonding strength [J. ADH]. A two-dimensional finite element analysis is presented to predict crack growth behavior of cracked panels repaired with bonded composite patch. Fatigue experiments were conducted with precracked aluminum specimens. The analysis provides a conservative assessment of durability and damage tolerance of repaired thin and thick panels.

Advanced composite materials have become increasingly popular in high-performance structural designs, particularly in aerospace applications. These materials are essential for creating lightweight components that possess excellent mechanical properties, enabling them to withstand challenging service conditions while also enhancing energy efficiency [YOUNG W. KWON]. However, one of the major challenges that the aerospace industry faces with advanced composites.

In this manuscript, the reparation method will be investigated using a numerical modeling by finite element method developed by ANSYS software. We will examine steel tubes containing corrosion defects such as corrosion pits repaired by reinforcement with composite material fibers containing one or more layers.

2. MATERIALS AND METHODS

The theoretical framework in a study comprises a critical and organized analysis of the literature relevant to the topic, providing a theoretical contextualization and defining the key concepts. It must comprehensively contain theories, models and previous research, identifying gaps, contradictions and consensuses in the literature that are important for the focus of the work being developed.

2.1 STUDY MATERIAL

The material's chemical composition, as detailed in Table 1, was analyzed using a SpectroRp 212 spectrophotometer located at the ALPHAPIPE Annaba plant for spiral tubes. The stresses present in the tube include radial stress, hoop stress and tensile stress [ADAMS, R.D., ATKINS, R.W., HARRIS, J.A. AND KINLOCH, A.J.].

Table 1. Chemical composition (%)

C	Si	Mn	P	S	Cr	Ni
0.213	0.380	1.35	0.015	0.016	0.025	0.024
Al	Co	Cu	Nb	Ti	(S+P)	Ceq
0.067	0.007	0.029	0.078	0.003	0.031	0.45

Table 2. Tensile test [7]

Tests number	Re (MPa)	Rm (MPa)	A %	Z %
1	410	557	32	49
2	413	569	30	53
3	417	578	33.3	55
4	413.33	568	31.76	52.33

Table 3. Characteristics of materials (composite, adhesive and steel)[8]

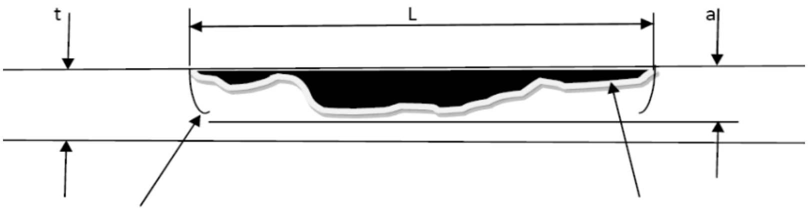
	Materials	E1 (GPa)	E2 (GPa)	E3 (GPa)	v12	v13	v23	G1 (GPa)	G2 (GPa)	G3 (GPa)
Clock spring	Glass/epoxy	160	25	25	0.21	0.21	0.21	7.5	5.5	5.5
adhesive	FM73	255			0.32					
Pipe	Steel X60	210			0.30					

E- Young modulus

2.2 B31G MODEL

ASME B31G [S. MALL, D.S. CONLEY] is a code intended to evaluate the residual breaking strength of a corroded pipe. It constitutes an additive to ASME B31 used for the tubes under pressure. The entry parameters comprise the external diameter (Dext), the thickness (t), the necessary minimal elastic limit, the maximum operating pressure, the longitudinal maximum extension of corrosion (2c) and the depth of the defect (a).

Figure 1. Long defect of corrosion projected according to a rectangular form



The rupture equation of the corroded tubes is established starting from the experimental data and is expressed from the two following conditions:

- firstly, the maximum total circumferential constraint cannot exceed the elastic limit of material;
- secondly, a defect of corrosion runs is compared to its projection according to a parabolic form and a long defect of corrosion is projected according to a rectangular form.

Figure 2. Representation of a corrosion defect on the tube

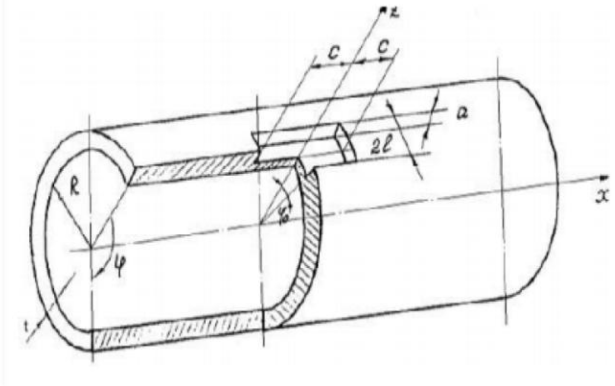


Figure 3. Front longitudinal of a corrosion defect

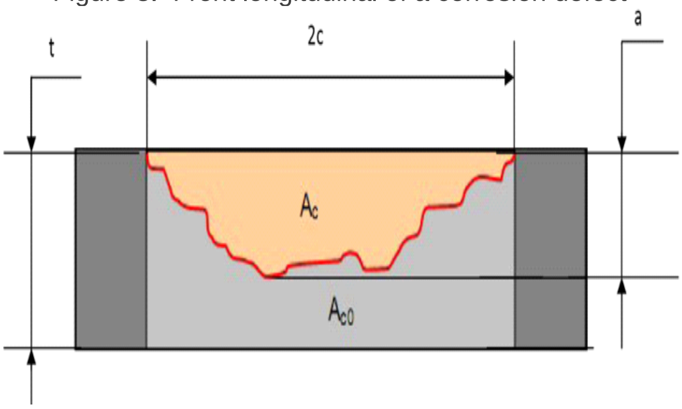
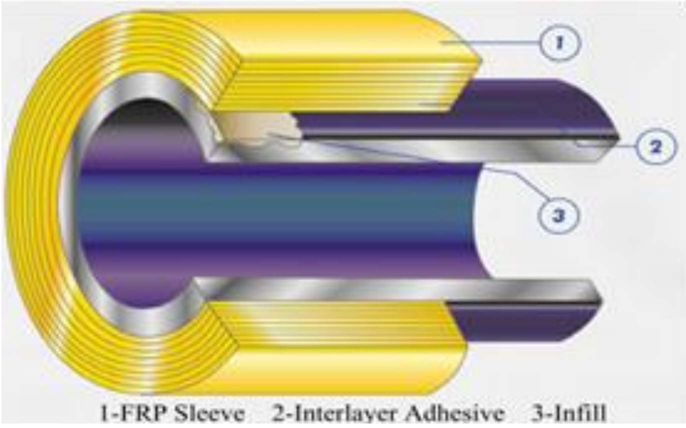


