

THE TECHNODISDISCOURSE OF SCIENTIFIC DISSEMINATION: RHETORICAL RELATIONS AND NON-LINEAR READING IN HYPERLINKS OF DIGITAL NEWS

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- **ABSTRACT:** This paper aims to analyze the rhetorical-discursive behavior of hyperlinks constitutive of digital news of scientific dissemination published in the online magazines *Galileu* and *Superinteressante*, based on notions postulated in the framework of Digital Discourse Analysis (DDA), by M-A. Paveau, and of the Rhetorical Structure Theory (RST), developed by W. Mann and S. Thompson. Towards that, we examine the hyperlinks according to the technodiscursive category of nonlinear reading (ADD), as well as to the rhetorical relations (RST) that emerge between the source and the target text by means of the hyperlink. The analyses show that the textual producer chooses to non-linearize, by means of hyperlinks, the syntagmatic, enunciative and discursive threads of his/her text, in a markedly visual way, in order to cause rhetorical effects on the reader, such as: to bring credibility to the scientific information disseminated, to increase the ability to understand information, to detail the information and, ultimately, to induce the reading of other texts published in the same magazine. It is important, however, to point to the fact that the achievement of those effects depends directly on the reader, who will choose to activate, or not, the hyperlink by means of a gestural statement: the click.
- **KEYWORDS:** digital discourse; technodiscursivity; hypertext; hyperlinks; non-linear reading; rhetorical relations; digital news of scientific dissemination.

Introduction

This paper presents results from a research developed by the group *CCELD - Comunicação da Ciência: Estudos Linguístico-Discursivos*, coordinated by Prof.

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Dr. Maria Eduarda Giering and linked to the Post-Graduation Program in Applied Linguistics from the University of Vale do Rio dos Sinos (UNISINOS), whose aim was to investigate the discursive manifestation of hyperlinks present in a *corpus* of digital news of scientific dissemination. In its broader context, the investigation covered description, analysis and interpretation of a *corpus* composed of ten digital news of scientific dissemination, published in the on-line magazines *Galileu* and *Superinteressante*.

Considering the purpose of this paper, we select two of the ten digital news of scientific dissemination previously collected, using the following criteria: (i) the greater number of hyperlinks presented; and (ii) the representation of each one of the magazines chosen for study (*Galileu* and *Superinteressante*). Thus, in this paper, we aim to analyze the rhetorical-discursive behavior of the hyperlinks that constitute the digital news, by means of the investigation of the rhetorical relation [through *Rhetorical Structure Theory* (henceforth RST)] that emerges between the news, called as “source text”, and the documents which the reader is sent to, called as “target text”. We also seek to expose the visual, syntagmatic, enunciative and discursive marks that underlie the hyperlinks.

For this purpose, we examine the hyperlinks based on the *non-linear reading* category - proposed by Paveau (2017a) for the digital discourse analysis -, as well as on the *rhetorical relations* - postulated in the scope of RST (MANN; THOMPSON, 1988; BERNÁRDEZ, 1995) - that are established between the source text and the target text by means of the hyperlink.

Therefore, this investigation is underpinned by Paveau (2015, 2017a, 2017b), with the notions of technodiscourse and, mainly, non-linear reading; and by Mann and Thompson (1988) and Bernárdez (1995), with the aspects related to RST.

Besides of this introduction, the present paper is composed of five sections, which present, in the following order: the exposition of the theoretical postulates related to (i) the nonlinear reading as a technodiscursive category; and to (ii) the RST perspective; the methodology applied in this study; the analyses of the digital news of scientific dissemination selected and the final considerations.

Non-linear reading: a category from technodiscursivity

In a digital or technodiscursive context, the discourse thread is made nonlinear by technolinguistic marks: clickable elements (words or signs) that lead to other on-line texts, such as the hyperlinks. According to Paveau (2017a), non-linear reading results in a discursive fragmentation, which produces a very different reality in comparison with the one of the printed text, leading to the phenomenon of *readwriting*. The readwriting is revealed when the reader assumes a role of co-authorship of the text, once it is presented to him/her, by means of the hyperlink, the possibility of performing various reading pathways and, consequently, of constituting a new text from the fragments read.

The linguist argues, then, that the enunciation of the digital text is “pedestrian”¹ (PAVEAU, 2017a), metaphorically referring to the walker activity from both the production instance - the writer - and the reception instance - the readwriter - along the multiple pathways, not necessarily linear, which are offered by hypertextualization to the discourse constitution.

In short, for Paveau (2017a, p. 16, our translation²), non-linear reading “consists on the intervention of clickable elements in the discourse chain, which direct the readwriter from a source-thread to a target-thread, establishing a relation among two discourses.” Once more, it is necessary to highlight that this relation results from the readwriter’s decision of activating the hypertextual elements by means of a click - or, in the author’s words, of a “gestural statement”. Thus, this element clickable by means of a visual *gesture* (PAVEAU, 2017b) - which is called, by convention, *hypertextual node* - makes the text non-linear, connecting the source text to the target one.

Paveau (2017a, p. 8, our translation) also highlights that the hyperlink:

[...] constitutes a suspension or a deviation in the discursivity linear order, both in production and in reception: the hyperlink produces a non-linear reading that modifies the internal logic of the intradiscourse, producing, at the same time, its extension and its fragmentation.³

A concrete and visible aspect of this type of non-linear reading is that it is charged by a specific visual mark, namely by a distinguished color or by an emphasis, such as the underline. These specific visual marks indeed materialize the hyperlink, once they put on relevance the hypertextual node. According to Paveau (2017a, p. 16, our translation), the hyperlinks:

[...] involve the syntagmatic ramification of the statement, its enunciative functioning and its semiotic materiality; they also bear a specific visual mark, color or underline, which are non-linear reading signs⁴.

Considering those non-linear reading signs previously identified, it is important to highlight that, in the digital discourse context, the visual mark is a way of implicating the readwriter in a possible action: the one of clicking on the hyperlink presented in the text. This action involves technology, because it intermediates the connection

¹ Free translation of the expression “*piétonnière*”, used by Paveau (2017a).

² Original: “[...] *l’intervention d’éléments cliquables dans le fil du discours, qui dirigent l’écrivain d’un fil-source vers un fil-cible, instaurant par là une relation entre deux discours*”. (PAVEAU, 2017a, p. 16).

³ Original: “[...] *constitue une suspension ou une déviation dans l’ordre linéaire de la discursivité, tant en production qu’en réception: l’hyperlien produit une délinéarisation qui modifie les logiques internes de l’intradiscours en produisant à la fois son augmentation et sa fragmentation*”. (PAVEAU, 2017a, p. 8).

