

Anaphoric Processing and Reading: a systematic review and considerations to teaching and learning to read

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Abstract:

This article investigates the relationship between anaphoric processing and reading from a Psycholinguistic perspective, aiming to know and analyze Brazilian studies that relate these two axes and to propose deliberations for pedagogical implications to the teaching of reading. Thus, this article is characterized as a bibliographic research, carried out through the systematic review method and the study of the literature on reading processing, comprehension and teaching. The pieces of research analyzed through the systematic review are all experimental and their results show the processing cost differences generated by different anaphoric constructions. Regarding pedagogical implications, the deliberations are based on 1) reading has to be taught; 2) the text is the stimuli readers access to comprehend; 3) text nature and composition have direct implications in processing as well as in its result; 4) the written text is constituted by a web from which co-reference is an important part; 5) anaphor resolution is, therefore, central to text comprehension and it has to be explicitly and systematically taught, which means the point in the classroom environment is not the text analysis itself, but its analysis concerning the reader in a reading activity aiming at comprehension.

Keywords:

Anaphoric processing. Teaching and learning to read. Systematic review.

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Anaphoric Processing and Reading: a systematic review and considerations to teaching and learning to read¹

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INTRODUCTION

Ever since teaching objectives are guided by the intention of promoting meaningful, relevant, interesting, inclusive and democratic learning, the teaching of reading and, as an inherent part of it, the facilitation of comprehension have become the focus of attention for those who develop public policies, researchers, educational managers and teachers who work in direct relationship with students to improve teaching practices that lead to learning to read. A plethora of studies has been conducted by scholars who are dedicated to investigating the process of reading itself, through the relationship that readers establish with the text to understand it, as well as other aspects that are specifically related to the readers. Reader related aspects may include affective, perceptive, attentional and memory processes; text related aspects might involve its internal linguistic constitution, form, function and gender, and other factors that are investigated in reading research related to the reading context and situation, that is, how social, economic and cultural aspects influence the reading process. What is fundamental to this study is how this set of factors operates and can be explored in the process of teaching how to read (some related studies in the area are: Flood, 1984; Ruddell; Ruddell; Singer, 1994; Kamil; Pearson; Moje; Afflerbach, 2011²; Alvermann; Unrau; Ruddell, 2013; Snowling; Hulme, 2013; Oakhill; Cain; Elbro, 2017; among many others).

In the present study, which focuses on anaphoric relations, special attention will be given to one of the aspects involved in the interaction between the text and the reader: co-referencing. Anaphors are part of the text and, therefore, need to be interpreted during the process readers engage in when confronted with written comprehension activities. In order to comprehend a text, it is not enough to understand each word in isolation, for a text is not just a sequence of related words and phrases. Nor is it enough to understand the text locally, that is, the intra and interphrasal relations. However, without local understanding, there is no possibility of integration, elaboration, and production of a mental representation, which is consistent and coherent with the text. It is necessary that the textual elements are related to each other; that there are connections to ensure topical and thematic maintenance; that there are sequence and organization around what is said; and that the reader perceives and understands the relationships and the text content. But not just that. In respect to what is of particular interest to this study, a text must also have a progression regarding the established theme. This factor, along with word arrangement, leads to several ways of stating what is being discussed in a text. The textual connections need to be adequately constructed so that the processes involved in reading comprehension are properly implemented, resulting in a successful relationship between the reader and the text in a specific situation.

¹ We thank Tatiana Koerich Rondon for the translation of this article.

² This volume, organized by Kamil, Pearson, Moje and Afflerbach, and published in electronic format in 2011, is a handbook, part of a set of handbooks that have been published since 1984 presenting updated research in the field of reading in the period related to the coverage of each volume. The fifth volume of this handbook will be made available in 2020. Information about its content can be accessed at <https://bit.ly/34QavxY>. Access in 16 Apr. 2020.