Figure 4. Repair by Clock Spring type composite reinforcement [KALI BABU KATNAM, DASILVA, TREVOR YOUNG]



2.3 NUMERICAL SIMULATION

Industrial problems such natural gas pipelines transmitting are usually modeled by partial differential equations. These equations are hard to be solved; this leads us to the use of numerical approximation methods. The finite element method has now become one of the most common numerical methods for solving these equations. Its efficiency has been proved in several areas of science including solid mechanics, fluid mechanics, heat, electricity and electromagnetism. Pipeline tubes are thin ones; this is due to the fact that the thickness of the pipe is less than $t/Dext \leq 0.05$. Samples of the considered structure are: ($Dext = 1016$, $t = 12.7$mm) in the case of GZ1 line in Algeria where Dext is the external diameter of tube and T is the thickness.

Numerical simulation is a validation step close to possible data and experimental conditions. In the context of our study, the sample structure is essentially composed of a cylindrical specimen (single hull curvature) under elastic behavior patterns or elastoplastic [KALI BABU KATNAM, DASILVA, TREVOR YOUNG]. The simulation combines geometric representation, a mechanical model, a model of equipment behavior and representation of external actions (boundary conditions) [BRENT_PHELPS REMAINING_STRENGTH]. We summarize below the assumptions for each of these characteristic representations of materials in order to show the different situation and cases of the corroded pipe.

We considered initially the pipe structure without defect by varying the thickness and diameter and in a second step the structure comprising a parabolic failure such as loss of corrosion metal and we will finish this simulation by considering the structure repaired by composite sleeve approaching the industrial context. Numerical modeling was done by ANSYS software. The simulation combines geometric representation, a mechanical model, a model material behavior and representation of external actions (boundary conditions).

Figure 5. Tube under internal pressure has a parabolic default Pi = 5 MPa and damage rate 50% [SMITH, S.T. AND TENG, J.G.]

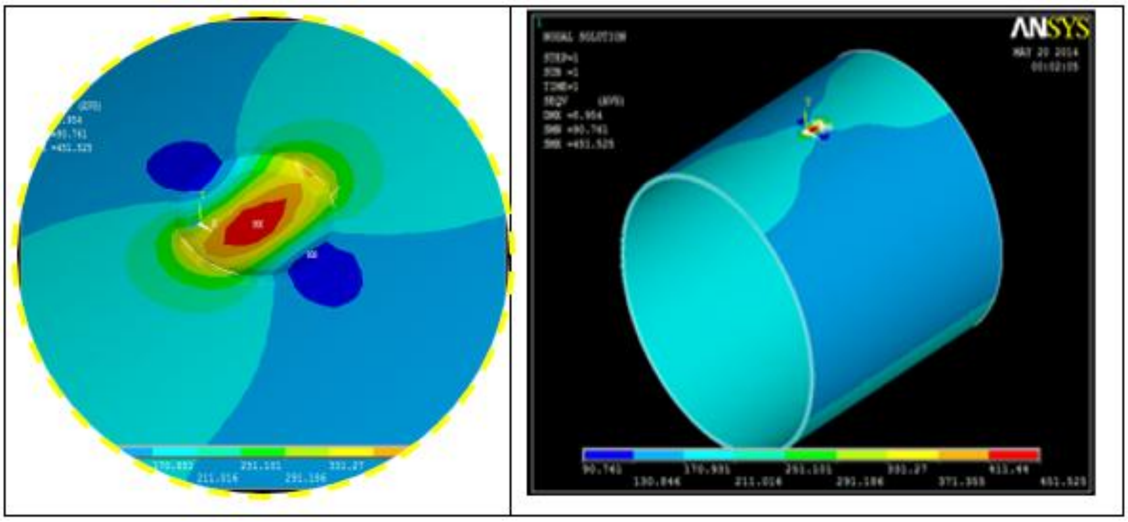


Figure 6. Tube under internal pressure has a parabolic default repaired by 8 filled composite layers Pi = 5 MPa and damage rate 50% [SMITH, S.T. AND TENG, J.G.]

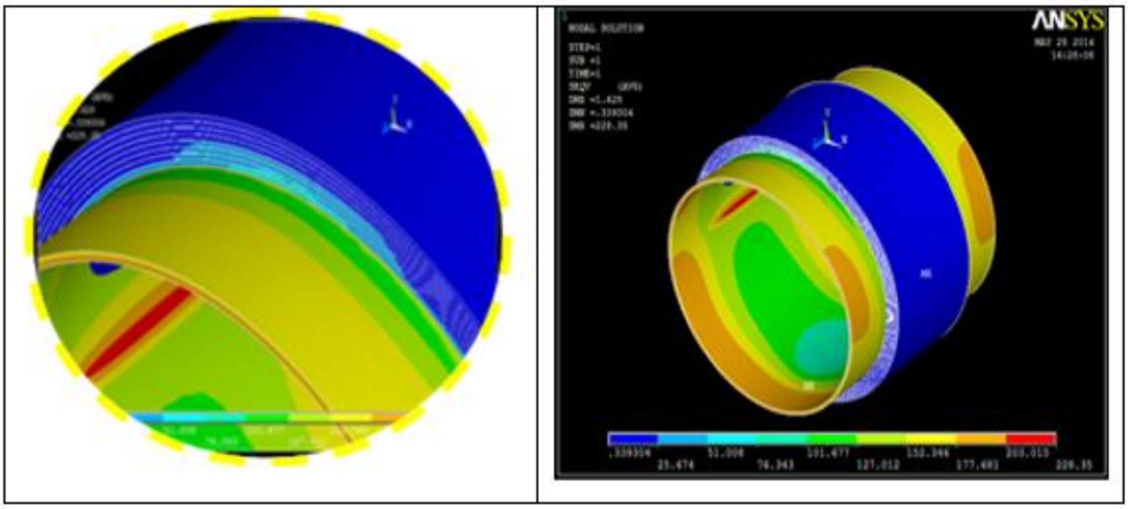
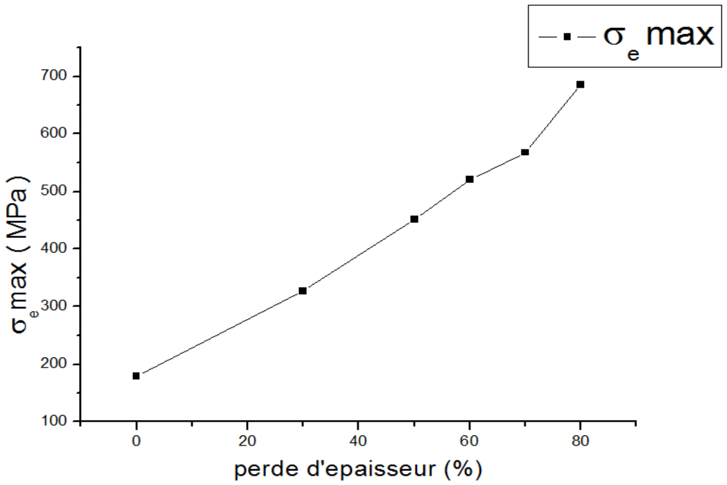