⁴ Original: “[...] *Les hyperliens engagent le déroulement syntagmatique de l’énoncé, son fonctionnement énonciatif et sa matérialité sémiotique; ils portent en outre une marque visuelle spécifique, la couleur ou le soulignement, qui sont des signaux de délinéarisation*”. (PAVEAU, 2017a, p. 16).

between two hypertextual nodes. For this reason, Paveau (2017b, p. 1, our translation) explains that:

[...] Non-linear reading is an elaboration of the discourse thread in which the technological and linguistic questions are co-constitutive and affect the combinatory syntagmatic, building a composite discourse with relational dimension. Non-linear reading is a phenomenon totally dependent on discursive technology.⁵

In order to analyze the composite mark of non-linear reading in hyperlinks - considering it in the relation between its linguistic and technological dimensions -, we adopt categories developed by Paveau (2017a). According to the linguist, there are five different, but simultaneous and cumulative, manners of observing this phenomenon of the digital discourse:

- a) visual non-linear reading: it has visual and material existence manifested in the hyperlink. The color, for example, takes a relevant role in discourse, both in writing and reading. Any element of the text that is clickable appears in color, requiring an action from the readwriter (PAVEAU, 2015, 2017a);
- b) syntagmatic non-linear reading: it leads to a clickable element that operates a suspension in the text sequence, enabling the insertion of other discursive segments connected to this element. In other words, the “discourse thread is syntactically made non-linear”⁶ (PAVEAU, 2017a, p. 17, our translation);
- c) enunciative non-linear reading: it stems from syntagmatic non-linear reading, namely “the exit point from the discourse thread is also an exit point from the enunciative thread; the source-thread is, therefore, materialized inside the target-thread by hypertextual marks” (PAVEAU, 2017a, p. 17-18, our translation⁷). The coexistence, in the same thread, of various potential situations of enunciation is always marked by a graphic form (PAVEAU, 2015, 2017a);
- d) discursive non-linear reading: it indicates that the “phenomenon of reported technodiscourse effaces the linearity of the quotes discourse to replace it by an enunciative gesture” (PAVEAU, 2017a, p. 18, our translation⁸). Namely, the readwriter passes, by means of a click, from a hyperdiscourse to another hyperdiscourse;

⁵ Original: “[...] *La délinéarisation est une élaboration du fil du discours dans laquelle les matières technologiques et langagières sont co-constitutives, et affectent la combinatoire phrastique en créant un discours composite à dimension relationnelle. La délinéarisation est un phénomène relevant pleinement de la technologie discursive*”. (PAVEAU, 2017b, p. 1).

⁶ Original: “*Le fil du discours est délinéarisé syntaxiquement*”. (PAVEAU, 2017a, p. 17).

⁷ Original: “[...] *la sortie du fil du discours est aussi une sortie du fil énonciatif, le fil-cible étant alors matérialisé à l'intérieur du fil-source par les marques hypertextuelles*”. (PAVEAU, 2017a, p. 17-18).

⁸ Original: “[...] *ce phénomène de technodiscours rapporté efface la linéarité du discours citant pour remplacer par un geste d'énoncé*”. (PAVEAU, 2017a, p. 18).

- e) semiotic non-linear reading: it includes the combination of non-verbal elements, such as image, sound, graphic or action, due to the composite nature of digital statements. Any clickable element can also lead to some forms that combine the verbal and the non-verbal. For example, in digital news, semiotic non-linear reading occurs when the textual producer shares a video before, in the middle or at the end of his/her text (PAVEAU, 2015, 2017a).

Among these five manners of non-linear reading, only the semiotic one is not considered in this paper, because, in the selected *corpus*, the combination of non-verbal elements in the target texts does not occur.

Besides observing technolinguistic marks of the non-linear reading category, Paveau (2017a) acknowledges the existence of rhetorical relations between the source text and the target one. In order to deal with those relations, the linguist bases herself on Alexandra Saemmer's study (2015), that set a typology of links from the result of a crossing of the uses made by the readwriters (user-based) of the target texts and semiotic and rhetorical observations of hypertextual corpora (screen data).

However, in order to examine the rhetorical relations in the present investigation, we adopt studies carried out in the field of *Rhetorical Structure Theory* (RST), a theory which we judge to be adequate to our task, once it allows us to consider the relations between the source and the target texts from a typology of rhetorical relations identified by means of an evaluation of the analyst about the connections that are established between the two texts. This type of analysis has been developed by the research group CCELD for corpora composed of samples from printed and digital media (GIERING, 2007b; SOUZA; GIERING, 2010; BECKER; GIERING, 2010; IRACET, 2014).

In the next section, we present RST (MANN; THOMPSON, 1988; BERNÁRDEZ, 1995; GIERING, 2007a), theory in which we are based on to describe the rhetorical relations verified between the source and the target texts in our *corpus*.

Rhetorical Structure Theory (RST)⁹

In 1988, Mann and Thompson developed the Rhetorical Structure Theory (RST) when dealing with automatic generation of texts. However, this theory assumes a very relevant role for the linguistic studies, regardless of its computational application.

The textual linguist Enrique Bernárdez introduced RST application in the text studies, searching for a model that could simultaneously serve to text and clause analysis, so that it could be possible to explain, in structural terms, the patterns of the smaller units, in relation to each other, to compose the greater unit: the text.

In this context, the author defines RST as a model that:

⁹ The theoretical approach of this section partly reproduces the text of Iracet (2014).

[...] uses the relations that are established between the elements of a text, holding a radical difference with respect to the procedure adopted by syntax, where we have relations such as “subject-verb”, “modifier-nucleus”; in the text, these relations are of the type “summary-nucleus” or “background-nucleus”. (BERNÁRDEZ, 1995, p. 82, our translation)¹⁰.

According to W. Mann and S. Thompson, RST founding authors, the term “structure” is used in an organizational sense. Based on the premise that a theory of text structure must describe the parts that compose the text as well as their principles of combination, Mann, Thompson and Matthiessen (1989) postulate that RST is a theory of relational structure, which aims to analyze and describe the relations that are established between couples of areas of the text, areas whose extent may vary from small clauses to entire groups of paragraphs.

In this context, RST purpose is “[...] to describe the relations that occur between certain parts of the text, considering that, inside the global textual unity, there are information blocks among which *relations of nucleus-satellite* are established” (IRACET, 2014, p. 39, author’s emphasis). Thus, according to Iracet (2014, p. 39), “for RST, while some of those blocks assume more central roles in the text (N), others have more peripheral functions (S), serving the nuclear units”.

