

**Contributions of the Semiotics of Culture as Reading Approach to *O reino encantado dos pôneis 4D* [The Enchanted Reign of the Ponies 4D] /  
Contribuições da Semiótica da Cultura como abordagem de leitura de *O Reino encantado dos pôneis 4D***

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ABSTRACT

Recently, children's books have used augmented reality as a resource, being called 4D books. Augmented reality allows the user to see through the world while interacting in real-time with images produced digitally, resulting in interactivity. The present study aims to introduce the results of a brief reflection on the illustrated book *O reino encantado do pôneis 4D* under the approach of the semiotics of culture, departing from the notion of semiosis and semiosphere. The semiosphere, drawn by Lotman (1990), in analogy with the biosphere, can help understand the topology of the real and virtual worlds, referred to as the real subsemiosphere and virtual subsemiosphere, located in the interior of the broader semiosphere of the Brazilian culture. In 4D/Augmented reality books, the elements from the virtual subsemiosphere are placed into the real subsemiosphere, crossing their borders.

KEYWORDS: Augmented Reality; 4D Book; Semiosphere; Lotman; Children's Literature

RESUMO

Recentemente os livros infantis têm usado o recurso da realidade aumentada, sendo chamados de livros 4D. A realidade aumentada permite ao usuário ver o mundo enquanto interage em tempo real com imagens produzidas digitalmente, resultando em interatividade. O presente estudo tem como objetivo apresentar os resultados de uma breve reflexão acerca do livro ilustrado *O reino encantado dos pôneis 4D* sob a abordagem da semiótica da cultura, partindo das noções de semioses e semiosfera. A semiosfera, traçada por Lotman (1990) em analogia à biosfera, pode auxiliar na compreensão da topologia dos mundos reais e virtuais, referidos como a subsemiosfera real e a subsemiosfera virtual contidas em uma semiosfera mais ampla da cultura brasileira. Em livros com realidade aumentada/livros 4D, os elementos da subsemiosfera virtual são alocados na subsemiosfera real, transpassando suas fronteiras.

PALAVRAS-CHAVE: Realidade aumentada; Livro 4D; Semiosfera; Lotman; Literatura Infantil

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## Introduction

Currently, children's literature is seen as a broad phenomenon, which includes oral literature of regional folklore with immemorial roots, as well as legends of African origin brought by enslaved African peoples to the country, from storytelling shared among the riverside dwellers of the Amazon region to the printed book that circulates nationally. However, children's literature printed in Brazil had its beginnings in the late nineteenth and early twentieth centuries through the importation and translation into the Portuguese language of stories compiled in Western European countries, such as those of the Brothers Grimm, and written stories, such as those of Charles Perrault and Hans Christian Andersen, in addition to locally produced books that instilled traditional values, such as *Contos Pátrios* [Homeland Tales] (Bilac; Netto, 1931) and *Através do Brasil* [Across Brazil] (Bilac; Bonfim, 1910), authored by Olavo Bilac and Coelho Neto (Becker, 2001).

Brazil, being a former colony of Portugal, developed its way of speaking and, later, writing by transforming and adapting the Portuguese language according to its use. The translation of imported texts, however, followed a Portuguese linguistic pattern, making their versions difficult to be understood by the Brazilian public. In addition, the elements found in the imported texts, according to Becker (2001), differed substantially from the Brazilian culture, representing a major barrier to overcome.

Long years have passed since the importation of books from Western Europe, and there is a fruitful Brazilian production of children's books that address Brazilian folklore. Monteiro Lobato is considered to be an outstanding figure in this segment. There are also productions such as *Contos e lendas de índios do Brasil* [Short Stories and Legends of Indigenous People from Brazil]<sup>1</sup> by Antonieta Dias de Moraes (1979), *O último curumim* [The Last Curumim] by Isabel Vieira (2003 [1996]) and *Yakima, o menino-onça* [Yakima, the Cheeta-Boy] by Assis Brasil (2019). National productions continue to address new themes and include technological innovations in the context of the globalised world, interspersed with migratory flows and the import of consumer goods. These texts' cultural elements represent translations and foreign texts' incorporations into contemporary Brazilian culture.

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<sup>1</sup> In contemporary society, the term "índios" was replaced by "indigenous" to respect the differences.

The use of multimodal language in children's literature has also been highlighted. In this context, new literacies are demanded from readers, as they need to deal not only with static images inserted in the pages of books but also with moving images and interactivity in books with augmented reality, for example. Recently, it has become relatively common for children's books to have augmented reality resources in stories from animations, such as *Cars 2: Ride with Mater* (2011), based on the animation of the same name by Walt Disney and Pixar Studios. The book allows readers an immersive experience, as readers can also drive the red car Mater through the book's pages. Locally produced books also allow for an immersive experience, such as *O reino encantado dos pôneis 4D*, authored by Stevan Richter, Luziane F. de Gasperi and Jean Carlos Ferreira (2018), which allows readers to interact with enchanted beings on the pages of the book.

This article aims to map the process of cultural translation and the use of multimodal languages observed in the book *O reino encantado dos pôneis 4D* under the approach of the semiotics of culture by the Tartu-Moscow School, which allows the study of translation and assimilation of cultures, according to the studies of Yuri Lotman (1990).

This study was carried out through bibliographic research and gathered texts about the semiotics of culture (Lotman, 1978, 1990; Ivanov *et al.*, 2003; Lotman, Uspiênsky, 2003). The notion of children's literature was approached from the perspective of the discursive genre by Mikhail M. Bakhtin (2016), which continuously engages through images and verbal texts (Ivanov *et al.*, 2003; Lotman, Uspiênski, 2003). A brief mapping of the metalanguages of augmented reality was also carried out based on research by, among others, Billingham (2002), Milgram and Kishino (1994)

## 1 The Semiosphere

The process of reading children's books, commonly permeated by references from foreign countries, can be deepened with the understanding of Lotman's<sup>2</sup> notion of translation of cultural traditions.

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<sup>2</sup> LOTMAN, Yuri. The Notion of Boundary. In: LOTMAN, Yuri. *Universe of the Mind: A Semiotic Theory of Culture*. Translated by Ann Shukman, With introduction by Umberto Eco London: I. B. Tauris co Ltd., 1990, pp. 131-142.

Culture, in its origin, begins with the division of “the world into ‘its own’ internal space and ‘their’ external space,” constituting paradigms of the national *versus* the foreign, interior space *versus* exterior space, organised *versus* chaotic (Lotman, 1990, p. 131).<sup>3</sup> If we consider a culture inherent to a topology where a work is produced, when it is consumed in another topology, it is inevitably translated into another language/culture.