Figure 7: maximum Von Mises stress as a function of the loss of thickness with an internal pressure Pi=5 MPa



The results of the simulation showed that the stress state structure is changed by considering the pipe without corrosion defect, with parabolic corrosion defect and repaired by composite sleeve type clock spring. The maximum Von Mises stress curve as a function of loss of thickness with an internal pressure Pi= 5 MPa we note that the stress increases proportionally with loss of metal (Figure 7).

3. RESULTS AND DISCUSSIONS

The study in this project is to consider the mechanical behavior of the metallic structure of pipelines under stress from soil leading to corrosion failures (pitting corrosion) and repairs bonding materials based on sleeves composites.

3.1 PITTING CORROSION

API steels are safeguarded against external soil corrosion through a bituminous coating, which works in conjunction with a cathodic protection system that maintains a minimum potential of -850 mV relative to (Cu/$CuSO_4$). This system is designed to keep the steel within its protective range, thereby minimizing the risk of corrosion if the coating were to fail. However, corrosion issues have emerged on the steel surfaces under certain conditions due to interactions between the pipe material and the surrounding soil. These issues primarily manifest as localized pitting, pipeline perforation, coating failure, cracking, and biocorrosion. Such problems arise from direct exposure of the steel to aggressive soil environments, such as clay or saline groundwater. Corrosion in buried structures, particularly gas transmission pipelines, poses a significant challenge in the oil industry and represents a complex damage phenomenon. The extent of corrosion is influenced by specific site conditions and various factors, including soil resistivity, pH levels, and soil composition. Our analysis focused on the resistance of pipes under ideal conditions where no defects are present.

3.2 PIPE REPAIR BY COMPOSITE MATERIAL BONDING

Researchers [TAVAKKOLIZADEH, M. AND SAADATMANESH, H.] have demonstrated that carbon fiber reinforced polymer materials can be used to strengthen steel. In one early study a conventional modulus system was developed by considering a number of factors including material selection, system behavior under static and fatigue loads, environmental durability and basic bond characteristics. However, the research did not provide guidelines to facilitate the design and implementation of the system for field application. Most early research focused on the use of conventional fiber materials with a modulus of elasticity typically equal to or less than that of steel. Thus, although the materials could effectively enhance the strength of the structure, large amounts of strengthening materials were required to improve the service ability. Recent research [TECHNICAL RECOMMENDATION CONSTRUCTION] has focused on the bond characteristics of fiber materials bonded to steel surfaces. A number of analytical models have been developed to describe the bond behavior. Other researches [ALEXDER C. FRANCINI R.] primarily in the mechanical, aerospace and marine industries, have demonstrated that bond strength is highly affected by the shape of the end of the strengthening plate.

The repair of steel using composite material bonding following localized corrosion (specifically pitting corrosion) is analyzed through numerical simulation. This approach highlights its significance in interpreting results and obtaining experimental data that may be difficult to access. In the second phase of the study, we examined damaged corroded tubes with parabolic defect rates, finding a damage rate of 70%. It was observed that the Von Mises stresses were unevenly distributed along the parabolically shaped corroded tube, with maximum stress levels indicating potential failure over time, necessitating repair. In the third phase, we investigated the same corroded tube but reinforced it with a composite sleeve. The simulation revealed that the maximum Von Mises stress in this reinforced configuration was nearly three times lower than that in the corroded pipe, as illustrated in figures 5.

The results indicated that the peak Von Mises stress in a corroded pipe reinforced with a composite material sleeve is nearly equivalent to the maximum stress of an undamaged pipe. This underscores the importance and effectiveness of using composite material sleeves to strengthen compromised structures. Figure 5 illustrates a cylindrical tube experiencing internal pressure with a parabolic defect, highlighting how this pressure affects the equivalent stress. The equivalent stresses, based on Von Mises criteria, are distributed unevenly along the parabolically corroded surface of the tube, with the defect exhibiting the highest stress levels. This elevated stress may lead to failure over time, necessitating repairs.

In figure 6, the findings indicate that the maximum Von Mises stress in a corroded pipe that has been repaired and filled is reduced by nearly three times, approaching the maximum stress of an intact tube. This highlights both the necessity and effectiveness of using sleeve composite materials for defect filling in structural applications. When the defect is filled, the stress concentration is evenly distributed across the surface of the defect. This underscores the importance of repairing defects prior to applying composite bonding to achieve optimal results. The results were derived from repairs made with a composite sleeve of the clock spring type. Additionally, it was observed that the number of composite layers used in the filling process affects the repair outcomes and the pipe's resistance; specifically, increasing the number of layers enhances the pipe's strength. Other bonding methods were not examined, which may yield different results.

The Clock Spring Composite Repair and Reinforcement Sleeve System are specifically designed for high pressure transmission pipelines. Consisting of a pre-strained unidirectional e-glass composite coil, high modulus filler material and high shear strength methyl methacrylate adhesive [ADAMS, R.D., ATKINS, R.W., HARRIS, J.A. AND KINLOCH, A.J.], Designed to structurally reinforce and permanently restore external anomalies to their perfect condition, the Clock Spring Sleeve can repair a wide range of mechanical damage and mill defects and can restore the full strength of a pipeline with wall loss ranging up to 80%.It is the most tested, researched and documented composite repair system [ANSYS USER’S].