Thinking of the relations between nucleus (N) and satellites (S), Bernárdez (1995, p. 84, our translation) states:

The distinction between N and S is of great importance, because it enables us to suppose that a text is composed of two basic levels of information: the one that contains the main information, the more important information provided by the author, and the level in which the secondary information appears, the one that appears to aid comprehension, acceptance, etc., of the main information.¹¹

The relations between nuclear and satellite units have functional nature, which means that they are determined in terms of the effects they produce, reflecting the options of presentation and organization made by the textual producer. Therefore, Mann, Thompson and Matthiessen (1989, p. 8) claims that “it is in this sense that a RST structure is ‘rhetorical’”.

¹⁰ Original: “[...] utiliza las relaciones que se establecen entre elementos de un texto, con lo que no hay una diferencia radical respecto al procedimiento seguido en sintaxis, donde tenemos relaciones como “sujeto-a-verbo”, “modificador-a-núcleo”; en el texto estas relaciones son del tipo “resumen-a-núcleo” o “fundo-a-núcleo”. (BERNÁRDEZ, 1995, p. 82).

¹¹ Original: “La distinción entre N y S es de gran importancia, porque permite suponer que un texto está formado por dos niveles básicos de información: el que contiene lo principal, la información más importante que quiere proporcionar el autor, y el nivel en el que aparece la información secundaria, en el sentido de que aparece para ayudar a la comprensión, aceptación, etc., de la información principal.” (BERNÁRDEZ, 1995, p. 84).

In other words, when we talk, under RST perspective, about rhetorical function of the informational units of a text, we refer to the decision-make process carried out by the textual producer in order to configure his/her text to produce various effects over the reader, such as, for example, the motivation for reading and the identification of cause-consequence or problem-solution relations among textual segments. In this sense, according to Giering (2007a, p. 244), “the analysis enabled by RST model attributes, thus, a role and an intention to each informational unit of the text”.

Based on Bernárdez’s studies (1995), in 2008, the project entitled Rhetorical Organization of Texts of Scientific Dissemination (Portuguese abbreviation: ORTDC), coordinated by Prof. Dr. Maria Eduarda Giering, organized a list of rhetorical relations. Giering’s project approaches Bernárdez’s proposal (1995), once the linguist links RST to the idea that “[...] textual organization can be understood as a series of continuity ways, tagged with RST relations” (BERNÁRDEZ, 1995, p. 85).

In the list organized in the context of ORTDC project, there are three great ways - Presentative (presentation category), Hypotactic (content category) and Paratactic (multinuclear category) -, by means of which we can investigate, in a probabilistic level, the relation between a unit N and a secondary unit S.

The first way regards to Presentation relations, namely the ones that offer information that aid reader’s comprehension of the previous unit. The second way is linked to Content relations, i. e., there is a detailing, development or re-elaboration of the initial unit content. And the last way refers to Multinuclear relations, which offer new information to the reader, information that are not necessarily related to the previous unit. These three ways encompass specific rhetorical relations in order to analyze the relation between N and S.

This is an extensive list of relations exhaustively described, so that we choose to detail, in this paper, the concepts and features of the three rhetorical relations identified in the analysis section: Evidence, Background and Elaboration. Composing the Presentative way, the rhetorical relation of Evidence emerges between a nuclear unit (N), in which an affirmation is placed, and a satellite unit (S), in which information is placed in order to increase reader’s (R) belief in relation to the affirmation in N. The Background relation, by its turn, also belongs to the Presentative way and is established between the affirmation contained in a unit N and information that serve to facilitate the comprehension of this affirmation (unit S), so that the R’s capacity to understand N is increased. At last, the relation of Elaboration, belonging to the Hypotactic way (content category), associates additional information (S) to basic information (N), in order to make R recognize the situation presented in S as providing additional details for N. These definitions support the rhetorical nature attributed by RST to the different relations that may emerge between textual units, once they are directed to the effects caused over the reader by the various possibilities of organization the producer may have.

Bernárdez (1995) explains that the identification of the rhetorical relations that emerge in a text follows probabilistic criteria. Therefore, the linguist claims that:

[...] Language phenomena are not deterministic, but have a basically stochastic nature. As a consequence, it is impossible to exactly predict the statements that will be produced in a certain context. It is also probabilistic in the prediction of possible statements in type-contexts. (BERNÁRDEZ, 1995, p. 93, our translation).¹²

In other words, as we are dealing with language, we cannot predict with absolute certainty “[...] the form a text will adopt, or explain in a totally irrefutable way the form taken by a text” (GIERING, 2007b, p. 9). Thus, according to Bernárdez (1995, p. 112), it is possible “[...] to predict which is the most probable form for a certain text in certain conditions, but we can never fully guarantee that it does not appear something different¹³.”

Due to this probabilistic nature, another fundamental principle that bases analyses in RST scope is the plausibility. The investigation of rhetorical relations that emerge in a text occurs from the particular, but justified, judgment of the analyst. It means, again, that the analysis under RST model does not intend to be established as the unique possible truth about the relational structure of the text analyzed. Therefore, as Mann, Thompson and Matthiessen (1989, p. 15) highlight:

Since the analyst has access to the text, has knowledge of the context in which it was written, and shares the cultural conventions of the writer and the expected readers, but has no direct access to either the writer or the readers, judgments about the writers or readers must be plausibility judgments rather than judgments of certainty.

Aiming to define what can be considered as an informational unit that, inside of the text global structure, maintains rhetorical relations with other units, Taboada and Habel (2013, p. 68) state that: “in Rhetorical Structure Theory (RST), texts are understood as coherent wholes, made up of parts that stand in rhetorical relations to each other. The parts are typically clauses or sentences”. In relation to the possibilities of text segmentation for RST analysis, Mann and Thompson (1988) claim that texts may be divided into units still greater than sentences, according to the analyst’s objectives. Also highlighting the various options of textual segmentation that are offered to the analyst, Bernárdez (1995) points out sentences, clauses and semantic propositions as different possibilities for text division, always taking into account the analysis objectives.

Taking advantage of the theory’s recursion, indicated by the several and open possibilities of segmentation pointed by its founders, in this paper, we further extend its

¹² Original: “*Los fenómenos del lenguaje no son deterministas sino básicamente de naturaleza estocástica. Es imposible, por lo tanto, predecir con precisión las declaraciones que tendrán lugar en un contexto dado. También es probabilístico predecir posibles enunciados en contextos estándar*”. (BERNÁRDEZ, 1995, p. 93).

¹³ Original: “[...] *predecir la forma más probable para un texto dado bajo ciertas condiciones, pero nunca podemos asegurar completamente que no surja algo distinto*”. (BERNÁRDEZ, 1995, p. 112).

scope, aiming to cope with phenomena native from digital contexts, more specifically with hypertextual organization. Then, we adopt the list organized by ORTDC project, in 2008, in order to investigate the rhetorical relation between the source and the target texts, in the context of the mediatic hyperdiscourse of scientific dissemination. In the case of hypertexts, the source texts are “N” - the ones that assume a central role, once the hyperlinks are placed in them -, and the target texts are “S”. The importance of this analysis is in the fact that it enables us to identify possible intentions in the producer action of placing a hyperlink in his/her text, connecting it to another text which is also available in digital media.