Lotman (1990), in *Semiotic Space*,<sup>4</sup> explains the notion of semiosphere or semiotic space in analogy to Vernadsky’s concept of biosphere. Lotman (1990, p. 133)<sup>5</sup> argues about the intrinsic relationship between the semiosphere and culture: “culture organises itself in the form of a special space-time and cannot exist without it. This organisation is realised in the form of the semiosphere and at the same time comes into being with the help of the semiosphere.”

Communication and language occur only in and through the semiotic space, since semiotic systems represent models through which the world is understood and experiences gain meaning (Lotman, 1990). The semiosphere is detailed in its spatial and temporal aspects:

imagine a museum hall where exhibits from different periods are on display, along with inscriptions in known and unknown languages and instructions for decoding them; besides, there are the explanations composed by the museum staff, plans for tours and rules for the behaviour of the visitors. Imagine also in this hall tour-leaders and the visitors and imagine all this as a single mechanism (which *in a certain sense* it is). This is an image of the semiosphere (Lotman, 1990, pp. 126-7).<sup>6</sup>

The semiosphere involves the notion of time and space, so it is possible to study the production of a culture according to distinct periods. Since the contemporary text is characterised, according to Agamben (2009),<sup>7</sup> by a confluence of distinct temporalities, Lotman’s notion of semiosphere allows the process of deepening such textualities based on the process of cultural assimilation of texts from other cultures and temporalities.

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<sup>3</sup> For reference, see footnote 2.

<sup>4</sup> LOTMAN, Yuri. *Semiotic Space*. In: LOTMAN, Yuri. *Universe of the Mind: A Semiotic Theory of Culture*. Translated by Ann Shukman, With introduction by Umberto Eco London: I. B. Tauris co Ltd., 1990, pp. 123-130.

<sup>5</sup> For reference, see footnote 4.

<sup>6</sup> For reference, see footnote 4.

<sup>7</sup> AGAMBEN, Giorgio. *What’s an Apparatus? And Other Essays*. Translated by David Kihik and Stefan Pedatella. Stanford: Stanford University Press, 2009.

Lotman (1990) mentions the assimilation of French texts by Russian writers and the Russian public through the phenomenon of crossing the boundaries of the semiosphere.

Scholars such as Ekaterina Vólkova Américo (2017)<sup>8</sup> and Winfred Noth have debated the notion of semiosphere or semiotic space. For Américo, Lotman's notion of semiosphere is not contained in merely abstract notion; on the contrary, it allows us to observe the geographical spaces and the processes of cultural assimilation, seen in the circulation of products such as "jeans" from the United States to the Soviet Union (Américo, 2017, p. 15).

For Noth (2014, p. 12),<sup>9</sup> Lotman's semiosphere can be seen as a

concrete geographical space, whose topology [consists of spaces] such as St. Petersburg, but it can also be a metaphorical space, whose topology consists of the characters of a 'plot space', such as the main characters of a myth, the hero, the opponent, the helper, father, mother, son, daughter, etc.

Therefore, the semiosphere allows us to study both the topology of real spaces, where foreign products cross the boundaries of other nations, and metaphorical spaces, where characters' narratives are constructed, and events are unfolded.

According to Eco (1990, p. xii),<sup>10</sup> Lotman extends his comprehension of text in *The Structure of the Artistic Text* (Lotman, 1978) to encompass the semiosphere as a unit: "Lotman states that the whole semiosphere (culture as semiosphere) must be considered as a single mechanism and it is only in this way that we will be able to understand its various aspects." However, the semiosphere is characterised by its internal "heterogeneity" and the tensions between the centre and the periphery, which is close to its limits" (Lotman, 1990, p. 125).<sup>11</sup>

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<sup>8</sup> AMÉRICO, EkaterinaVólkova. The Concept of Border in Yuri Lotman's Semiotics. *Bakhtiniana, Rev. Estudos do Discurso* 12 (1), Jan-Abril. 2017. Doi: <https://doi.org/10.1590/2176-457326361>. Available at: <https://www.scielo.br/j/bak/a/bjLH7zFRPJQwxJgJhjCzPB/?lang=en#>. Accessed on 5 Mar. 2024.

<sup>9</sup> NOTH, Winfred. The Topography of Yuri Lotman's Semiosphere. *International Journal of Cultural Studies*. Vol. 18(1) pp. 11–26, 2015. Available at: [https://www.researchgate.net/publication/275485670\\_The\\_topography\\_of\\_Yuri\\_Lotman's\\_semiosphere](https://www.researchgate.net/publication/275485670_The_topography_of_Yuri_Lotman's_semiosphere). Accessed on 3 Mar. 2024.

<sup>10</sup> ECO, Umberto. Introduction. In: LOTMAN, Yuri. *Universe of the Mind: A Semiotic Theory of Culture*. Translated by Ann Shukman, with Introduction by Umberto Eco. London: I. B. Tauris Co Ltd., 1990, pp. vii-xiii.

<sup>11</sup> For reference, see footnote 4.

Moreover, the boundary is the domain of bilingualism, which, as a rule, finds literal expression in the language practice of the inhabitants of borderlands between two cultural areas. Since the boundary is a necessary part of the semiosphere and there can be no ‘us’ if there is no ‘them’, culture creates not only its own type of internal organisation but also its own type of external “disorganisation” (Lotman, 1990, p. 142).<sup>12</sup>

The notion of boundary is crucial for understanding the semiosphere, which establishes dialogues with other external semiospheres through the hierarchisation of internal and external spaces and organised and chaotic spaces. Similarly, the internal boundaries of the semiosphere produce an internal hierarchy between the different groups both on the horizontal axis (centre and periphery) and on the vertical axis (distinct groups according to various categories (Lotman, 1990).<sup>13</sup>

The semiosphere is constantly changing, being invaded by foreign texts/artefacts continuously, and is also subject to changes in its “inner structure and as a whole” (Lotman, 1990, p. 151).<sup>14</sup> For Lotman (1990, p. 140),<sup>15</sup> the border has a primary function “to control, filter and adapt the external into the internal.” Consequently, it is possible to understand how a given group assimilates a cultural product from another group.

Culture, seen as text, according to Lotman (1990), is assimilated in five stages: firstly, the foreign text is seen as having a high value compared to the texts produced domestically; secondly, the foreign text is reinterpreted and considered to be a continuation of the texts produced domestically; thirdly, the imported text is seen as not true or distorted in the space of origin and is perceived as being *true* and organised in the receiving semiosphere; fourthly, the cultural text, once considered foreign, is completely assimilated and reinterpreted in the receiving semiosphere, which begins to produce new texts, and finally, the receiving culture becomes “the general centre of the semiosphere” and begins to produce new texts that circulate in the periphery and on the border (Lotman, 1990, pp. 146-7).<sup>16</sup>

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<sup>12</sup> For reference, see footnote 2.