Discussions around anaphoric processing are important in the area of Psycholinguistics and, in this context, research has been developed over the years to learn about anaphoric processing, relating different variables and theories, through different methods and tasks. Having said that and taking into consideration the relevance of this micro-textual aspect to the construction of text coherence in reading, this article presents a mapping of Brazilian studies about the processing of anaphor in written stimuli. For that, a systematic review method was implemented to know and analyze such studies and, subsequently, some considerations about pedagogical implications were proposed based on their results and in light of the literature in the area of Psycholinguistics and Applied Psycholinguistics related to processing, comprehension, learning and the teaching of reading.

Based on that, it is possible to describe the functioning of anaphoric processing during reading comprehension and contribute to the research on the teaching of reading, considering its processing. This study is guided by the following research questions: How has the relationship between anaphoric processing and reading in the field of Psycholinguistics been investigated in Brazil and in Brazilian Portuguese (BP)? How can these studies contribute to the teaching of reading texts? Related to the aforementioned questions, the key terms of this research are anaphoric processing and reading, and, because it entails language processing, this study concerns research in the area of Psycholinguistics. It is worth mentioning, however, that the studies analyzed did not necessarily mention this area explicitly and assumed that they were investigating reading processes. Rather, the criteria for the inclusion of the study in the systematic review were that the studies investigated processing; that the stimuli in the tests used for data collection were written and significant; and that the cross-referential anaphor was the target element of the investigation. Also, only studies that dealt with primary data were included in this review.

Among the recurrent themes in Psycholinguistics are the processes involved in understanding language and, especially for the objectives of this study, in comprehending written text – in which anaphoric processing takes part (GAGNÉ; YEKOVICH; YEKOVICH, 1993; KINTSCH, 1998; KINTSCH; RAWSON, 2013; OAKHILL; CAIN; ELBRO, 2017). Comprehension takes place with the support from different factors contained in a text, such as elements of cohesion, which enable listeners³ or readers to make the necessary inferences and, in this manner, construct coherence and contribute to their comprehension. For adequate and sufficient comprehension that promotes the generation of meanings, the involvement of several aspects is essential, among which are the forms of reference. In the flow of the text, an element which is being dealt with is mentioned in different ways, forming a co-referential relationship that participates in the generation of meaning. Thus, according to Teixeira (2013), coreferential anaphors have the role of returning to an element already mentioned. Reference can be made in different ways, through a pronoun, a demonstrative, a null pronoun, or a noun phrase. The fact is that, for there to be cross-referentiality, anaphor and antecedent must relate to the same referent.

There are anaphoric constructions that may require readers⁴ to have previous knowledge or to make inferences from the information given. This article focuses on anaphors that have a specific referent, determined by the text itself (different from associative anaphors⁵, for example). Therefore, it is concerned with the relationships established internally in the text, especially in their implications for bottom-up processes, that is,

³ This research deals primarily with Brazilian Portuguese oral language. However, it is emphasized that cohesive aspects are also relevant to the access and comprehension of non-oral languages, such as sign languages.

⁴ Even though anaphors are constituent elements of any text, this study is focused on written texts.

⁵ For instance: “It was the most beautiful house in the city; the entrance door brought the sophistication of antiquity”. In this case, the connection between the door and the house is automatic. Thus, readers must know what constitutes doors and houses, as this information is not explicit in the text. Coreferentiality occurs, therefore, through prior knowledge, constituting what is called associative anaphor (KOCH; ELIAS, 2015).

for the processes in which the text is the starting point in the direction of activating previous knowledge of the reader, having established the intratextual relations. Kintsch and Rawson (2013, p. 233) define anaphor by highlighting the fact that it refers particularly to a previously mentioned concept. In this sense, “any linguistic device that can be used to refer to a concept already mentioned is called anaphor, and anaphoric resolution is the psychological process of identifying the concept (or referent) mentioned above, to which the anaphor refers”. The present study is about this type of anaphor, which is the coreferential or direct anaphor, as explained by Kintsch and Rawson.