The difference between this type of analysis and investigations focused on the emergence of rhetorical relations in non-hypertextual contexts (linear contexts) is that, in the case of hypertexts, the rhetorical relations that are established between the source and the target texts, connected by the hyperlink, are accomplished only if the readwriter accesses the document - occurring, this way, the connection between the texts. In other words, in the hypertextual digital context, the hyperlinks rhetorical effect intended over the reader depends not only on the producer’s choices, but also on the reader’s choices. This observation responds to the notion, presented in the previous section, that the phenomenon of non-linear reading leads to the phenomenon of readwriting.

Having exposed our theoretical frame, we move on to the description of the methodology applied in the research reported in this paper.

Methodology

The general *corpus* of the research, in its broadest context, featured 10 digital news of scientific dissemination extracted from the Science tab of the websites of *Galileu* and *Superinteressante* online magazines, five of each, all published in June 2018. The news that published results of research or scientific discovery were selected in sequence (as they were published) until they totaled 10 samples. All news from the *corpus* presented at least one hyperlink.

When dealing with the extension of corpora in a digital environment, linguist Moirand (2020) argues that the digital discourse analyst can carry out his/her analysis from what she calls “small *corpora*”. According to Moirand (2020, p. 21), small corpora “make it possible to describe discursive forms, rare or not yet stabilized, [...] as well as the relationships between verbal language and the world (the environment, the objects, the actors and their actions)¹⁴.” Thus, supported by Moirand (2020), considering that this research is included in the digital discourse analysis, we chose to compose a not so extensive *corpus*, considering the depth made in each analysis presented.

¹⁴ Original: “possibilitam descrever as formas discursivas, raras ou não estabilizadas ainda, [...] bem como as relações entre a linguagem verbal e o mundo (o ambiente, os objetos, os atores e suas ações)” (MOIRAND, 2020, p. 21).

Galileu's website informs that the publication talks about science, technology, behavior and politics. The website of *Superinteressante* magazine, in turn, has the slogan “for those who want to understand the world beyond the obvious¹⁵”, and it is accessed 11,659,000 times a month, according to *Publiabril* (REVISTA SUPERINTERESSANTE, 2019). These are, therefore, media vehicles widely recognized in the scope of public communication of science and technology in Brazil.

In view of the space restrictions in this article, we present the analysis of digital news for each magazine studied, numbering two texts analyzed. The criterion for selecting those two samples was the fact that they had the largest number of hyperlinks, thus showing themselves to be more recursive for the analyses and the discussions carried out in this work. Both the news are available in the Appendices, presenting themselves segmented by means of the enumeration of their sentences. Such segmentation facilitates, for analysis purposes, the reference to the excerpts of the texts by their respective segment numbers. In addition, the links to the analyzed news, in full, are available at the end of the Appendices section.

The analysis of digital news consisted of the following steps: (i) selection of the study *corpus*; (ii) recognition of characteristics of the *corpus* (title of the news, linguistic mark of the hypertext node, target text); (iii) analysis of the occurrence of the non-linear reading category, typical of digital discourse (describing its types by means of tables); and (iv) identification of rhetorical relations, according to the RST, that emerge between the source text (Nucleus - N) and the target text (Satellite - S), by means of the organization of tables.

After the exposition of the methodological procedures adopted in the research addressed in this work, we present, next, the analysis of the two texts that compose our *corpus* of study.

Analysis of digital news of scientific dissemination

The first news analyzed is entitled *Astrônomos descobrem exoplaneta com ano de 20 dias de duração* (*Astronomers discover a 20-day-long exoplanet*, in English), published in *Galileu's* magazine. In it, we identified six hyperlinks: (1) *Artigo* (in the third sentence of the text); (2) *The Astronomical Journal* (in the third sentence of the text); (3) *NASA* (in the fourth sentence of the text); (4) *Saturno* (in the eighth sentence of the text); (5) *Rússia* (in the twelfth sentence of the text); (6) *Marte* (in the thirteenth sentence of the text).

Below, we reproduce a screen capture that shows the hyperlinks in the digital news, in order to facilitate the visualization of the way they are distributed throughout the text.

¹⁵ Original: “para quem quer entender o mundo além do óbvio”.

Image 1 – Hyperlinks of the digital news *Astrônomos descobrem exoplaneta com ano de 20 dias de duração.*



Source: Astrônomos ... (2018).

Regarding non-linear reading, in the chart below, we describe all the types present in the hyperlinks of this hypertext of the *corpus*.

Chart 1 – Result of the analysis of the types of non-linear reading of digital news *Astrônomos descobrem exoplaneta com ano de 20 dias de duração*

Hyperlink (Language mark of the node)	Visual Non-linear Reading	Syntagmatic Non-linear Reading	Enunciative Non-linear Reading	Discursive Non-linear Reading
<i>Artigo</i>	Hyperlink highlighted in bold and underlined in the third sentence.	This mark serves as the nucleus of the adverbial adjunct of place in the syntagmatic axis of the period.	Enunciative instance made non-linear for authors of the scientific article <i>Evidence of a Sub-Saturn around EPIC 211945201</i> , Abhijit Chakraborty, Arpita Roy, Rishikesh Sharma, Suvrath Mahadevan, Priyanka Chaturvedi, Neelam J. S. S. V Prasad, and B. G. Anandarao.	It leads to a scientific summary on the website of <i>The Astronomical Journal</i> .