<sup>13</sup> For reference, see footnote 2.

<sup>14</sup> LOTMAN, Yuri. The Semiosphere and the Problem of Plot. In: LOTMAN, Yuri. *Universe of the Mind: A Semiotic Theory of Culture*. Translated by Ann Shukman, With introduction by Umberto Eco London: I. B. Tauris co Ltd., 1990, pp. 151-170.

<sup>15</sup> LOTMAN, Yuri. Dialogue Mechanisms. In: LOTMAN, Yuri. *Universe of the Mind: A Semiotic Theory of Culture*. Translated by Ann Shukman, With introduction by Umberto Eco London: I. B. Tauris Co Ltd., 1990, pp. 143-150.

<sup>16</sup> For reference, see footnote 15.

The five stages detailed above help to map the process through which the image of ponies was imported from the United States, popularised in Brazil, and later became the subject of illustrated books until reaching the context of the object chosen for this study. In the next topic, we will detail the dynamic language processes that are operated in the semiosphere.

## **2 Children's Literature as Secondary Modelling of Language**

Natural language, for Lotman (1978), means, in Saussure's terms, language as a system and is seen as the first codification. For Lotman (1978), natural language systems such as Russian, English and Portuguese are considered primary modelling systems and represent the first codification. Religion, myths, cultural rules, artefacts, and the language of art and sciences are considered secondary modelling systems due to the processes of codification, first by natural language and then by means of the arts and literature, which carry "a certain integral meaning and fulfil a common function" (Ivanov *et al.*, 2003, p. 106).<sup>17</sup> The members of a given group understand the world from the secondary modelling systems.

As culture is doubly codified, it comes to be seen as texts; therefore, it is interesting to emphasise the notion of "cultural text" that refers to the text produced in a secondary language, which are artefacts, art objects, literature, films, animations, games, etc. (Ivanov *et al.*, 2003, p. 111). In this context, literary language is considered to be doubly codified, being considered text in the sense of Lotman (1978). In the literary field, Bakhtin's (1986) discursive genre is considered a secondary modelling system, a text being doubly codified that assumes specific functions, being produced by generative rules (Ivanov *et al.*, 2003).

Eco (1990, p. x) states that "texts represent models of the world, the set of texts which is the culture of a period is a secondary modelling system." In this sense, a children's literary work, being a discursive genre, is also part of a set of secondary modelling systems of a culture, as it carries a specific aesthetic/communicative function, being generated by a set of particular rules observed in a constant engagement between

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<sup>17</sup> In Portuguese: "um certo significado integral e preenchem uma função comum" (Ivanov *et al.*, 2003, p. 106)

Children's literature is considered to be doubly codified, firstly by natural language itself and, secondly, by the discursive genre. For Bakhtin (1986, p. 60), the discursive genre is "a relatively stable utterance" formed by "thematic content," "style," and "compositional structure." Khéde (1983, p. 13) states that children's literature is generally produced by an adult "who wishes to reach the level of the child and the young person, and it is impossible, obviously, for them to get rid of their 'status' as an adult."<sup>18</sup> The author/authority behind children's literature inserts morals and educational values.

Coelho (2023) points out the need to teach literature to children and young people in schools and proposes that educators adjust and adapt their worldviews to the transformations promoted in today's society in Brazil according to three aspects: literature itself, the surrounding reality, and the teaching process. Bringing this discussion to the reading approach of the semiotics of culture, it can be argued that a book produced in a semiosphere cannot be disconnected from moral values and the purpose of a given nation at a given time. However, such production goes through a process of questioning by focusing on "ethical responsibility," allowing the past to be rediscovered and reinvented, thus promoting a more inclusive society with respect for differences (Coelho, 2023, pp. 19-23).

In order to understand the semiosphere or semiotic space and the dynamics of the production of modal and multisemiotic texts, it is necessary to observe the notion of sign in Lotman's study. In *Semiotics of Cinema*, Lotman (1978)<sup>19</sup> points out the distinction between conventional signs, whose most prominent experience is seen in the verbal/linguistic sign and the pictorial/iconic or representational sign, seen in pictures and photographs. While verbal language is based on the conventional use of signs to be deciphered, pictorial signs, such as figures, photographs, drawings, etc., seem to convey the message more directly (Lotman, 1978).

The dual aspect of the organisation of a semiotic system observed in relations between signs can occur in cultures all over the world:

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<sup>18</sup> In Portuguese: adulto "que deseja chegar ao nível da criança e do jovem, sendo-lhes impossível, obviamente, desfazer-se de seu 'status' de adulto."

<sup>19</sup> Reference to the Text in the English version: LOTMAN, Yuri. *Semiotics of Cinema*. Translated by Mark E. Suíno. University of Michigan Slavic Contribution. N.5. Ann Arbor. University of Michigan. Graduate Slavic Studies, 1976. The English Version is not available. This study adopts the Portuguese Version as a reference: LOTMAN, Yuri. Introdução. In: LOTMAN, Yuri. *Estética e semiótica do cinema*. Translated from the French Version by Alberto Carneiro. Lisboa: Editorial estampa, 1978, p. 9-23.



Just the fact that it is a universal of human culture, that there exist both conventional and pictorial signs (or rather that all signs are to some degree both conventional and representational), is enough to show that semiotic dualism is the minimal form of organisation of a working semiotic system (Lotman, 1990, p. 124).<sup>20</sup>

These two notions, however, are not exclusive and can appear combined in a text. The author explains that the conventional aspect is also seen in the pictorial sign, as in Egyptian hieroglyphics, in which there are some conventional aspects related to the production and use of images (Lotman, 1978). The pictorial and representational aspects can also be observed in the conventional sign when the content is added to “the purely formal levels of expression of the verbal sign (phonetic, grammatical, and even graphic), [which] acquire in poetry the value of content” (Lotman, 1978, p. 20).<sup>21</sup> These figurative and pictorial aspects of the verbal/conventional sign are usually seen in poetry but also in prose.

The language style of children’s literature results from the combination of a “continuous text” formed by visual resources and “discrete texts” based on verbal text (Ivanov *et al.*, 2003, p. 107). The different signs are organised through the creation of “an imaginary child” with whom readers establish a relationship of identification because they share “similar difficulties” (Zilberman, 1983, p. 29).