4. CONCLUSION

Corrosion risks, including external corrosion pits, are significant concerns in the oil industry, posing serious threats to the structural integrity of pipeline transmission systems. These issues arise from the interaction between steel materials and the surrounding soil environment. The use of carbon fiber reinforced composite materials for repairing steel applied in one or more layers has been explored through numerical modeling using the finite element method implemented in ANSYS software.

The simulation study revealed that structures with corrosion defects exhibit stress concentration at the defect location, potentially leading to the propagation of the issue and structural failure. Consequently, this necessitates a structural repair.

Results showed that the maximum Von Mises stress is decreased almost three times in a corroded pipe repaired and filled and almost represents the maximum stress a flawless tube which shows the need and the efficiency of defect filling in the building structure by the sleeve composite material. The results of the simulation showed that the stress state structure is changed by considering the pipe without corrosion defect, with parabolic corrosion defect and repaired by composite sleeve type clock spring. Stress concentration state is distributed homogeneously on the defect surface when it is filled. The results of the reinforcement sleeve based on composite material have shown that the stress reaches almost the constraint of a flawless tube.

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CHAPTER 8

CONSTRUCTION AND ANALYSIS OF A MINI TESLA COIL AS AN EDUCATIONAL SUPPORT ELEMENTO

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ABSTRACT: This article presents an assembly manual for a Tesla coil prototype using low-cost materials, developed to meet the needs of public education in Brazil. Public education in Brazil faces significant challenges, including a lack of structural and teaching resources. This makes it difficult to teach complex subjects such as Physics, which require experimental resources to understand the concepts. The Tesla coil prototype is built from low-cost materials such as acrylic, PVC, copper and electronic components. The coil has a base with 26 concentric circles, which allows vertical mobility. For qualitative analysis, the coil is used to ionize a fluorescent lamp, which turns on only when approached. For quantitative analysis, the coil is coupled to a Gaussometer, which measures the magnetic field values at different distances from the coil. In other words, we model the relationship between the distance from the sensor to the coil and the value of the measured magnetic field. Tests carried out in two public schools demonstrated that the coil is capable of arousing students' curiosity and interest in experimental Physics. The students were impressed by the effect of the electrical sparks produced by the coil, and showed interest in learning more about the concepts involved. The prototype presented is a valuable tool for teaching Physics in public high schools. The coil is affordable, easy to build and can be used to carry out experiments in Physics classes, electives and in-depth courses.

KEYWORDS: Tesla coil, magnetic field, physics teaching, electromagnetism, modeling.

RESUMO: Este artigo apresenta um manual de montagem de um protótipo de bobina de Tesla com materiais de baixo custo, desenvolvido para atender às necessidades da educação pública no Brasil. A educação pública no Brasil enfrenta desafios significativos, incluindo a escassez de recursos estruturais e didáticos. Isso torna difícil o ensino de disciplinas complexas como a Física, que exigem recursos experimentais para a compreensão dos conceitos. O protótipo de bobina de Tesla é construído com materiais de baixo custo, como acrílico, PVC, cobre e componentes eletrônicos. A bobina possui uma base com 26 círculos concêntricos, que permite a mobilidade vertical. Para a análise qualitativa, a bobina é utilizada para ionizar uma lâmpada fluorescente, que acende apenas com a aproximação. Para a análise quantitativa, a bobina é acoplada a um Gaussímetro, que mede os valores do campo magnético em diferentes distâncias da bobina. Ou seja, modelamos a relação entre a distância do sensor até a bobina e o valor do campo magnético aferido. Os testes realizados em duas escolas públicas demonstraram que a bobina é capaz de despertar a curiosidade e o interesse dos alunos pela Física experimental. Os alunos ficaram impressionados com o efeito das faíscas elétricas produzidas pela bobina, e demonstraram interesse em aprender mais sobre os conceitos envolvidos. O protótipo apresentado é uma ferramenta valiosa para o ensino de Física no ensino médio público. A bobina é acessível, fácil de construir e pode ser utilizada para realizar experimentos em aulas de Física, eletivas e trilhas de aprofundamento.

PALAVRAS-CHAVE: bobina de Tesla, campo magnético, ensino de física, eletromagnetismo, modelagem.

1. INTRODUCTION

The fascination with observing the skies, noticing a cluster of electrically charged clouds and noticing an electrical discharge glow brightly among the clouds has always aroused curiosity among scholars since the earliest times (1). Being able to reproduce in the laboratory the effects similar to this phenomenon is something that arouses interest in the teaching of physics for both students and teachers.

We know that there is a frantic race for new technologies in their most diverse areas of knowledge and new ideas and research arise at every moment (2). In the field of physics it is no different, we can bring to light the advances of modern physics such as the behavior of particles with speeds close to or equal to that of light, quantized energy, among others.

Electromagnetism is a branch of physics that studies the interaction between the electric and magnetic fields. These phenomena are essential for the operation of various electronic devices and are fundamental for the development of modern technologies. In this sense, an interactive way to explore and demonstrate these principles would be using an educational product, which in this case is directed to a prototype of the mini electronic tesla coil.

Abstract: The new high school allows a physics teacher to adopt in his elective courses or even in deepening trails, projects in the scope of modern physics that are not limited only to an expository and demonstrative class. This teacher can develop with his students the construction of this prototype, the mini Tesla coil, from assembly to the final stage of operation and measurement measurement.

Reconciling theory with practice will not be a challenge, since the components of the coil are distributed throughout the curricular component of Physics. The Tesla mini coil consists of an electronic circuit composed of a transformer, a capacitor and a primary and a secondary coil. Resonance is a phenomenon that occurs when there is an efficient exchange of energy between the magnetic field of the primary coil and the secondary coil. This interaction can result in the formation of a high-frequency electromagnetic field that produces a fascinating visual effect.

Consequently, this process meets the premises of the Law of Guidelines and Bases of National Education - LDBN (3) in its article IV - "understanding the scientific and technological foundations of production processes, related to theory and practice, in the teaching of each discipline" and the skills and competencies of the National Curricular Common Base - BNCC (4), which says in EM13CNT107 that one can "make qualitative and quantitative predictions on the operation of generators, electric motors and their components, coils, transformers, batteries and electronic devices".

The search for new technological horizons is on the rise, certainly this search will not end in this century. These trends also apply to education. There is a huge gap to be filled between technologies inside and outside the learning environment.