Hyperlink (Language mark of the node)	Visual Non-linear Reading	Syntagmatic Non-linear Reading	Enunciative Non-linear Reading	Discursive Non-linear Reading
<i>The Astronomical Journal</i>	Hyperlink highlighted in bold and underlined in the third sentence.	This mark serves as the nucleus of the adverbial adjunct of place in the syntagmatic axis of the period.	Enunciative instance is made non-linear for authors of the scientific article <i>Evidence of a Sub-Saturn around EPIC 211945201</i> , Abhijit Chakraborty, Arpita Roy, Rishikesh Sharma, Suvrath Mahadevan, Priyanka Chaturvedi, Neelam J. S. S. V Prasad, and B. G. Anandarao	It refers to a scientific summary on the website of <i>The Astronomical Journal</i> .
<i>NASA</i>	Hyperlink highlighted in bold and underlined in the fourth sentence.	This mark serves as the nucleus of the subject on the syntagmatic axis of the period.	Enunciative instance is made non-linear for <i>Galileo's</i> journalist André Jorge de Oliveira.	It leads to a digital news on <i>Galileo</i> magazine website.
<i>sub-Saturno</i>	Hyperlink highlighted in bold and underlined in the eighth sentence.	This mark serves as the nucleus of the predicative of the direct object in the syntagmatic axis of the period.	Enunciative instance is made non-linear for <i>Galileo's</i> journalist Humberto Abdo.	It leads to a digital news on <i>Galileo</i> magazine website.
<i>Rússia</i>	Hyperlink highlighted in bold and underlined in the twelfth sentence.	This mark serves as the nucleus of the adnominal adjunct in the syntagmatic axis of the period.	Enunciative instance is made non-linear for <i>Galileo's</i> journalist Marilia Marasciulo.	It leads to a digital news on <i>Galileo</i> magazine website.
<i>Marte</i>	Hyperlink highlighted in bold and underlined in the thirteenth sentence.	This mark serves as the nucleus of the adnominal adjunct in the syntagmatic axis of the period.	Enunciative instance is made non-linear for <i>Galileo's</i> journalist Humberto Abdo.	It leads to a digital news on <i>Galileo</i> magazine website.

Source: Authors' elaboration.

As we can see in Table 1, as for visual non-linear reading, the six hyperlinks appear in bold and underlined, as a specific visual mark, which is the concrete sign chosen by *Galileo* to indicate the way in which this resource of digital discourse is integrated into its texts.

In relation to the syntagmatic non-linear reading, all hypertextual nodes are part of the syntagmatic organization of the respective period. In this hypertext, *NASA* hyperlink serves as the nucleus of subject on the syntagmatic axis of the period in which it is found; *Artigo* and *The Astronomical Journal* hyperlinks serve as the nucleus of the adverbial

adjunct of place in the syntagmatic axis of the period; *Rússia* and *Marte* hyperlinks serve as the nucleus of the adnominal adjunct in the syntagmatic axis of the period in which they are found; and *sub-Saturno* hyperlink serves as the predicative nucleus in the syntagmatic axis of the period.

In the enunciative non-linear reading, in the first two hyperlinks, *Artigo* and *The Astronomical Journal*, the authors of the target texts (S) are the same: Abhijit Chakraborty, Arpita Roy, Rishikesh Sharma, Suvrath Mahadevan, Priyanka Chaturvedi, Neelam J. S. S. V Prasad, and B. G. Anandarao. This is because both hyperlinks lead the reader to the scientific article that originated the news, entitled *Evidence of a Sub-Saturn around EPIC 211945201*. In the other hyperlinks of this news, *NASA*, *sub-Saturno*, *Rússia* e *Marte*, the authors of the target texts, call themselves *Galileu*'s own journalists, being them: André Jorge de Oliveira, Humberto Abdo, Marília Marasciulo and Humberto Abdo, respectively. We note that the journalist Humberto Abdo is the same in the hyperlinks *sub-Saturno* and *Marte*.

In discursive non-linear reading, all hyperlinks, as clickable elements, open the way for new hypertexts (that is, for other discourses), which connect the source texts (N) with the target texts (S). In this case, the first and second hyperlinks, *Artigo* and *The Astronomical Journal*, respectively, refer to the summary genre, on the website *The Astronomical Journal*. The other hyperlinks of that hypertext, *NASA*, *Saturno*, *Rússia* and *Marte*, point to other digital news, in *Galileu* itself.

Regarding rhetorical relations, in the chart below, we show which of them emerged in the hyperlinks of this hypertext of the *corpus*.

Chart 2 – Result of the rhetorical relations of digital news
Astrônomos descobrem exoplaneta com ano de 20 dias de duração

Hyperlink	Rhetorical relationship	Rhetorical relationship effect
<i>Artigo</i>	Evidence	Reading the scientific summary published on <i>The Astronomical Journal</i> website increases the readwriter's acceptance of what is reported in N ¹⁶ . In this case, the textual producer considered it necessary to lead to the study that supported <i>Galileu</i> 's digital news, disseminating the findings about the exoplanet.
<i>The Astronomical Journal</i>	Evidence	Reading the scientific summary published on <i>The Astronomical Journal</i> website increases the readwriter's acceptance of what is reported in N. In this case, the textual producer considered it necessary to lead to the study that supported <i>Galileu</i> 's digital news, disseminating the findings about the exoplanet. This is the same link as the <i>Artigo</i> hyperlink.

¹⁶ In this analysis, "N" refers to "Nucleus", that is, the source text.

Hyperlink	Rhetorical relationship	Rhetorical relationship effect
<i>NASA</i>	Background	Reading the target text (S) increases the readwriter's ability to understand N. In this case, to facilitate the understanding of what <i>NASA</i> is, the textual producer considered it necessary to lead to another digital news within the <i>Galileo</i> magazine's own website, which elucidates what <i>NASA</i> is and what it develops.
<i>Sub-Saturno</i>	Background	Reading the target text (S) increases the readwriter's ability to understand N. In this case, to improve the understanding of <i>EPIC 211945201b</i> , which was classified as <i>sub-Saturno</i> , the textual producer presents, with the hyperlink, supplementary information about the planet Saturn, by means of a digital news on the <i>Galileo's</i> website.
<i>Rússia</i>	Background	Reading the target text (S) increases the readwriter's ability to understand N. In this case, to bring curiosities about Russia, the textual producer considered it necessary to lead to another digital news from <i>Galileo's</i> website, which shows some peculiarities of the country for the readwriter.
<i>Marte</i>	Background	Reading the target text (S) increases the readwriter's ability to understand N. In this case, to facilitate understanding about the planet <i>Mars</i> , the textual producer considered it necessary to take another digital news on <i>Galileo's</i> website, to show the characteristics of the planet to the readwriter.

Source: Authors' elaboration.

As shown in chart 2, in the six news hyperlinks, it was possible to find two rhetorical relations between the source text and the target text: Evidence (two occurrences) and Background (four occurrences).

In the first two hyperlinks, the relation is Evidence, since both take the readwriter to the same source: a scientific summary located on the website of *The Astronomical Journal*, as a way to make him/her believe what was informed in the source text (Nucleus/N). The other hyperlinks, on the other hand, establish a Background relation, since all of them aim to increase the capacity of the readwriter to understand what was informed in N. That is, *NASA* hyperlink presents data about the American agency, so that the reader better understands the role of NASA in the discoveries, and the hyperlinks *Saturno*, *Rússia* and *Marte* bring information regarding the planets and the country.