Having said that and taking into consideration that proficient reading is inherently strategic and, therefore (among other reasons), it is cognitively complex and expensive, it is necessary that the processing at the local level, where the co-referential relations that participate in the textual network reside, occurs automatically, in such a way that the reader can search, quickly and efficiently, for the internal relations contained in a text (KINTSCH, 1998). This way, coreferential relations act in the formation of the textual basis, that is, in the microstructure of the text and reflect in its global understanding. Besides that, according to Teixeira (2013, p. 24), the investigation of anaphor resolution attempts to “solve problems related to our ability to retain the information recently read in our memory and to our ability to integrate this information with others that will be activated during the reading of a text”. Furthermore, anaphors are part of the textual fabric, that is, they are responsible for the connections and give continuity to an idea, in order to offer progression around what is said. Understanding the mental representations that occur when processing these structures is a way towards understanding the way the brain processes textual architecture, which is composed of several microstructures that include phonological, morphological, lexical, syntactic and semantic aspects.

Looking at anaphoric processing may allow for the understanding of how textual progression acts in the cognitive aspects of comprehension and how the different systems of cognition are involved in the processing of anaphors, to propose pedagogical implications for the teaching of reading. As mentioned by Leitão (2005), working memory is directly involved in anaphoric processing, because, depending on how the anaphor is constructed, the costs can be higher or lower for this system. The greater the demand for working memory, the more effort will be required to maintain the information so that it can be properly processed and linked to both old and new data; and the more strategic readers must be to perform adequately, increasing the chances of reaching their goals (SOUZA, 2004). Such a task can have high processing costs, resulting in decreased performance and increased time for performing the task, if the reader is not sufficiently skilled in reading. This is one of the reasons why anaphoric relationships should be taught when the purpose is to teach how to read, to favor efficient and effective processing that enables understanding (KINTSCH; RAWSON, 2013; KOCH; ELIAS, 2015; OAKHILL; CAIN, ELBRO, 2017; SOUZA; SEIMETZ-RODRIGUES; WEIRICH, 2019).

METHOD

As for the method employed, this study is characterized as a bibliographic research (GIL, 2017; MARCONI; LAKATOS, 2017; SEVERINO, 2017), developed in two moments, according to its objectives. In the first phase, a systematic review was conducted (NÓBREGA-TERRIENEN; TERRIEN, 2004; SAMPAIO; MANCINI, 2007; HIGGINS; GREEN, 2008; DE-LA-TORRE-UGARTE-GUANILO; TAKAHASHI, BERTOLOZZI, 2011; RAMOS; FARIA; FARIA, 2014) to map studies about a particular object of knowledge, to know and analyze Brazilian studies that focused on the investigation of anaphor processing in written stimuli, that is, in reading. In the second phase, in possession of the analysis of studies and literature that underlies the science of reading (processing, understanding, learning and teaching) and the processing of anaphor, some considerations and pedagogical implications for the teaching of reading were presented.

As Gil (2017) explains, the main advantage of bibliographic research is that it allows the researcher to cover a wide range of phenomena, greater than what could be investigated directly and through the collection of primary data. This is a positive aspect of the present study. The more we know about what has been investigated, the more it will be possible to deal with the pedagogical implications generated by the method and the results of the reviewed studies for the teaching of reading, which is one of the abilities that has not received enough attention in Brazilian basic education (MORAIS, 2014; KENEDY, 2018; SCLAR-CABRAL, 2018).

Being a type of bibliographic research, systematic reviews, in turn, constitute a research method that requires precision, clarity and well-defined criteria, so that it is possible to carry out the investigation, using the same parameters. It is characterized by having objectives with pre-defined criteria for the eligibility of studies to be selected; explicit and detailed methodology; systematic search to identify all the studies that may fit the eligibility criteria; and systematic presentation and synthesis of the characteristics and results of the selected studies (HIGGINS; GREEN, 2008). “In this perspective, studies that aim to carry out [this type of] review allow for an understanding of the movement in the area, its configuration, methodological theoretical propensities, critical analysis indicating trends, recurrences, and gaps” (RAMOS-VOSGERAU; ROMANOWSKI, 2014, p. 167).