In order to reduce this gap, the purpose of this work was to develop a pedagogical material where we can deepen the studies of electromagnetic phenomena produced through tests, arriving at an intuitive and harmless educational product at the time of use in the classroom. In addition, it could bring significance to the teaching-learning of Modern Physics and at the same time that we could merge production with items and components of easy access and low commercial value.

2. THEORETICAL FOUNDATION

The teaching of physics is, at least partially, centered on the formal idea that the problems of nature are expressed in equations and that their resolution would have as a means and end the resolution of these equations. Part of this behavior could have originated from the direction that some authors of textbooks give to the vestibular, making the material more propaedeutic and less reflective (5).

Consequently, the teaching of physics is sometimes limited to memorizing formulas and the exhaustion of teaching this fascinating experimental science by interpreting its main laws already agreed upon. In this dynamic hangs the perception of a subject of difficult assimilation by students from the early grades of high school.

Physics in high school should ensure that investigative competence rescues the questioning spirit, desire to know the world in which one inhabits, so it is a science that allows to investigate the mysteries of the world, to understand the nature of matter macro and microscopically (6). It is expected that in high school, the teaching of physics contributes to the formation of a scientific culture, which allows the individual to interpret natural phenomena that are always in transformation.

The causes pointed out for the students not to appreciate the physics intrinsically linked to the difficulties in learning in physics have several factors which are related to: little appreciation of the teaching professional, poor working conditions of the teacher, quality of the contents developed in the classroom, too much focus on the so-called physics-mathematics to the detriment of more conceptual physics, fragmentation of the contents developed in the classroom (7).

Experimental activity plays a crucial role in ushering in the student's mind and starting the construction of a new cognitive structure. However, it is essential to recognize that this training is not completed immediately, but over time. In this evolutionary process, the introduction, discussion and repetition of new concepts are imperative. The effectiveness of this cognitive development depends on a continuous social interaction between teacher and student (8).

Performing an experimental demonstration in the classroom is not an autonomous pedagogical tool, nor is it a self-explanatory activity (9). Its presentation is not enough to ensure that students assimilate the underlying concepts. In this context, the active participation of the teacher is imperative, since he plays the role of a more qualified collaborator, possessing mastery over the abstract and the ability to extract meaning from the concrete. Therefore, the construction of this Tesla mini-coil prototype is justified by the cognitive concepts derived from interspersed classes of experimental theory and practice.

Physics, as an experimental science, requires a constant integration with practices, since the essence of science is intrinsically linked to experimentation. Experimental physics, therefore, assumes a position of significant relevance in the study of the discipline, playing a crucial role in the understanding, confirmation and improvement of previously acquired knowledge.

Experimental practice can play a key role in aligning the teaching of natural sciences with the inherent characteristics of scientific work, while favoring the acquisition of knowledge and mental development of the student (10).

A frequent challenge in the course of practical activities of natural sciences is the lack of essential physical infrastructure, such as laboratories, in schools. According to data from the 2019 School Census, only 42.1% of public high schools in Brazil had science laboratories and only 35.7% had scientific materials (11). In the case of public elementary schools, the presence of laboratories was even scarcer, reaching only 8.6% and only 11.5% of these had scientific materials.

Thinking about this problem and in order to design and build a prototype as teaching material capable of reproducing some phenomena related to electromagnetism, being visually analyzed by the students, providing with this the integration with the formal and conceptual sides of physics teaching, the problematic question arises of building a mini Tesla coil electronic that can have durability in the uses in the classroom greater than 4 hours without prejudice to the effectiveness of its operation and presentation, without the saturation and burning of electronic components.

Resonant circuits are an essential part of electronics. Almost all electronic circuits have an oscillator, which is responsible for the correct functioning of the circuit as a whole. The oscillator controls the switching on and off of the associated components, ensuring that the circuit functions harmoniously (12).

The coil is a device that transforms an alternating voltage into another alternating voltage of greater or lesser amplitude. The Tesla coil is a special type of transformer, which uses an air core and a high frequency alternating voltage to generate a high voltage in the secondary (13). The electronic Tesla coil differs from the conventional Tesla coil in two aspects: the voltage delivered to the primary and the resonance generation method between the windings.

In electronic coil, the voltage applied to the primary is usually a continuous voltage of a few hundred volts. The oscillation is generated by switching transistors, which create a high-frequency alternating voltage in the primary. The relationship between the input voltage and the output voltage is proportional to the relationship between the number of turns of the windings. However, the level of coupling between the coils also influences the voltage supplied by the secondary system (13).

The Tesla coil is a versatile didactic tool that can be used to demonstrate a variety of physical phenomena. The high levels of electric voltage and high frequencies generated by the coil allow the visualization of phenomena such as electrical discharges, magnetic fields and propagation of electromagnetic waves (14).

The Tesla coil is a resonant transformer with air core, which uses a high frequency alternating voltage to generate a high voltage in the secondary. In addition, it transmits electromagnetic frequency waves between 1 MHz and 1 GHz, with peak amplitude of up to 100 kV. The currents are not high, ranging from 0.5 mA to 10 mA (15). However, if the user is not properly grounded, he may feel a slight tingling or shock sensation. Electromagnetic waves transmitted by the Tesla coil can be detected from radio wave receiver circuits, as the device is an electromagnetic generator.

The magnetic flux density module at a point far from the coil does not maintain an inverse linear relationship with the measured distance, as would be expected if we were to calculate the magnetic field of a long rectilinear wire or a simple coil (16). We can calculate with some approximation by equation (17):

$$B = \frac{\mu_0 N I}{4r^2 + h^2} \quad (I)$$

Where:

μ_0 is the magnetic permeability of the medium,
N is the number of turns in the primary,
I is the electric current,
r is the radius of the primary solenoid, and
h is the length of the solenoid.

3. METHODOLOGY

3.1 CHARACTERIZATION OF THE RESEARCH

The main characteristic of this research is to be classified as experimental, since it involves the direct manipulation of the variables related to the object of study. By manipulating variables, one can investigate how and why a phenomenon is produced. This means that the researcher intentionally alters one or more independent variables to observe how this affects one or more dependent variables (18).

In experimental research, the researcher ceases to be a mere passive spectator and assumes the role of an active agent. It is responsible for planning and executing the experiment, collecting and analyzing the data, and interpreting the results (18).