In *Hanna’s Transformation*, author Luziane F. de Gasperi creates a pony character suffering from the transformations of adolescence. When readers read the text, they will establish relationships of identification with the character since the experience of dealing with similar difficulties can provoke a feeling of empathy. Peter Hunt (2010, p. 106)<sup>22</sup> explains the process of reading a children’s literary work as being similar to any literary work, which takes place through the relationship between readers and books:

Literary meanings are often emotive or impressionistic, connotative as well as denotative; and so who the readers are, where they are, when and why they read are how much they know, how much they have read, and how much they want to read, their capacity for understanding – all

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<sup>20</sup> For reference, see footnote 4.

<sup>21</sup> In Portuguese: “os níveis de expressão puramente formais do signo verbal (fonético, gramatical, e até mesmo gráfico), [os quais] adquirem na poesia valor de conteúdo.” (Lotman, 1978, p. 20)

<sup>22</sup> HUNT, Peter. *Criticism, Theory and Children’s Literature*. Oxford (UK) and Cambridge (USA): Blackwell, 1991.

these and other factors besides contribute to the meaning (Hunt, 1991, p. 66).<sup>23</sup>

Hunt (1991, p. 121) explains in stages the reading process that involves the decoding of a literary work: firstly, there is the relationship between the reader and the “texture” of the book, which is related to the language style of the work, and how the author expresses himself/herself in the book; secondly, the focus is on the “plot” and the “narrative,” which is built as the reader retells the story giving their point of view; and, finally, the relationship between the book and the world, which allows the deepening of the critical understanding about the educational policies involved in the production of a given book. Therefore, it is necessary to know “what language signifies” and the “rules of the game” in order to carry out the process of reading a given children’s book (Hunt, 1991, p. 72).<sup>24</sup>

Readers need to know natural language and understand how it works, as well as develop an understanding of the secondary modelling of the language of the discursive genre (Lotman, 1990; Machado, 2007). For Hunt (1991, p. 74),<sup>25</sup> the audience for children’s literature is made up of “developing” readers, who must integrate the “codes of text,” that is, natural language in Lotman’s terms and genres, products of secondary modelling, in order to deepen generic expectations and the understanding of intertextual relationships.

Regarding the genre, Coelho (2023, p. 156) maps the tendencies regarding the thematic and stylistic content explored by works of children’s literature in Brazil, the strands of “everyday realism,” “the marvellous,” “enigma or police intrigue,” “narrative through images,” and “linguistic games.”<sup>26</sup> The strand of the marvellous, in particular, is subdivided into metaphorical or symbolic marvellous, whose meaning is perceived at the metaphorical level; a marvellous satirist, whose meaning denounces outdated values through satire; marvellous scientific, in which the stories take place in unknown places that escape rationality; marvellous folk or folkloric stories, stemming from European and local stories; and the fable marvellous, in which anthropomorphic animals are perceived

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<sup>23</sup> For reference, see footnote 22.

<sup>24</sup> For reference, see footnote 22.

<sup>25</sup> For reference, see footnote 22.

<sup>26</sup> In Portuguese: “realismo cotidiano,” “maravilhoso,” “enigma ou intriga policialesca,” “narrativa por imagens,” e “jogo linguístico.”

(Coelho, 2023). The books with the pony theme, authored by Gasperi, can be seen as books that explore the strand of the marvellous that occurs in a world apart, distinct from the Earth, being precisely considered a fable marvellous story in which they present “situations experienced by characters – animals” (Coelho, 2023, p. 160).<sup>27</sup> Regarding ponies, the phenomenon by which these animals came to be popularised as marvellous beings will also be mapped.

Tzvetan Todorov (1973)<sup>28</sup> places the marvellous into the broader notion of the fantastic, which implies hesitation on the part of readers when faced with a supernatural event. Faced with hesitation, readers are forced to choose an explanation for the phenomenon. If readers opt for a natural explanation, and the phenomenon is linked to fear, the work will be considered uncanny, while if readers opt for a supernatural explanation, the work will be considered marvellous (Todorov, 1973).<sup>29</sup> According to Todorov (1973), children’s books represent a separate phenomenon because there is no fantastic hesitation by the reader, and the work fits directly into the domain of the marvellous and the explanation based on the laws of another world. Lotman’s (1990) notion of semiosphere allows us to study the various dualities, such as the real world and the marvellous world in children’s books.

The alternation between verbal texts and visual elements helps to form the compositional structure of a work of children’s literature. In the chosen work, besides the textual and visual elements, there is also augmented reality, which will be more detailed in the next topic.

### 3 Augmented Reality

Augmented reality (AR) adds interactivity (Billinghurst, 2002; Billinghurst, Duenser, 2012) in the process of reading a book and allows the approximation of the gaming experience. The impact of RA on students’ education and reading performance has yet to be verified in future studies. However, some AR textbook researchers have

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<sup>27</sup> In Portuguese: “situações vividas por personagens – animais.”

<sup>28</sup> TODOROV, Tzvetan. *The Fantastic: A Structural Approach to a Literary Genre*. Translated from French by Richard Howard with Foreword by Robert Scholes. Cleveland/ London: The Press of Case Western Reserve University, 1973.

<sup>29</sup> For reference, see footnote 4.

shown promising results in education. Research involving fifth-grade students aged 10 to 11 years showed that the experimental group, which read material with AR projected on a screen, had a better performance level than the control group, whose students read printed texts (Bursali, Yilmaz, 2019).

According to Andreas Duenser (2008, p. 44), during their research with AR picture books, students referred to AR books as “games,” especially because they allow the experience with interactivity. Readers perceive reality as mediated through a tangible physical object (Billinghurst, Kato, Poupyrev, 2008), such as a mobile phone or tablet, through which they interact with virtual objects in real time. In this sense, AR books “bridge the gap between the digital and physical worlds” (Yuen, Yaoyuneyong, Johnson, 2011, p. 127). AR books cross the barrier between the fictional world and the real world since readers can interact with the fictional virtual images located on the physical pages of a book. Consequently, there is tension between the real-world environment, where readers manipulate the printed pages of books and the real-world environment mediated by the tablet/mobile phone screen where the interaction occurs.

Interactivity deeply related to games is present in the process of apprehending and reading books with AR since readers start to interact with the characters produced virtually. Picture books combine words and images, structuring their narrative, resulting from the combination of discrete or conventional signs (verbal signs) and pictorial or figurative signs (images) (Lotman, 1978,<sup>30</sup> 1990).<sup>31</sup>

Picture books with AR, currently called 4D books, combine not only images and words but also AR resources, challenging readers and educators. Lotman’s (1990) broad notion of text as culture allows us to observe the 4D book with its varied semiosis. The reading processes of the 4D book cease to be linear to acquire the rhizomatic structure, centred on a root with its multiple parts (primary roots, secondary roots, elongated part and hairs) since the apprehension of the verbal text is carried out with breaks caused by the insertions of interactions with virtual elements, which may also contain sound resources.