As explained in the document “Methodological guidelines: elaboration of a systematic review and meta-analysis of randomized clinical trials” (BRASIL, 2012), being a method of synthesis of reliable, auditable and rigorous evidence, systematic reviews allow the researcher to interpret and critically evaluate all the available and relevant studies that were covered by the search and selection criteria, defined according to the objectives, to be able to deal with a particular issue, a problem or a phenomenon of investigative interest deeply and consistently. It is worth mentioning that, although the systematic review is a research method very often used in other areas (such as health, engineering and applied social sciences), it is a method of great value for all areas of knowledge, which allows researchers to not only know the research field itself but also to explore and develop it in a clearer way, to seek gains in basic and applied research. One study conducted by Ramos, Faria and Faria (2014), for instance, deals with systematic review as a research method in the area of Educational Sciences, raising questions of great relevance for the development of research.

The survey for the studies to be included in this review was carried out in January 2020, using the following descriptors: “anaphoric processing” (in quotation marks), anaphoric processing AND psycholinguistics (without quotes and using the Boolean operator AND), and “anaphoric processing” AND “reading” (both descriptors in quotes and with the Boolean operator AND). The time frame of the selected studies included those published up to the time of the search. No studies have been found which were published later than 2017. Therefore, no studies have been found that were published in 2018, 2019, and 2020 in the databases searched. The survey was carried out using databases that provide complete texts and bring together theses, dissertations, and articles, which included the Brazilian Digital Library of Theses and Dissertations (BDTD), the Pro Quest Dissertations and Theses, the Directory of Open Access Journal and the *Portal de Periódicos Capes*.⁶

In order to meet the eligibility criteria, the studies had to: 1) develop in terms of their more general objectives, in an exploratory, descriptive or explanatory perspective; 2) involve collection and analysis of primary data, either through experimental research, cohort study, case study, action or intervention research; 3) be located in the multidisciplinary Psycholinguistic area; 4) elect as an object of investigation the anaphoric processing of written stimuli from BP, which necessarily implies reading processes. Studies that did not meet any of the eligibility criteria were excluded.

⁶ It is worth mentioning that the starting point for the selection of databases was the list provided by the Universidade Federal de Santa Catarina, available in: <http://bit.ly/3aQvN2j>.

As a result of the search and selection, only 14 studies remained. Repeated studies were not included. In the case of masters and doctoral research, that is, theses and dissertations, that had been transformed into a journal article, the derived publication was considered only when the main work was not found in the databases. In the remaining cases, there was only mention of the location of publications corresponding to the same data and results. This procedure was intended to guarantee the most adequate coverage of the target investigations of this research and did not imply an increase in the number of studies analyzed.

Regarding the Boolean operators, it is important to highlight that the search was carried out with more restrictive terms, anaphoric processing “AND” reading and anaphoric processing “AND” psycholinguistics, and also with a term that could encompass a larger number of studies, as it is broader and does not explicitly require the relationship established in this study, anaphoric processing. Even so, when applying the inclusion and exclusion criteria, the number of studies did not increase.

As for the pedagogical implications, the proposed reflections are drawn based both on the systematic review carried out and on the theoretical literature about reading processes, involving processing, comprehension, learning and teaching, and about anaphoric processing. The following main studies and publications support this proposal: Ruddell; Ruddell; Singer (1994); Alvermann; Unrau; Ruddell (2013); Snowling; Hulme (2013); Oakhill; Cain; Elbro (2017); Souza; Seimetz-Rodrigues; Weirich (2019).

Studies that Investigate Anaphoric Processing of Written Verbal Stimuli: a systematic review

The participants in the studies analyzed are mostly university students, from typical populations, except for the research conducted by Correia (2014), who investigated people who stutter. All studies start from an experimental approach, that is, having defined the object of study (anaphoric processing), they select the variables that can influence its processing. Also, forms of control are defined and then the effects that the variable produces on the object are observed (GIL, 2017). However, they have different variables and different forms of control and testing.

In Table 1, next page, below, all the cataloged studies are presented, followed by a discussion of where they were developed. The data shown in the chart include whether there is a supervisor when it comes to graduate research since such studies are conducted through co-authorship. When it comes to an article derived from research developed under guidance not available in the aforementioned databases, the articles resulting from them indicate, mostly, the advisor as co-author of the text; therefore, the names appear in the “author(s)” column. For instance, Márcio Martins Leitão and Antônia Barros Gibson Simões (2011), Gitanna Brito Bezerra and Márcio Martins Leitão (2013). Only in the article by Leitão (2010), which included data from his doctoral dissertation (2005) developed under the supervision of Maia (UFRJ), there is no indication of the advisor as a co-author.