Qualitative and quantitative research combines two types of data: quantitative and qualitative. Quantitative data are represented by numbers and are analyzed statistically. Qualitative data are represented by words and are analyzed in an interpretative way. (19).

Besides being typified as experimental research, the work also demonstrated qualitative and quantitative aspects. Qualitative in the moments in which something is constructed whose phenomenon of spark and ionization is appreciated visually by the target audience (student) and understood as something complex of nature. Quantitative when it involves assembly, testing to measurements and measurements after assembly.

Qualitative aspects were observed at times when participants could visually appreciate the phenomenon of sparking and ionization. This appreciation allowed them to understand the complexity of this natural phenomenon. The quantitative aspects were observed at the moments when the participants performed the assembly, testing, measurements and measurements of the experiment. These data were statistically analyzed to verify the relationships between the variables involved in the experiment.

3.2 MATERIALS

The assembly of the tesla coil can be developed by the students, preferably in groups, in an experimental workshop mediated by the physics teacher. The tools used in the assembly are easily found. The materials used in the experiment are shown in Table 1 below:

Table 1 - Materials needed for construction.

QTDE	DESCRIPTION
1	PVC box with measures of 154x110x70 mm, standardized according to the technical standard NBR IEC60670-1, with protections IP 44 to IP 56, manufacturer Steck;
1	PVC Pipe Measuring 18.0 Cm Length x 3.0 Cm Diameter
45	Meters of 35 AWG enameled copper wire to be used as secondary transformer (L2/T2);
1	6.0 mm^2 diameter flexible cable piece with a length of 65 centimeters to be used as Primary Transformer (L1/T1).
1	TIP 41-C Transistor with NPN Polarization
1	10k resistor
1	1k resistor
1	Electrolytic capacitor 1000µ x 25 V
1	Ceramic disk capacitor 10nF x 50 V;
1	On\Off switch
1	220 V XD8-2 green bull eye lamp for on display
1	Bi-volt power supply (127/220) and 12VDC output, for circuit power
1	Perforated printed circuit board for component conditioning
1	acrylic plate measuring 30 cm x 30 cm, containing 27 (twenty-seven) concentric circles with a distance of 1 cm and ½ cm each being 14 circles with continuous line and 13 circles in dashed line
4	PVC gloves with ¾ gage

QTDE	DESCRIPTION
4	PVC gloves with ½ gage
4	Pieces of ½-inch barrel 16 cm long;
1	15 watt fluorescent lamp
1	25 watt fluorescent lamp
1	Anti-vibration rubber normally used in air-conditioning evaporator holder
1	Piece of zinc-plated wire, used as electrode at the top of the coil
1	EMF-Tester (Electromagnetic Field), model S8602

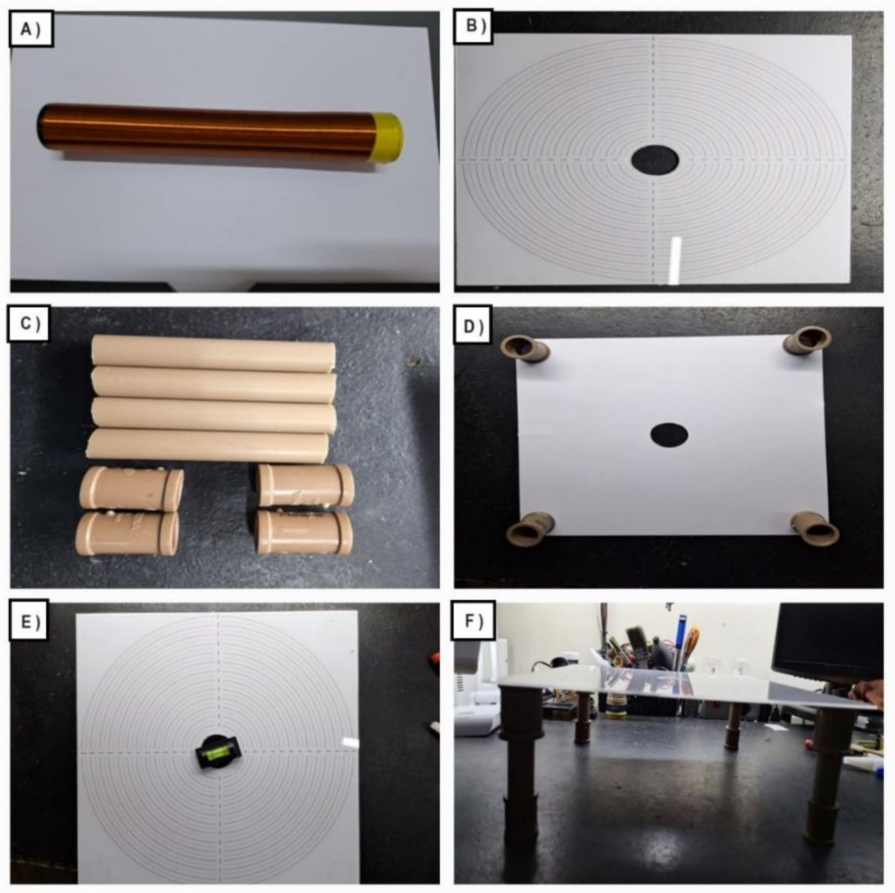
Source: Author.

As can be observed, both the tools and the materials used are easily accessible and inexpensive, making the experiment feasible. It can be assembled inside the school laboratory bench, if any, or even in the classroom with the dynamics of joining tables for decentralized work.

3.3 ASSEMBLY AND IMPLEMENTATION PROCEDURES

In this topic, the procedures for assembling and applying a tesla coil will be discussed. The assembly involves the construction of the two coils that make up the device, the primary and secondary. The application involves connecting the coil to a power supply and performing tests to verify its operation. They are relatively simple to mount, but it is important to follow the procedures correctly to ensure the safety and proper functioning of the device.

Figure 1: A) Secondary coil; B) Acrylic Movable Base with 27 concentric circles; C) PVC barrel and sleeve; D) Bottom view of the base assembly; E) Top view of the base in leveling; F) Side view of the mounted base.