Augmented reality (AR) is a platform that allows the user to fuse computer-generated images into the physical world in real time. It is a notion that requires

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<sup>30</sup> For reference, see footnote 19.

<sup>31</sup> For reference, see footnote 4.

understanding the physical/real world and the virtual/digital world. According to *Milgram's continuum* of Reality and Virtuality, the real world and virtual reality are located at opposite poles on a *continuum*, composing a mixed reality (Milgram, Kishino 1994). Augmented reality (AR) and augmented virtuality (AV) are encompassed between these poles, with the former tending towards the real world and the latter towards virtual reality (see diagram below):

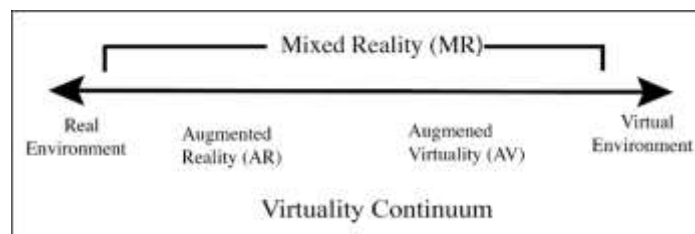


Figure 1: Mixed reality by Milgram and Kishino on the *Reality and Virtuality* continuum.  
Source: Milgram; Kishino (1994, p. 3)

Virtual reality (VR) is a digitally generated environment comprising virtual objects and characters. Users, in general, commonly get to know the virtual space through access to platforms such as personal computers (PCs), mobile phones, tablets, consoles, arcades, smart TVs, web browsers, online streaming, etc. In this context, users become immersed in the “synthetic world” of virtual reality (VR), in which they can interact with virtual images (Milgram, Kishino, 1994, p. 1321).

In AR, virtual objects are projected in real time in real space, coexisting with real objects. Virtual objects can even overlap with real objects, momentarily erasing them from reality mediated by a physical medium. AR, therefore, extends reality by allowing the user to see the real-world environment, with the computer-generated objects.

Just as in any culture, there is a separation between what is inside and what is outside; the semiosphere represents this duality that communicates through its borders: “The boundary may separate the living from the dead, settled peoples from nomad icons, the town from the plains; it may be a state frontier, or a social, national, confessional, or any other kind of frontier.”(Lotman, 1990, p. 131).<sup>32</sup> In children’s books with augmented reality, there is a dichotomy between reality and virtuality, consisting of two

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<sup>32</sup> For reference, see footnote 2.

subsemiospheres, the real world and the virtual world, respectively, which, in turn, are contained in the general semiosphere of Brazilian culture as shown below:

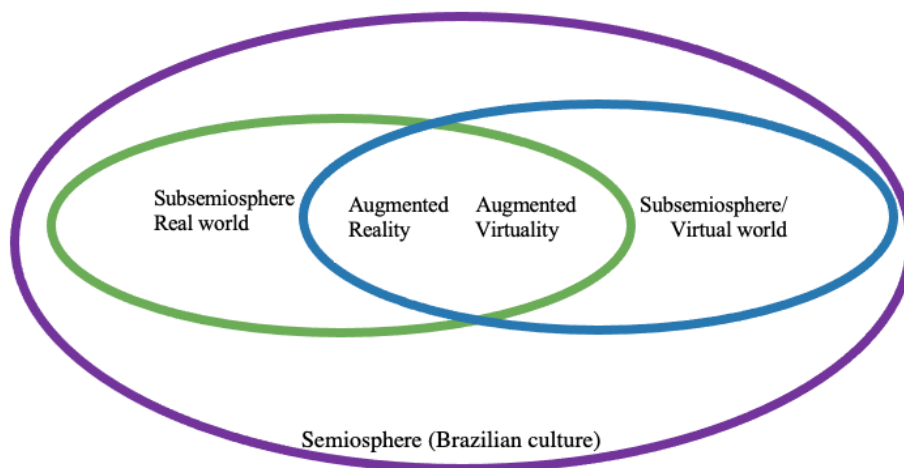


Figure 2: Real subsemiosphere and virtual subsemiosphere. Source: Elaborated by the author, based on Milgram; Kishino (1994) and Lotman (1990)<sup>33</sup>

Based on the notion drawn by Lotman (1978, 1990), the semiosphere of the real world or the real semiosphere generates the semiosphere of the virtual world, that is, the virtual semiosphere. However, it is observed that the virtual topology has its own characteristics and configurations that make it a semiosphere apart. However, the boundaries of the real semiosphere and the virtual semiosphere allow them to absorb each other, producing hybrid phenomena in their peripheries and their interior.

Augmented virtuality (VR) explains the incursion of the real-world semiosphere into the virtual semiosphere when elements of the real world are presented in the virtual semiosphere. Augmented reality (AR), on the other hand, represents an analogous and opposite process when the elements of the virtual semiosphere are present in the semiosphere of the real world. All these phenomena occur within the broader semiosphere, which can be seen as being related to Brazilian culture, whose interior is cut by various internal limits or subsemiospheres.

In AR, an appropriate physical interface is necessary for users to interact intuitively (Carmigniani, Furht, 2011). The origin of the term tangible AR interfaces derives precisely from Ishii and Ulmer's notion of Tangible User Interfaces (IUT),

<sup>33</sup> For reference, see footnote 2.

presented at the conference on the human factor in computer systems in 1997. The scholars envisioned a new means of human-computer interaction (HCI), not restricted to the desktop, mouse, and keyboard. The researchers expanded the interaction between computers and humans to include the interaction between users and everyday physical objects with “digital information” manipulated in the interactive task space. The interaction occurs in the environment of the real semiosphere where the readers manipulate the digital objects on tangible surfaces and, consequently, cross the border of reality and enter virtuality.

One of the first projects in the tangible interface was the *Magic Paddle*, in which virtual furniture was positioned on the pages of a printed book, which functioned as an interactive surface (Kawashima *et al.* 2001). By manipulating the racket, the user could pick up a piece of furniture and transfer it from one page to another. The user could push the furniture with the racket, making it move; he could also touch it lightly, making it disappear. The researcher carried out the experiment, checking the interactions by wearing a head-mounted display (HMD) on his head.

In the experiments, AR equipment ranged from HMDs to glasses that allowed users to see the real-world environment where digital objects were inserted in labs. Currently, virtual reality (VR), augmented reality (AR), and mixed reality (MR) are known in the market as the XR or extended reality niche. The AR market is growing, with an increasing number of AR-enabled apps available in the Google and Apple stores.