In order to know the research development centers, it is worth mentioning the place and the institution where the studies have been developed. From the studies originated from theses and dissertations, seven of them were conducted at the Federal University of Paraíba (UFPB), three of them supervised by Márcio Martins Leitão. The articles listed in the search refer to studies carried out by researchers from UFPB, one of them by Leitão and two others guided by him. The other four studies were conducted at different universities, namely: Federal University of Minas Gerais (UFMG), State University of Campinas (Unicamp), Federal University of Ceará (UFC) and Pontifical Catholic University of Rio de Janeiro (PUC-RIO). It is worth highlighting that most studies are the result of research carried out in public institutions of higher education, which reveals the importance of these institutions in the development of research in Brazil.

Table 1 – Studies on anaphoric processing

	Type ⁷	Author(s)	Advisor(s)	Year	Place	Techniques
01	D	Maria Luiza Cunha-Lima	Ingedore Grunfeld Vilaça Koch	2004	UNICAMP	Self-paced reading and sentence acceptability test
02	T	Karla Lima de Queiroz	Márcio Martins Leitão	2009	UFPB	Self-paced reading
03	A	Márcio Martins Leitão	—	2010	—	Self-paced reading
04	A	Márcio Martins Leitão; Antônia Barros Gibson Simões	—	2011	—	Self-paced reading
05	D	Elisângela Nogueira Teixeira ⁸	Maria Elias Soares	2013	UFC	Eye-tracking
06	A	Gitanna Brito Bezerra; Márcio Martins Leitão ⁹	—	2013	—	Self-paced reading
07	T	Jefferson de Carvalho Maia	Maria Luiza Cunha Lima	2013	UFMG	Self-paced reading, sentence acceptability test and eye-tracking
08	T	Ludmila Pimenta Salles Milhorange	Cilene Aparecida Nunes Rodrigues	2014	PUC-RIO	Grammaticality judgment test and sentence acceptability test
09	T	Antônia Barros Gibson Simões	Márcio Martins Leitão	2014	UFPB	Self-paced reading
10	T	Débora Vasconcelos Correia ¹⁰	José Ferrari Neto	2014	UFPB	Self-paced reading and alternating serial reaction time
11	T	Judithe Jenuíno Henrique	Rosana Costa de Oliveira	2016	UFPB	Acceptability judgment test
12	T	Elioenai Macena de Araújo	Rosana Costa de Oliveira	2017	UFPB	Self-paced reading
13	D	Liliane Carvalho Félix Cavalcante	Jan Edson Rodrigues Leite	2017	UFPB	Cloze test and reading comprehension tests
14	T	Eva Vilma Aires Cabral Gondim	Márcio Martins Leitão	2017	UFPB	Self-paced reading test

Source: Prepared by the authors.

The Techniques Used

Three common techniques appear (at least one of them) in almost all the selected studies or at least two of them, namely: self-paced reading, acceptability judgment test and eye-tracking.¹¹ Therefore, they are the most used techniques when it comes to studying anaphoric processing.

Self-paced reading and eye-tracking are behavioral techniques that are based on response time and seek results that capture ongoing processing, that is, they are considered online methods (KAISER, 2013).

⁷ “D” refers to doctoral dissertations, “T” refers to master’s theses and “A” refers to articles.

⁸ The publication by Teixeira, Fonseca and Soares (2014), entitled “Resolution of the null pronoun in Brazilian Portuguese: Evidence of eye movement”, which was part of the search results, was not included in the selection because data and results come from Teixeira’s dissertation (2013).

⁹ Bezerra and Leitão’s (2013) article, included in this systematic review, presents data and results from Bezerra’s thesis (2013), developed under Leitão’s guidance. The thesis was not included in the selection because it did not show in the search carried out in this systematic review.

¹⁰ The article by Correia, Ferrari-Neto, Leitão (2013), entitled “Co-referential processing of Brazilian Portuguese names and pronouns in people who stutter”, which was part of the original selection, was not included in the analysis because it discusses data contained in Correia’s thesis (2014).