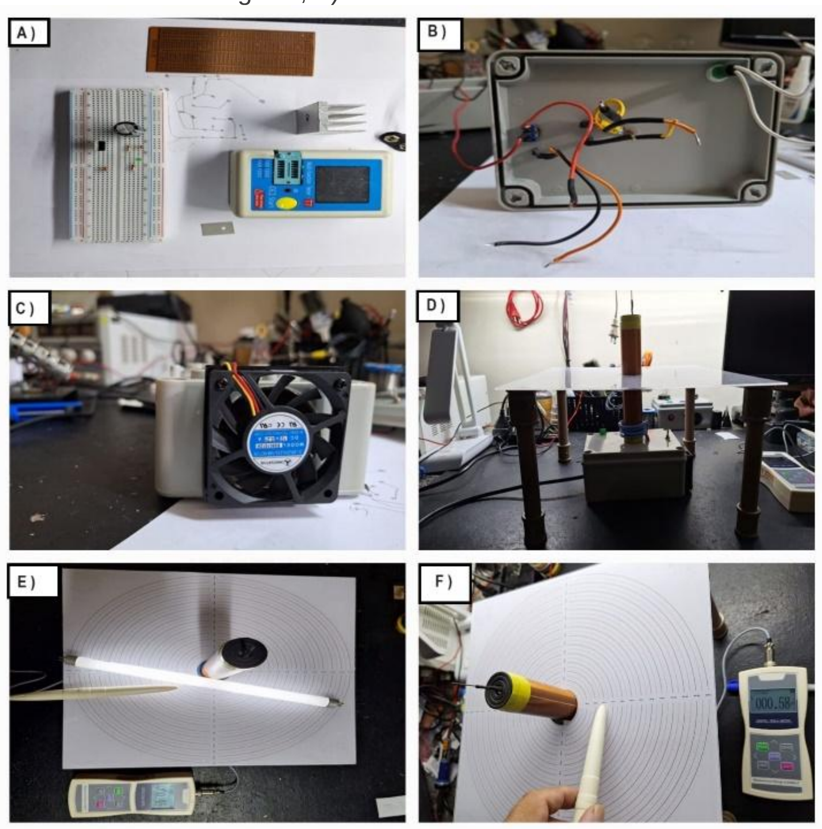
Source: Author.

- Step 1: Assembly of the base with silkscreen design containing 27 concentric circles which will serve as a basis for measuring the magnetic field produced by the coil, it is worth noting that this base will not be fixed, this will be due to ease of transport, assembly and handling.
- Step 2: Using an acrylic screen printing plate (Fig.1.B), we fixed four ¾" PVC gloves (Fig.1.C) at their respective vertices, with liquid adhesive. Once fixed, the PVC gloves will serve as a fitting for the four feet, also constructed of PVC and measuring 18.5 cm (Fig.1.D). Once assembled, the assembly forms a table-shaped base (Fig.1.E and Fig.1.F), which facilitates measurements with the EMF measuring instruments.
- Step 3: With the PVC box cover in hand, mark the position for fixing the primary coil, secondary coil, on/off switch and on indicator green light. Also drill holes in

the sides of the box for fixing the mini-fan (Fig.2.C), which will serve as an element of ambient heat exchange (Fig.2.A).

- Step 4: With the barrel (Fig.1.C) and the copper wire by hand, wrap the copper wire in a spiral (Fig.1.A), forming 682 turns. Start winding from the base to the top of the coil.
- Step 5: To close the top of the coil, use a rubber with a ¾-inch circumference and a central hole. Insert a zinc-plated wire electrode into the rubber, then screw it together with the end of the secondary coil wire (Fig.2.A).
- Step 6: With the secondary coil fixed in the center of the PVC box (Fig.2.B), make the primary coil. Use a 6.0 mm² cross-section piece of flexible copper cable that is 65 centimeters long. Wrap the cable in a spiral, forming 4 and a half turns on the secondary coil.

Figure 2: A) Protoboard Mounted Electronic Circuit; Phenolite Perforated Plate; Transistor Heat Radiator; Electronic Components Tester; Insulating Mica for Transistor.; B) Coil and circuit fixed to PVC box cover; C) Cooler; D) Side view of the coil assembly near the base; E) Top view of the working coil; F) Gaussimeter near the coil .



Source: Author.

- Step 7: Assemble the electronic components, fixing the TIP 41C transistor to its base (pin 2), the 10K resistor and the coil winding start (L2/T2). At the resistor tip, weld a coil terminal (L1/T1) and the power cord of the on/off switch. The other end of the coil (L1/T1) must be welded to pin 3 of the transistor (collector). The negative (-) value of the power supply is also fixed to pin 1 of the TIP 41C transistor. The positive wire from the power supply goes to one of the power switch terminals.
- Step 8: Start the function tests. If the tests are successful, complete this step. The moment you plug the device into the socket, the bull's-eye lamp will light. At this stage, the coil will still be turned off. After pressing the power button, an LED will light up, the microfan (cooler) will start working, and the coil will start working (Fig.2.C).
- Step 9: Perform the qualitative analysis, observing the spark and the lighting of the fluorescent lamp (Fig.2.E). Also perform the quantitative analysis, measuring the approximation and the distance of the gaussimeter (Fig.2.F).
- Step 10: Tabulate the results obtained through this analysis and compare them with the conceptual theories applied to the teaching of physics.

4. RESULTS AND DISCUSSIONS

The Tesla coil prototype we are studying was originally powered by a 9 volt battery. In this case, the transistor used was the 2N2222. For technical reasons, we decided to change the power supply to a 12 volt linear power supply. This change, however, caused a problem: the 2N2222 transistor became saturated. That means it got really hot, and within 20 minutes, it burned.

To solve this problem, we tested other transistors. We tested BC137, TIP-122, TIP-31 and TIP-41-c. The TIP 41-c transistor was the one that best met our needs. It was able to generate the desired magnetic field, but it heated up a lot.

To solve the problem of heating, we adopt the use of a heat radiator. The heat radiator is a part that helps to dissipate heat from the transistor. With these changes, the Tesla coil prototype became more stable and secure. It can now run for hours without the transistor burning.

In the Tesla coil prototype built, a vertically mobile platform was added, with several concentric circles, which served to measure the level of expansion of the electromagnetic field produced. That is, we correlate the magnetic field as a function of the distance from the coil.

After being built and tested on a bench, the Tesla coil showed stability, which led us to continue the project, evolving into scientific observations in order to create the necessary conditions for a quantitative analysis.

It was verified the operation of the mini Tesla coil with the ascending of a fluorescent lamp, only with the approach of the same, without there being contact between the lamp and the coil.