In turn, the second news in the present study, entitled *Rãs ficaram presas em âmbar e foram descobertas 99 milhões de anos depois* (Frogs were trapped in amber and they were discovered 99 million years later, in English) and published in *Superinteressante* magazine, contains six hyperlinks: (1) *cerca de 99 milhões de anos* (in the third sentence of the text); (2) *aracnídeos* (in the twelfth sentence of the text); (3) *pássaros* (in the twelfth sentence of the text); (4) *formigas* (in the twelfth sentence of the text); (5) *Cauda de dinossauro cheia de penas* (in the thirteenth sentence of the text); (6) *Morphosource* (in the fourteenth sentence of the text).

For the visualization of how those hyperlinks are distributed throughout the text, we present, in the following figure, the screen capture in which they appear in the digital news.

Image 2 – Hyperlinks of the digital news *Rãs ficaram presas em âmbar e foram descobertas 99 milhões de anos depois*.



Source: Sali (2019).

For the study of the category of non-linear reading, in the chart below, we describe the behavior of its different forms in the hyperlinks of this second hypertext of the *corpus*.

Chart 3 – Result of the analysis of the types of non-linear reading of digital news
Rãs ficaram presas em âmbar e foram descobertas 99 milhões de anos depois

Hyperlink (Language mark of the node)	Visual Non-linear Reading	Syntagmatic Non-linear Reading	Enunciative Non-linear Reading	Discursive Non-linear Reading
<i>cerca de 99 milhões de anos</i>	Hyperlink underlined and in red in the third sentence.	This mark serves as the nucleus of the adnominal adjunct nucleus in the syntagmatic axis of the period.	Enunciative instance is made non-linear for authors of the scientific article <i>The earliest direct evidence of frogs in wet tropical forests from Cretaceous Burmese amber</i> , Lida Xing, Edward L. Stanley, Ming Bai and David C. Blackburn.	It leads to a scientific article on the website of <i>Scientific Reports</i> .
<i>Aracnídeos</i>	Hyperlink underlined and in red in the thirteenth sentence.	This mark serves as the nucleus of the adnominal adjunct nucleus in the syntagmatic axis of the period.	Enunciative instance is made non-linear for <i>Veja's</i> editorial team.	It leads to a digital news on <i>Superinteressante</i> magazine website.
<i>Pássaros</i>	Hyperlink underlined and in red in the thirteenth sentence.	This mark serves as the nucleus of the adnominal adjunct nucleus in the syntagmatic axis of the period.	Enunciative instance is made non-linear for <i>Superinteressante's</i> journalist Lucas Baranyi.	It leads to a digital news on <i>Superinteressante</i> magazine website.
<i>Formigas</i>	Hyperlink underlined and in red in the thirteenth sentence.	This mark serves as the nucleus of the adnominal adjunct nucleus in the syntagmatic axis of the period.	Enunciative instance is made non-linear for <i>Superinteressante's</i> editorial team.	It leads to a digital news on <i>Superinteressante</i> magazine website.
<i>Cauda de dinossauro cheia de penas</i>	Hyperlink underlined and in red in the fourteenth sentence.	This mark serves as the nucleus of the direct object in the syntagmatic axis of the period.	Enunciative instance is made non-linear for <i>Superinteressante's</i> journalist Lucas Baranyi Helô D'Angelo.	It leads to a digital news on <i>Superinteressante</i> magazine website.
<i>Morphosource</i>	Hyperlink underlined and in red in the fifteenth sentence.	This mark serves as the nucleus of the adverbial adjunct of place in the syntagmatic axis of the period.	Enunciative instance is made non-linear for China Institute of Paleontology, <i>Dexu Institute of Palaeontology</i> .	It leads to scientific articles on the website of <i>Morphosource</i> .

Source: Authors' elaboration.

Looking at chart 3, regarding visual non-linear reading, we see that the six hyperlinks appear underlined and in red, as a specific visual mark used by *Superinteressante* to indicate this category of digital discourse.

Regarding the syntagmatic non-linear reading, all hypertextual nodes are part of the syntagmatic organization of the respective period of the text. In this hypertext, the hyperlinks *cerca de 99 milhões de anos*, *aracnídeos*, *pássaros* and *formigas* serve as the nucleus of the adnominal adjunct nucleus in the syntagmatic axis of the period; the hyperlink *Morphosource* serve as the nucleus of the adverbial adjunct of place in the syntagmatic axis of the period in which it is found; in turn, the hyperlink *Cauda de dinossauro cheia de penas* serves as the nucleus of the direct object in the syntagmatic axis of the period.

In the enunciative non-linear reading, the authors of the target text (S) of the first hyperlink, *cerca de 99 milhões de anos*, are called Lida Xing, Edward L. Stanley, Ming Bai and David C. Blackburn. These are the authors of the scientific article that originated the *Superinteressante* news, entitled *The earliest direct evidence of frogs in wet tropical forests from Cretaceous Burmese amber*. The authors of the target text of the hyperlinks *aracnídeos* and *cauda de dinossauro cheia de penas* are the editorial teams of *Veja* and *Superinteressante*, respectively. In turn, in the hyperlinks *pássaros* e *formigas*, the authors of the target text are journalists from *Superinteressante*, Lucas Baranyi and Helô D'Angelo, respectively. Finally, the hyperlink *Morphosource* has as its author the China Institute of Paleontology, called *Dexu Institute of Paleontology*.

In discursive non-linear reading, hyperlinks, as clickable elements, connect the source text to other texts, that is, to other discourses. Thus, the second, third, fourth, and fifth hyperlinks - *aracnídeos*, *Pássaros*, *formigas* and *cauda de dinossauro cheia de penas*, respectively - pave the way for other digital news, in the *Superinteressante* magazine itself. The first hypertextual node - *cerca de 99 milhões de anos* - opens for a scientific article, on the *Scientific Reports* website, and the sixth and final hyperlink of this hypertext - *Morphosource* - opens the page of *Morphosource* itself, showing its project entitled *Amber Specimens*.

Regarding rhetorical relations, in the chart below, we show which of them emerged in the hyperlinks of this hypertext of the *corpus*.

Chart 4 – Result of the rhetorical relations of digital news *Rãs ficaram Presas em Âmbar e foram descobertas 99 milhões de anos depois*

Hyperlink	Rhetorical relationship	Rhetorical relationship effect
Cerca de 99 milhões de anos	Evidence	Reading the scientific article published on <i>Scientific Reports</i> website increases the readwriter's acceptance of what is reported in N. In this case, the textual producer considered it necessary, as evidence, to take the study that supported the digital news of <i>Superinteressante</i> , in order to disseminate the findings about the frogs.