¹¹ As shown in Table 1, self-paced reading is used in studies 1, 2, 3, 4, 6, 7, 9, 10, 12 and 14. In turn, the acceptability judgment test is used in studies 1, 7, 8 and 11. Finally, the eye-tracking technique is used in studies 5 and 7.

Usually, both techniques are combined with comprehension questions, to check participants' attention and understanding. The self-paced reading test seeks to "measure how much time people spend reading words or phrases" (KAISER, 2013, p. 139-140, our translation). The experimental stimulus can be segmented into words, phrases or the entire sentence can be presented. Regardless of how the stimulus is segmented for presentation, the objective of this test is to obtain the time that the participant takes to read, and the measured result is related to processing cost. The more time spent, the higher the cost of processing. This brings evidence about the cognitive processes that occur in the face of a specific phenomenon (SOUZA; FRANZEN; SCHILICHTING, 2019).

Eye-tracking, in turn, is an online behavioral technique that directly captures eye movements performed by the participant during reading (MAIA, 2018). Using this paradigm, it is possible to work with larger texts, which can generate results closer to the natural reading experience, except for the fact that the device that allows measuring and recording eye movements is attached to the participant's face and/or head. When reading, the eyes perform saccadic movements, with stopping points, that is, the eyes are not fixed on each word in isolation. This way, the analysis can take into account several factors, including the time to fix the gaze, the amount of fixation, the length of the saccades and the number of regressions performed.

Another recurring technique, the acceptability judgment test, is an offline measure involving the use of scale. The most common is the Likert scale, which can have five or seven alternatives. Participants are asked to evaluate a specific extract presented in writing, according to what they consider most acceptable. This way, the researcher obtains a post-processing result, which focuses on an interpretation made by participants, in a conscious judgment of a certain aspect (SCHÜTZE; SPROUSE, 2013; SOUZA; FRANZEN; SCHILICHTING, 2019). In the studies reviewed in the present article, the target sentences presented to participants have anaphoric reference carried out in different ways, allowing the researcher to score the degree of acceptability of each sentence and compare if there were differences and what they are. In one of the studies analyzed (MILHORANCE, 2014), the technique was named as a grammaticality judgment test, given the problem and the foundations of the study, however, there were no changes in the form of elaboration, application and analysis of the technique.

What Has Research on Anaphoric Processing Shown?

All the studies selected for the analysis seek to achieve a better understanding of the functioning of the anaphor. The studies focus on different anaphoric relations and are inserted in different contexts with their specificities. However, all of them seek an understanding of how this important cohesive resource acts cognitively. It is possible to say that, in general, the focus of the studies is on investigating how different ways of anaphor comprehension can influence cognitive processing and how syntactic and semantic factors contribute to the processing of these different anaphors. Many studies (QUEIROZ, 2009; LEITÃO; SIMÕES, 2011; MAIA, 2013; TEIXEIRA, 2013; SIMÕES, 2014) are mainly focused on the differences between anaphors with pronouns, with noun repetition and with a null pronoun. Besides the aforementioned types of anaphoric reference, the selected studies included other variables in their analysis, to investigate which factors can contribute to processing cost during reading, in addition to the type of anaphor itself.

The study of anaphoric processing, in its most distinct aspects and considering different variables, is essential to support aspects of the planning and implementation of the teaching of reading. As initially presented, anaphor plays a fundamental role in textual cohesion. From this resource, it is possible to promote thematic continuity, to develop and organize ideas to articulate the different parts of a text, ensuring the interconnections of the text as a whole (HALLIDAY; HASAN, 1976). In this sense, the different studies reviewed here can shed light on the cognitive implications generated by the different ways of building anaphors as internal ties in the text.