We made the measurement of the values of the magnetic field created through the activity of the mini coil, through the digital tesla meter (gaussimeter). The values found within the circumscribed circles were tabulated.

Thus, we started to perform the tests with different distances and different heights of the mobile base. Initially, we analyzed the quadrant A, with the prototype using the set with the feet constructed with 4 pieces of PVC of ½ inch and being off, we approached the probe of the digital tesla meter, which did not present reading in its display.

We then attached the prototype and started measuring from the largest to the smallest circle. In the circle of 13 centimeters to the circle of 7 centimeters, there was no reading. This does not mean experimentally that there was no magnetic field in this region, but rather that the values were too small to be detected by the gaussimeter, which was calibrated in millitesla (mT).

Only in the radios of distance from the coil from the circle of 6, 5, 3, 2 and 1 centimeters was it possible to detect the magnetic field, that is, it reached the sensitivity of the measuring instrument and, therefore, there was reading.

In Table 2, we present the measured values of the magnetic field generated by the operation of the coil prototype in the two tests, at heights of 9 cm and 18.5 cm, performed at distances of 6, 5, 3, 2 and 1 cm from the coil.

Table 2 – Coil magnetic field distribution.

		Coil radial distance				
		6 cm	5 cm	3 cm	2 cm	1 cm
Height of acrylic base	9 cm	0.20 mT	0.22 mT	0.46 mT	0.58 mT	0.88 mT
	18.5 cm	0.23 mT	0.39 mT	0.58 mT	0.95 mT	1.43 mT

Source: Author.

We did a second test replacing the digital tool tesla meter by the EMF-Tester Electromagnetic Field. The results are shown in table 01. This analysis aims to observe the degree of electromagnetic radiation emitted by the coil as an educational tool, since its purpose is to use it in the classroom.

With the acrylic base at the height of 18.5 centimeters, it was possible, from the data in Table 1, to make the mathematical modeling and to arrive at a function of the magnetic field as a function of the distance given by the equation:

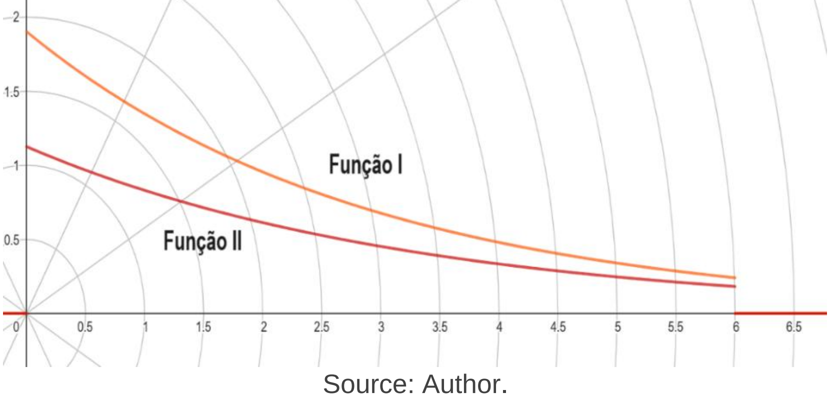
$$B(x) = 1.9e^{-0.34x}mT \qquad (II)$$

With the acrylic base at the height of 9 centimeters, it was possible, from the data in Table I, to carry out the mathematical modeling and to arrive at a function of the magnetic field as a function of the distance, given by the equation:

$$B(x) = 1.13e^{-0.3x}mT \qquad (III)$$

As we can see in Figure 3, not only the distance of the coil, but also its height influence the value measured by the gaussimeter. In a cylindrical coordinate system, both would be a function of r and z.

Figure 3: Magnetic field distribution of the coil as a function of distance.



Source: Author.

In Figure 3, both are in Cartesian coordinates, but with both functions, I and II, on the same graph, so we can notice the difference. Even with difference in values, the behavior of decrease is similar.

This difference found in Tables 1 and 3 is due to the border effect. The distance where the edge effect is present is approximately one to three times the diameter of the inspection coil (20).

The magnetic field edge effect affects the distribution of the magnetic flux density. This non-uniform distribution produces a multilayer elliptic macromorphology, which causes the induced parasite current, the Lorentz force and the deformed area to also be elliptical (21).

In addition to the experiments carried out and collected on the bench, the prototype was presented, in a qualitative way, in two school units of the state public network of Porto Velho - RO.

In the demonstrations and interaction with students in the classroom, the prototype proved to be effective as an experimental subsidy for teaching related to magnetism and electromagnetism. Adaptations were made for the design of a stable prototype, capable of being used for a long period of demonstrations, without the problem of saturation and burning of components in short time of use, as happens in the model studied.

The construction and execution of a didactic kit in the teaching of physics can contribute to overcome the pedagogical disarticulation, a characteristic of traditional teaching. This disarticulation can lead to fragmented classes, too theoretical or demotivating (22).

Didactic kits allow students to experience physical concepts in a practical and concrete way. This helps to make classes more attractive and relevant to students, making them more effective in teaching physics.

Physics experiments can be divided into two types: quantitative and qualitative. Qualitative experiments focus on the observation and description of physical phenomena, while quantitative experiments involve the collection and analysis of numerical data.

Students in basic education are generally more attracted to qualitative experiments, as they are simpler to perform and involve low-cost materials (23). However, it is important to balance the use of both types of experiments so that students reach a certain level of understanding and become convinced of the need for quantitative measures for the advancement of science.

5. FINAL CONSIDERATIONS

By presenting the Tesla mini coil as an experiment in the classroom, it is noticeable the awakening of students to critical thinking. They seek to understand what happens in the experiment, questioning the phenomena observed. This contributes to the development of scientific thinking, which is fundamental to the understanding of science.

In addition, the construction of the Tesla mini coil allows students to understand the operating principles of a transformer and a capacitor, devices widely used in several areas of electronics. By involving students in the assembly and operation of the mini-coil, they have the opportunity to experience in practice the different variables that influence the operation of the device, such as the relationship between the turns of the coils, the frequency of oscillation and the power supply.

This practical experience contributes to a deeper and more meaningful understanding of the theoretical concepts involved. Students can observe phenomena in action and understand how they occur. This helps to fix the concepts in memory and make them more meaningful. The mini electronic Tesla coil is therefore a valuable tool to make learning electromagnetism more dynamic and engaging. It contributes to a more meaningful understanding of concepts, arouses interest in physics and provides the development of practical and scientific skills.

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