The AR experience in the classroom can be dynamic since learning can occur “during the development of AR content as well as in the use of AR applications themselves” (Billinghurst, Duenser 2012, p. 47). Students exposed to AR applications and AR programs are confronted with opportunities to develop multiple types of literacies, as well as to experience a variety of reading processes.

The question of the book that integrates augmented reality, referred to as the 4D book, still involves a complex issue of authorship. The 4D book is, therefore, composed of a team of authors responsible for developing a text using different signs (referential/verbal, pictorial/imagery/4D/RA) in terms of Lotman.<sup>34</sup>

In *O reino encantado dos pôneis 4D*, Stevan Richter, Luziane F. de Gasperi and Jean Carlos Ferreira author the text, Stevan Richter, the graphic design, Adenio Fuchs,

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<sup>34</sup> For reference, see footnotes 2.

the 4D/RA project, and Jean Carlos Ferreira, the illustrations. The work chosen for this study was signed collectively, thus having a collective authorial instance. The texts composed in different semiosis clash, resulting in the breaking of the linearity of the reading process, which starts to be carried out in a rhizomatic way due to the different semiosis.

#### **4 On the Ponies**

Notions such as the semiosphere, signs, and cultural translations can contribute to understanding children's literature. Articles detailing the use of the semiotics of culture as an approach to studying children's literature are rare. This article will gather some concepts developed by the school of semiotics of Tartu–Moscow and exemplify them in the chosen object, *O reino encantado dos pôneis 4D*, authored by the Brazilian team Stevan Richter, Luziane F. de Gasperi, Jean Carlos Ferreira, Stevan Richter, Adenio Fuchs, and Jean Carlos Ferreira.

The theme of Ponies seems to have been popularised in the 1980s in Brazil, with the introduction of a line of toys initially aimed at girls in the age group of 8 to 13 years, called My Little Pony, created by Bonnie Zacherle, Charles Muechinger and Steve D'Aguanno. The franchise originated in the United States in 1981, with the release of the toy called My Pretty Pony, a larger and less stylised version of a beige pony with white spots, accompanied by a kit that included a brush, comb, hat and bows. The toy was able to move its ears and blink its left eye. The collection was followed by another edition accompanied by a smaller pony, and the third edition included the pony variation in pink. The release of a pink pony demonstrates an approximation of the representation of the pony with a figure in the domain of the marvellous (Todorov, 1973;<sup>35</sup> Coelho, 2023).

Initially, six colour variations of My Little Pony were released in the United States in 1983: the Cotton Candy (with pink mane and body), the Snuzzle (with pink mane and white body), the Blue Belle (with lilac mane, and blue body), the Butterscotch (with yellow mane and body), the Minty (with white mane and green body), and the Blossom (with lilac mane and light colour body) by the Hasbro company. The production followed

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<sup>35</sup> For reference, see footnote 28.



the trend of depicting ponies with colours that denote marvellous aspects (Todorov, 1973).<sup>36</sup>

Subsequently, two more pony models were added: the *Peachy* (with a pink mane and peach body) and the *Lemmondrop* (with lilac mane and yellow body). Other animals also accompanied the ponies, such as the yellow cat *Twinkles*, who accompanied the Pretty Parlour, where ponies could be combed and adorned with objects such as hats. There was also the Show Stable edition, accompanied by Brandy, the dog, and the pony *Lemondrop*.

The product manufactured in the United States was not imported to Brazil but began to be produced locally by the national toy industry called Estrela. The name of the product became “Meu querido pôney” [My Dear Pony], which does not represent the literal translation of *My Little Pony*, but its reinterpretation with the affective component observed in “dear.” Thus, with local production, the product entered the second phase of assimilation described by Lotman (1990), being reinterpreted and generating new meanings. The product suffered slight variations in the combination of colours adapting to the local productive sector and the consumer market: *Algodão Doce* [Cotton Candy] (with light pink mane and pink body), *Graminha* [Little Grass] (with white mane and green body), *Rosquinha* [Donut] (with yellow mane and orange body), *Torrãozinho* [Little Cube]<sup>37</sup> (with purple mane and blue body), Caramel (with blond mane and yellow body), and *Quindim* [Coconut Custard]<sup>38</sup> (with blue mane and yellow body). The general expression of pony names in Brazil is closely related to sweetness and sugar, establishing a relation between the affective aspect of “dear” and the sweet taste.

The product My Little Pony: Show Stable was translated as *Meu querido pônei: poneilândia: o show dos pôneis* [My Dear Pony: Ponyland: The Pony Show] in Brazil. The neologism *poneilândia* [Ponyland] has the sense of an enchanted world of ponies, more expressive than the original product’s name in English, which implies ephemeral spectacle events. The product description in English is “A playhouse and home for all your little ponies... with fences to jump and ribbon and trophies to win!” This is a succinct description of a product that is mainly aimed at competition among ponies since the product comes with stables, obstacles, and prizes. The central idea is the competition held

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<sup>36</sup> For reference, see footnote 28.

<sup>37</sup> Which is related to little sugar cube.

<sup>38</sup> “Quindim” is a sweet made of eggs, sugar and coconut flakes, similar to pudding.

through the pony race, which will possibly generate a winner. Another highlight in the box for its contents is “My Little Pony: Lemmondrop included.” Lemon in American culture is associated with childhood because, at a young age, American children often sell lemonade to raise funds to acquire something desired.<sup>39</sup>

In the Brazilian version, there is the following descriptor “A wonderful place for your ponies to put on a show of jumping. And then play in the charming little house with a trophy room, bedroom and kitchen.”<sup>40</sup> The central message in this text is precisely a disinterested game of jumping between children, and the issue of competition between ponies assumes a secondary role. Another piece of information stands out on the product box: “A gift for you: Sweet Drop and the dog Chocolate included.”<sup>41</sup> The pony’s name, “Lemmondrop,” is translated as Pingo Doce in Brazil since there is no relationship between the lemon fruit and childhood in Brazil. In the American version, there is no mention of the dog Brandy. The choice of the dog’s name in English may be related to the proximity of the brown colour of the dog’s fur to the colour of the related beverage. In the Brazilian version, the dog’s name becomes Chocolate, relating the colour of the dog’s coat to children’s favourite candy. Consequently, in the Brazilian version, the dog’s name, Chocolate, reinforces the relationship between affection, childhood and sweet taste. In the passage between one semiosphere and another, adaptations and reinterpretations of values end up influencing a product’s cultural representation.