Queiroz (2009), Leitão and Simões (2011), and Correia (2014) confirm, in their investigations, the penalty of the repeated name, that is, the repetition of the antecedent generates more processing cost during reading when compared to anaphors with pronouns. In the aforementioned studies, this occurs when the anaphor is in the subject position (QUEIROZ, 2009), in different distances from the antecedent (LEITÃO; SIMÕES, 2011) and in the object position (CORREIA, 2014). Regarding the penalty of the repeated name, in the study by Milhorce (2014), PB speakers rated sentences with elliptical anaphoric constructions as more acceptable in contexts such as: “Leandro dreamed of some Hollywood actress, but I didn’t I know who [Leandro dreamed of]”. In other words, the constructions in which there was repetition were not well accepted by the readers. The researcher relates this result to the penalty of the repeated name, that is, in such a constrained context, the processing costs become higher when the repetition occurs, so the ellipse would be better judged. Of course, in this case, the assessment was made consciously, through the use of a grammaticality/acceptability judgment test, and the investigated context is completely different from those that confirm the penalty. However, it offers additional data that can help to reflect on the processing of anaphoric references during reading.

It is also necessary to consider the distance between antecedent and anaphor. Leitão and Simões (2011) used sentences in which the distance between antecedent and anaphor followed three categorizations: short (between 10 and 14 syllables), medium (between 24 and 28 syllables) and long (between 34 and 38 syllables), but in all conditions, the lexical pronoun was processed faster than repeated names. According to Kintsch and Rawson (2013, p. 233), pronouns tend to be used to refer to more recently mentioned antecedents, while explicit anaphors, such as noun repetition, would end up delaying processing under conditions in which the antecedent is too prominent or explicit. It seems to be the case in Leitão and Simões (2011). Even at distances as long as 38 syllables, noun repetition caused processing costs to increase. Noun repetition can result in less processing costs when reading larger texts. However, in smaller text extracts, the antecedent is still very active in the reader’s memory; thus, its repetition ends up overloading processing capacity. Moreover, Correia (2014) experimented with a population that is distinct from the studies mentioned insofar. The author investigated people who stutter, and, because of this condition, it was hypothesized they would have their procedural memory affected. However, the study shows no difference in processing costs between people who stutter and people who do not stutter. Additionally, the investigation corroborates the penalty of the repeated name for both populations.

When reflecting upon the types of anaphors that are processed more quickly and in which contexts they are favored, Maia (2013) demonstrated that null pronouns that refer to salient antecedents are processed faster. In contrast with the studies mentioned previously, the experiment carried out by Maia (2013) suggests that repeated names are processed faster than overt pronouns. Thus, the author mentions a processing penalty of overt pronouns and rules out the penalty for repeated names.¹² Based on the results of his experiment, the researcher claims that the salience of the antecedent does not have a significant effect on the processing of pronouns or repeated nouns. He states that only the processing of the null pronoun is favored by syntactic salience¹³ and it is negatively affected under non-salient antecedent conditions. The use of the eye-tracking technique corroborates these results. Teixeira (2013) gives support to these results by investigating syntactic preferences for processing overt and null pronouns. The data show that, in ambiguous structures, readers relate the null pronoun to the subject of the sentence. Overt pronouns were not able to solve the ambiguity problem presented in the experimental test. In this stage of the research, the results revealed that there is a

¹² Lezama (2008) studied the processing of anaphors with overt pronouns, null pronouns and repeated names in Spanish. Briefly, the author found a penalty for anaphors that refer to an antecedent in the subject position, which he called “overt pronoun penalty”.

¹³ Antecedent in the subject position.

longer reaction time for reading in the conditions with the overt pronoun when compared to the conditions with the null pronoun. It is necessary to consider, however, that the experimental conditions used in the studies reviewed here are different, which can generate this difference in the results.

In this vein, Gondim (2017) takes into account methodological differences in research and conducts experiments to understand the conditions under which the repeated name penalty occurs in Brazilian Portuguese. From the results found, the researcher concludes that, for the repeated name penalty to be found in BP, it is necessary to consider a set of linguistic and methodological factors. Moreover, the author claims there is a multifactorial effect, with time segmentation of the experimental set as the main influencing factor, in addition to the number of antecedents that are humanly possible to be processed. Therefore, what the researcher finds is the existence of a penalty for repeated names in BP between pronoun and repeated name depending on the experimental configuration, that is, the results suggest that the processing cost of the anaphora varies according to the conditions presented to the reader. This would explain the difference found in previous studies, which were conducted using different experimental material, demonstrating the importance of experimental choices when carrying out a study. Furthermore, it is possible to say that, depending on the choices made to build an anaphoric reference, overt pronouns can be considered as elements that generate more or less processing load, regardless of its nature.