Hyperlink	Rhetorical relationship	Rhetorical relationship effect
<i>Aracnídeos</i>	Background	Reading the target text (S) increases the readwriter's ability to understand N. In this case, to facilitate the understanding that the sap of trees is an excellent friend of archaeologists, information said in the article, the textual producer considered it necessary to refer to a digital news on <i>Veja's</i> website to inform about the oldest spider fossil.
<i>Pássaros</i>	Background	Reading the target text (S) increases the readwriter's ability to understand N. In this case, to facilitate the understanding that the sap of trees is an excellent friend of archaeologists, information present in the article, the textual producer considered it necessary to conduct a digital news on the website of the magazine <i>Superinteressante</i> itself, to clarify the bird fossil with 99 million years.
<i>Formigas</i>	Background	Reading the target text (S) increases the readwriter's ability to understand N. In this case, in order to facilitate the understanding about the life of ants, the textual producer considered it necessary to conduct to a digital news on the website of the magazine <i>Superinteressante</i> , which informs the function of ants in the nature.
<i>Cauda de dinossauro cheia de penas</i>	Background	Reading the target text (S) increases the readwriter's ability to understand N. In this case, to facilitate the understanding that the sap of trees is an excellent friend of archaeologists, information present in the article, the textual producer considered it necessary to take a digital news on the website of the magazine <i>Superinteressante</i> itself, to inform more about the dinosaur found, which had feathers.
<i>Morphosource</i>	Evidence	Reading the target text (S) increases the readwriter's ability to understand N. In this case, to detail the Amber Specimens project, the textual producer considered it necessary to take it, by means of the <i>Morphosource</i> website.

Source: Authors' elaboration.

The visualization of Table 4 shows that three relations emerged between the source (N) and target (S) texts: Evidence (one occurrence), Background (four occurrences) and Elaboration (one occurrence), respectively, in the six hyperlinks of the hypertext. The first hyperlink, *cerca de 99 milhões de anos*, Evidence relation, sends the readwriter to a scientific summary located on *The Scientific Reports* website, as a way of believing what was reported in N: the study that supported the digital news of *Superinteressante*.

The hyperlinks *aracnídeos*, *pássaros*, *formigas*, and *cauda de dinossauro cheia de penas*, respectively, aim to increase the ability to understand what was reported in N,

in the Background relation. In this case, the hyperlink *aracnídeos* sends the readwriter to a digital news item on *Veja's* website, which informs about the oldest spider fossil.

The hyperlinks *pássaros*, *formigas* and *cauda de dinossauro cheia de penas* send the readwriter to digital news in *Superinteressante's* own magazine; the first reports on the 99-million-year-old bird fossil; the second discloses the life of the ants, and the third informs about the dinosaur tail found, which had feathers.

The last hyperlink of this hypertext, *Morphosource*, Elaboration relation, refers the readwriter to an announcement of the project entitled *Amber Specimens* on the *Morphosource* website itself, in order to show more details about the project called *Amber Specimens*.

Finishing the stages of *corpus* analysis, we move on to the final section on the final considerations about this study.

Final considerations

Based on the analysis developed above, regarding non-linear reading, the analysis of its forms revealed that, in digital news, most of the hyperlinks, in both magazines of the *corpus*, lead to other digital news from the same magazine of the source text or to a scientific article/summary. Taking the readwriter to other documents in the same magazine is also a strategy to keep him/her in the magazine, reading other texts published by the journal itself.

With regard to the analysis in the framework of the RST, in the 12 hyperlinks in this *corpus* of study, the rhetorical relations that emerged between the source texts (N) and the target text (S) were predominantly Background, with eight occurrences, and Evidence, with three occurrences. This reveals that the textual producers, in both magazines, had the intention of increasing the readwriter's capacity to understand what was being reported, by means of the relation of Background. In addition, sometimes, textual producers sought to increase the readwriter's belief about what was informed in a part of N, as a way of giving credibility to the information by means of the Evidence relation. In addition to these relations, the Elaboration relation emerged in one of the hyperlinks in the *corpus*, showing that the hyperlink can also have the purpose of detailing the information given in N.

In view of these observations, we verify that the textual producer chooses to non-linearize, by means of hyperlinks, the syntagmatic, enunciative and discursive threads of his text, in a markedly visual way, to exert rhetorical effects on the readwriter, such as to bring credibility for the scientific information disclosed, to increase the ability to understand the information, to detail the information and, ultimately, as previously mentioned, to induce the reading of other texts published in the same magazine. These intentions are mainly related to the characteristics and restrictions of the media discourse of scientific dissemination, especially with regard to the objectives of making information accessible, understandable and reliable, in addition to attracting the public's

attention to the magazine and its content. It is important, however, to point out the fact that the accomplishment of these effects - and, in fact, of the non-linear reading itself - depends directly on the readwriter, who will choose to activate, or not, the hyperlink by means of a gestural statement: the click (PAVEAU, 2017a).

Thus, in the hypertextualized (or technodiscursive) digital context, the autonomy of the reader - of the readwriter - in the construction of the discourse calls into question the enunciative system, since one can no longer distinguish a locutor, an interlocutor, a message, a place and a time. Even the most complex devices for the analysis of offline or non-digital discourses, which take into account the phenomenon of co-announcement, do not account for the native discursive occurrences from the Web: beyond a co-construction of the sense carried out by the reception instance (widely assumed by the linguistic theories of text and discourse analysis), the hypertextualized readwriting poses a problem about the very existence of the discourse and about the unpredictability of its constitution (PAVEAU, 2017a). After being published in the Web and added with hypertext resources (native from the digital environment or inserted by the user), a discursive production may be partially written and continued by other discourses, which the readwriter may or may not pass through.

Ultimately, we assume that hypertext and, specifically, hyperlink are the object of an important study for linguistic-discursive studies. Increasingly, there are texts from different discursive genres circulating in the electronic media, and this area of knowledge needs to focus on the investigation of discursive phenomena native from the Web, as emphasized by Paveau (2017b). Thus, we seek, with this article, to contribute to the empirical demonstration of a theoretical and methodological apparatus that is quite new and still little explored in investigations in the fields of text and discourse, the DDA. In the analyses undertaken here, we also bet on the recursion of a theory already used for the study of pre-digital texts, the RST, and on the productivity of its association with DDA for the investigation of emerging phenomena in the digital context.

Likewise, we seek to consolidate the importance of shedding light on the different textual-discursive configurations presented by the different genres of scientific dissemination present in digital ecosystems. Thus, we endorse the relevance of understanding the different possibilities that open up in this discursive domain and, consequently, of contributing to the strengthening of the activity - increasingly necessary - of popularizing science.

GLÜCK, E.; IRACET, E.; GIERING, M. O tecnodiscurso de divulgação científica: relações retóricas e deslinearização em hiperligações de notícias digitais. *Alfa*, São Paulo, v.66, 2022.