After generations of toys from the *Meu querido pônei* collection and mediatic productions such as animations, movies, games, and web series, the pony figure is popularised and associated with marvellous elements in several countries, including Brazil. Other productions with enchanted ponies or horses as unicorns were also popularised. Lately, in Brazil, products from the franchise previously released as *Meu querido pônei* started to keep the English nomenclature My Little Pony, reinforcing its foreign origin, which may demonstrate the revaluation of foreign culture from another semiosphere.

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<sup>39</sup> In Brazil, the term lemon (limão) commonly refers to the green “lime”; the yellow one is called Sicilian lemon.

<sup>40</sup> In Portuguese: “Um lugar maravilhoso para seus pôneis darem um show de saltos. E depois brincarem na encantadora casinha com sala de troféus, quarto e cozinha.”

<sup>41</sup> In Portuguese: “Um presente para você: Pingo Doce e o cachorro Chocolate incluídos.”

## 5 On *O reino encantado dos pôneis 4D*

In Brazil, the author Luziane F. de Gasperi released books with themes centred on the main character of a pony: *A transformação de Hanna* (2017), The storybooks *Cantar e brincar: o reino dos pôneis* [Singing and Play: The Kingdom of the Ponies] (2012), in addition to *O reino encantado dos pôneis 4D* (2019).

Gasperi's books are part of the fourth phase of assimilation of foreign texts since the author completely assimilates the image of the pony and begins to produce texts adapted to the contemporary Brazilian reality (Lotman, 1990).<sup>42</sup>In *A transformação de Hanna*, Gasperi addresses the passage from childhood to adolescence through Hanna, a lilac-coloured pony. Readers follow the combination of verbal language, consisting of representational signs, and images, consisting of pictorial signs. The reading process is carried out in a non-linear way since the reading of passages composed of verbal language is interspersed with "readings" of images that complement or supplement the verbal text. Children's picture books have been the subject of discussion by various theorists, such as Coelho (2023, p. 196), who states that in children's literature, "the image speaks as much as the word."<sup>43</sup>

In *O reino encantado dos pôneis 4D*,<sup>44</sup> the authors invite readers to undertake a journey to a marvellous world inhabited by ponies in the "*Galáxia Cor-de-Rosa*" [Pink Galaxy]. Through a QR code found on the back of the book's first page, readers are directed to the VL4D application, available on Android and IOS platforms, to download the program to be installed on the tangible platform, the cell phone or tablet. Through the application, readers will be able to interact with the virtual objects to be positioned on the physical page. The interaction takes place through the direct manipulation of the readers with the use of fingers on the surface of the mobile phone or tablet, which acts as a tangible work area.

Marla, the owl, the Queen Amabel's advisor, explains why she was asked to write the travel guide to the marvellous land and warns readers of the dangers involved in the journey. The guide introduces the readers to Queen Amabel, who carries a red crystal in

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<sup>42</sup> For reference, see footnote 14.

<sup>43</sup> In Portuguese: "a imagem fala tanto quanto a palavra."

<sup>44</sup> The pages of the chosen children's book are not numbered. Thus, the analysis followed the order of the events in the book.

a tiara. The stone is called *Lágrima de Zoltar* [Zoltar's Tear] and gives the queen courage and wisdom, as well as wings that allow her to fly. After reading the text, readers, through the VL4D application feature installed on their cell phone or tablet, access the image of the Pony Queen and participate in a game in order to fulfil a task. Readers must help the queen break the rocks to find the red crystal, the *Lágrima de Zoltar*, which will grant her wings. Readers also take on the role of players as they touch the rocks with their fingers through the screen of their cell phone or tablet and lead Queen Amabel toward the rocks. Through touch, the readers/players help the queen break the rocks to find the hidden red crystal. Readers should touch the red crystal with their fingers. In this way, Queen Amabel approaches the stone and interacts with it. As a result, Queen Amabel is given the wings to fly, taking the form of a small Pegasus, a white pony with yellow manes and wings.

The book goes on to detail the magical world of ponies and tells about a rainbow that does not hold a pot of gold at its end. Instead, there is a beautiful waterfall. The location allows fairies from various kingdoms to gather to recharge their powers. Therefore, the nature of the pony kingdom is seen as its great wealth.

The book also introduces readers to the singer Gil, who had lost his voice the day before his stage performance. Readers need to help Gil position himself near the microphone for the show to start. To do this, they must lightly touch the microphone so that the pony repositions itself. As he accomplishes the task, the pony hums. The book warns the reader to respect the voice's limit and avoid shouting or speaking too loudly.

The character Gil, who inhabits the semiosphere of the *Reino encantado dos pôneis*, located in the magical dimension of the *Galáxia Cor-de-Rosa*, establishes a reference with the figure of the singer Gilberto Gil, who inhabits the real world in Brazil. The reference to Gil is further reinforced in the representation of the pony in black, with white manes. In this way, there is a confrontation between the two semiospheres, the real world semiosphere, where the readers live, and the marvellous world semiosphere, where *reino encantado dos pôneis* is located. Such a relationship with the real world is also present in the advice to readers, detailed in the book, as it also serves the context of the real world.

The children's book conveys learning and a moral message to the intended audience, which necessarily results in the confrontation of at least two worlds: the semiosphere of the marvellous world of the book, where the characters live their plot, and

the semiosphere of the real world, where the readers inhabit (Lotman, 1990).<sup>45</sup> Augmented reality adds another world, the semiosphere of virtuality, whose topology readers/gamers access through interactivity. Readers start to assume the roles of players/gamers to actively participate in the narrative construction process, helping character fulfil their tasks. However, the narrative construction of the 4D/AR book differs from the narrative construction of the video games, since readers do not accumulate points and activities are not prerequisites for readers to advance in the narrative.

The manual also introduces the trolls, creatures considered horrifying, as they want to move the swamp where they live to the place where the rainbow is located. The book advises readers to escape dangerous situations with the trolls by asking complex questions, which the trolls will come to worry about, letting the readers escape. The reference to the troll results from the confrontation between different semiospheres in the fictional and marvellous worlds. Trolls are creatures from Norse folklore that belong to another semiosphere and do not commonly appear in pony narratives, as ponies belong to their own kingdom. Lotman's (1990) semiosphere allows readers to understand the interactions of the various worlds that permeate through their boundaries while reading and constructing narratives. Readers construct the narratives by making sense of their experiences.