- *RESUMO: Este trabalho tem por objetivo analisar o comportamento retórico-discursivo de hiperligações constitutivas de notícias digitais de divulgação científica publicadas nas revistas on-line Galileu e Superinteressante, a partir de noções postuladas nos quadros da Análise do Discurso Digital (ADD), de M-A. Paveau, e da Rhetorical Structure Theory (RST), desenvolvida*

por W. Mann e S. Thompson. Para tanto, examinam-se as hiperligações segundo a categoria tecnodiscursiva da deslinearização (ADD), bem como a partir das relações retóricas (RST) que emergem entre o texto de origem e o de destino por meio da hiperligação. As análises evidenciam que o produtor textual opta por deslinearizar; por meio das hiperligações, os fios sintagmático, enunciativo e discursivo de seu texto, de uma forma marcadamente visual, para exercer efeitos retóricos no escreitor, como, por exemplo: trazer credibilidade para a informação científica divulgada, aumentar a capacidade de compreensão da informação, detalhar a informação e, em última análise, induzir a leitura de outros textos veiculados na mesma revista. É importante, contudo, apontar o fato de que a concretização desses efeitos depende diretamente do escreitor; que optará por acionar, ou não, o hiperlink por meio de um enunciado gestual: o clique.

- **PALAVRAS-CHAVE:** discurso digital; tecnodiscursividade; hipertexto; hiperligações; deslinearização; relações retóricas; notícia digital de divulgação científica.

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ANNEX A – Digital news entitled *Astrônomos descobrem exoplaneta com ano de 20 dias de duração*

- (1) *Astrônomos descobrem exoplaneta com ano de 20 dias de duração*
- (2) *Objeto está localizado a 600 anos-luz da Terra, orbita bem próximo de sua estrela e é quente demais para suportar alguma forma de vida*
- (3) *Em artigo publicado na The Astronomical Journal, pesquisadores indianos apresentaram evidências sobre a existência de um novo exoplaneta, o EPIC 211945201b, também chamado de K2-236b.*
- (4) *Apesar dos astrônomos já terem comprovado a existência de mais de 3.786 exoplanetas, este chama a atenção por dois motivos: primeiro, porque ele foi descoberto por astrônomos da Índia (geralmente, a NASA lidera esse tipo de descoberta, tendo reconhecido cerca de 2.600 deles) e, segundo, porque o ano do EPIC 211945201b dura apenas 19,5 dias.*
- (5) *O novo astro já havia sido avistado e listado pelo telescópio Kepler, da agência espacial americana, mas somente a equipe liderada pelo astrônomo Abhijit Chakraborty, do Laboratório de Pesquisa Física de Ahmedabad, conseguiu comprovar que o corpo celeste se tratava realmente de um exoplaneta, e não de um cometa ou algum outro objeto espacial.*
- (6) *Os pesquisadores observaram as oscilações luminosas vindas da estrela EPIC 211945201 (ou K2-236) por um ano e meio, no Observatório Gurushikhar, situado no Monte Abu, Índia. (7) Após esse período, a equipe conseguiu descrever uma série de características do astro.*
- (8) *O EPIC 211945201b foi classificado como sub-Saturno e é 27 vezes maior do que a Terra, tendo um raio seis vezes maior do que o nosso. (9) De acordo com as estimativas dos astrônomos, esta órbita é sete vezes mais próxima do que a nossa ao redor do Sol.*
- (10) *Por isso, o novo exoplaneta tem um ano de apenas 19,5 dias e uma temperatura estimada em 600 graus Celsius (quente demais para suportar alguma forma de vida).*
- (11) *Além de ser descoberta importante para estudar planetas que se formam tão próximos de suas estrelas, o resultado da pesquisa mostram como a Índia tem crescido no ramo astronômico.*
- (12) *Em fevereiro de 2017, por exemplo, a Organização de Pesquisa Espacial Indiana (ISRO) lançou 104 satélites ao espaço de uma só vez, superando o recorde da Rússia, que havia lançado 37 satélites em um só foguete. (13) Antes disso, em 2013, os indianos enviaram ao espaço também a missão Mars Orbiter Mission, mais conhecida como Mangalyaan, que chegou à atmosfera de Marte em 2014.*

Available in: <https://revistagalileu.globo.com/Ciencia/Espaco/noticia/2018/06/astromonos-descobrem-exoplaneta-com-ano-de-20-dias-de-duracao.html>. Access on: 21 jun. 2018.

ANNEX B – Digital news entitled *Rãs ficaram presas em âmbar e foram descobertas 99 milhões de anos depois*

- (1) *Rãs ficaram presas em âmbar e foram descobertas 99 milhões de anos depois*
- (2) *O azar dos bichinhos é a sorte dos pesquisadores: os fósseis mais antigos do anfíbio encontrados até então datam de 40 milhões de anos de atrás*
- (3) *Uma série de pequenas coincidências precisaram trabalhar em sincronia para que, em 2018, o Instituto Dexu de Paleontologia em Chaozhou, na China, recebesse fósseis de rãs presas em seiva de árvore com cerca de 99 milhões de anos. (4) Quatro delas foram encontradas no sudeste da Ásia inteiras o suficiente para ajudar nas pesquisas.*
- (5) *Pode parecer estranho que a comunidade científica fique tão animada com rãs, mas é inusitado obter um sapo fóssil tão antigo, ainda mais preservado tridimensionalmente.*
- (6) *Seus ossos são pequenos, frágeis e raramente sobrevivem ao tempo. (7) Os mais antigos encontrados neste estado até então são do Caribe e datam de 40 milhões de anos. (8) Atrás disso, existem os fósseis mexicanos de “apenas” 25 milhões de anos.*
- (9) *O local da descoberta também é importante: uma floresta úmida. (10) Hoje, nós sabemos que sapos gostam de viver em ambientes úmidos, mas curiosamente não havia nada que provasse que essa é uma relação de longa data. (11) Como fósseis se deterioram mais rápido em ambientes úmidos, fica mais difícil encontrar evidências.*
- (12) *A seiva das árvores é uma excelente amiga dos arqueólogos. (13) Novas espécies de aracnídeos, pássaros, camaleões e formigas foram descobertos graças ao âmbar.*
- (14) *Sem contar uma cauda de dinossauro cheia de penas.*
- (15) *A nova espécie de rã foi batizada de *Electrorana limoae* e está sendo tratada como uma *popstar*. (16) Além de ser mantida e estudada no Instituto Dexu, existe uma cópia no Museu da Flórida — e você também pode interagir com modelos 3D dos fósseis no Morphosource.*

Available in: <https://super.abril.com.br/ciencia/ras-ficaram-presas-em-ambar-e-foram-descobertas-99-milhoes-de-anos-depois/>. Access on: 21 jun. 2018.

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