There is also a section with a Chinese ideogram, which indicates kung-fu. The ponies practice the ancient art for eight years in a row, together with Master Chang. After this period, the ponies work as Imperial Guardians. The manual also features the *Café Pinote* [Pinote Café], which serves a delicious milkshake and lists sights to visit, such as the Horseshoe Bridge, the Dancing Waters Fountain, the Centaur Xandrinus Tattoo Studio, and the Cotton Candy Museum.<sup>46</sup> The insertion of a reference to a culture of a semiosphere (China) existing in the real world causes tension between the fictitious and the real worlds in the reading process. For Noth (2014, p. 13), the semiosphere is seen as the result of “metaphorical projections of cultural values in geographical spaces.”<sup>47</sup> The representation of China is seen as linked to values such as discipline, respect and courage, combined with the practice of the martial art kung-fu. The lack of any mention of China

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<sup>45</sup> For reference, see footnote 4.

<sup>46</sup> In Portuguese “Ponte da Ferradura,” “Fonte das Águas Dançantes,” “Estúdio de Tatuagem do centauro Xandrinus,” “Museu Algodão Doce.”

<sup>47</sup> For reference, see footnote 8.

causes such values to be incorporated into the very representation of the Enchanted Kingdom of the Ponies in the semiosphere of the marvellous world.

In another section, readers are confronted with the values of the community of ponies who live in the countryside, and each is nurtured with a basket full of apples. The readers must help the pony pick up the apples from the ground and place them in the basket. When the pony approaches and lightly touches the apple with his nose, he causes it to be thrown into the basket to the sound of a neigh. Readers should be careful when manipulating virtual objects because when they touch the apples abruptly, the pony can move back, letting all the apples fall off the basket, thus demanding the task to be performed again. The tasks are done when all the apples on the ground, in the shape of a circle, are harvested.

The following section introduces readers to the pony school, where each pony's special talents are developed. Kung-fu master Chang also practices philosophy, and by studying ponies, he concluded about pony skills in general. Master Chang says, "There are three essential characteristics common to all ponies: friendship, a great love for nature, and care for their manes, always clean, beautiful and fragrant."<sup>48</sup> In addition to martial arts, China is seen as the birthplace of the great philosopher Confucius, who inquired about the meaning of life. Elements of the Chinese semiosphere in the book establish the relationship between the enchanted world and the real world, causing the confrontation of their borders.

In the end, readers are faced with the heir to the throne of the pony kingdom, Princess Jade, who will be queen in the future, following the lineage of her mother, Amabel. In her last task, readers must help Princess Jade find the flower hidden in a magical chest. Readers must tap on the chest so Princess Jade can approach it and open it. Upon finding the flower, readers must touch it so that it can be moved to the princess's mane.

Matrilinear values are embedded in the book, as the throne of the Enchanted Kingdom of Ponies is passed down from mother to daughter. Such a value leads the child to confront patriarchal values inherent to the real world, resulting in reflections. The journey ends with Marla the owl's farewell greeting with Queen Amabel: "I hope you

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<sup>48</sup> In Portuguese; "há três características essenciais, comuns a todos os pôneis: a amizade, um grande amor pela natureza, e o cuidado com suas crinas, sempre limpas, belas e cheirosas."

enjoyed it. Now that you know the Enchanted Kingdom of the Ponies and the way here. Always come back!<sup>49</sup>

## Conclusion

New technological genres emerge as an educational resource in the market, challenging educators and readers. The semiotics of culture developed in Tartu–Moscow allow us to rethink the notions of multiple semioses, including new resources such as augmented reality that have been standing out in the production of new genres of children’s literature, the 4D books.

The article explored the possibility of using the notion of the semiosphere of the semiotics of culture as an approach to reading 4D children’s books, enabling the understanding of the genre as a text formed by multiple semiosis. The notion of the semiosphere in the marvellous children’s book allows for mapping the real world, the real semiosphere, and the marvellous world, the semiosphere of the enchanted realm. As for the children’s 4D book with AR, the notion of semiosphere helped understand the real world where the reader inhabits and finds the tangible object through which he manipulates the virtual elements and the virtual world to which belongs the digitally produced elements that allow interaction. The choice as the object of study of a marvellous book with AR allowed the use of the semiosphere as a complex reading approach to map the varied worlds such as the real world and the enchanted world, the real world and the virtual world to which correspond respectively a specific subsemiosphere with its borders. The imbrication of the boundaries of these subsemiospheres demonstrates communication through the intersection between borders and peripheral zones. Such subsemiospheres, in turn, are contained in a general semiosphere that can be seen as the Brazilian semiosphere, which was the recipient of cultural products such as *My Dear Pony* from the foreign semiosphere and began to produce renewed cultural products with diverse references.

This research demonstrated the mapping of the 4D book reading process, which was not carried out linearly but rhizomatically. This allowed the reading of verbal tests

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<sup>49</sup> In Portuguese: “Espero que vocês tenham gostado. Agora que conhecem o Reino Encantado dos Pôneis e o caminho até aqui. Voltem sempre!”

and images with the performance of interactive tasks. However, more research is still needed in other corpora to reinforce using the semiosphere as an approach to reading 4D books.

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### **Research Data and Other Materials Availability**

The contents underlying the research text are included in the manuscript.

### **Reviews**

Due to the commitment assumed by *Bakhtiniana. Revista de Estudos do Discurso* [Bakhtiniana. Journal of Discourse Studies] to Open Science, this journal only publishes reviews that have been authorized by all involved.

### **Review I**

The article's purpose—to analyse the illustrated book *O reino encantado dos pôneis 4D* using the semiotics of culture reading approach—is valid and original, but it presents several problems: Revising the assertion that the semiosphere coincides with the geographical space is necessary. This may or may not be true. For example, we can speak of the semiosphere of children's literature, which does not coincide with any concrete geographical space. In general, the presentation of the concept of semiosphere could be further explored. The notion of boundary refers not only to the boundaries of a semiosphere but also to its interior since several borders traverse every semiosphere. Therefore, the translation and production of new meanings occur both in the borderline part of the semiosphere and within it. In the part of the exhibition on AR, the references to the information presented are missing. MANDATORY REVIEW [Revised]

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Reviewed on November 27, 2023.

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## **Review II**

The text, as a whole, is appropriate to the proposed theme in a certain way, in the title and in the abstract. The essay's objective is essentially explained in the introduction, and there is coherence in the development of the text. The entire text follows the proposed theory from the abstract in dialogue with other related perspectives. However, the bibliography is not at all up to date, and outdated studies are used. Originality of reflection and contribution to the field of knowledge. In general, the study is original in its reflection and contributes to the field of knowledge in the area. The text is clear, but there are many language flaws, either due to poor punctuation or vocabulary selection, as well as typos whose correction is necessary. APPROVED

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Reviewed on February 02, 2024.

## **Review III**

Most of the suggestions were incorporated into the second version of the article, but it still needs to undergo a careful review of Portuguese. APPROVED

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