Another point addressed in the studies is related to semantic preferences in the processing of anaphors (TEIXEIRA, 2013). In that regard, anaphors are tested with hyponymy and hyperonymy. Results show that the processing cost of the anaphor concerning hyperonymy with its antecedent tends to be lower than that of the anaphor concerning hyponymy, when in the subject position. The difference between hyperonymy and hyponymy in object position was not significant. This finding leads to a discussion about the semantic distance between antecedent and anaphoric referent and the costs for working memory. This is an important issue to be considered when comparing experimental laboratory conditions and reading itself, since the factors that generate more costs for processing may, in certain situations, compromise reading comprehension. Thus, in addition to the discussions around cognitive aspects involved in anaphoric processing, it is worth considering the consequences of the penalties reported by studies for reading larger text extracts, especially regarding the generation of inferences, also made possible by anaphoric references (KINTSCH; RAWSON, 2013).

Among the studies reviewed in the present article, some focus on understanding the functioning of other types of anaphors and also the context (semantic and syntactic) in which they are performed (LEITÃO, 2010; BEZERRA; LEITÃO, 2013; HENRIQUE, 2016; ARAÚJO, 2017). Leitão (2010) investigated the effect of parallelism, relating it to the animacy of the antecedent of the anaphoric reference made by the pronoun in the object position. Perhaps the author's main finding is that structural factors are active in anaphoric processing, including the pronoun (different from what some theories propose – SAG; HANKAMER, 1984, quoted by LEITÃO, 2010, and HANKAMER; SAG, 1976 – for whom only semantic factors would affect pronominal processing). Thus, sentence structure can contribute to a particular referent to be active in working memory and to be recovered more easily. It is worth considering that reading is a complex cognitive activity, involving several subtasks, among which the proper establishment of correspondence. In other words, for readers to understand the meaning of what is being read, it is essential that when they encounter an anaphor, the appropriate antecedent is found. This process must occur very quickly, based on the information that is active in working memory. What can be seen from the results presented so far is that some elements and structures are more favorable to this rapid activation. However, it is also necessary to consider the working memory capacity of the individual participating in the study.

Bezerra and Leitão (2013) investigated the difference in anaphoric processing when pronouns are arguments and when they are adjuncts of a verb and noun phrases.¹⁴ The results show that the reading of anaphors that are arguments of noun phrases is faster than that of adjuncts. As for the verb phrases, the study did not identify significant differences. Results like this bring indications that there are many factors that can be considered when it comes to processing anaphors during reading. There are also some studies that focused on the processing of other types of anaphors, such as Henrique's (2016), which investigated reflexive anaphors in Brazilian Portuguese: "*a si mesmo*" and "*se*". The author conducted an acceptability test on these two forms of anaphoric reference. The anaphor constructed with "*se*" was considered the most acceptable within the context investigated. One of the main findings obtained is the fact that "not only the position of the anaphor in the sentences is sufficient for the predicate to become reflexive, but also its semantic feature gives support to the interpretation of reflexive sentences" (HENRIQUE, 2016, p. 76).

The anaphor "*a si mesmo*" was also investigated by Correia (2014), who took into consideration that this is an intrasentential co-reference. The author hypothesized that this type of anaphor would be more susceptible to grammatical principles, which could generate a higher processing cost for people who stutter.¹⁵ The objective of the study was to measure the reading time of the anaphor "*a si mesmo*" when preceded by a grammatical and an ungrammatical antecedent. The experiment showed that speakers who do not stutter have faster reading times in the grammatical condition and slower reading times in the ungrammatical condition.¹⁶ In turn, even though results did not reach significance, reading times for those who stutter showed the opposite pattern. Thus, one of the hypotheses¹⁷ suggested in the study was corroborated, and there was also an indication that procedural memory influenced the grammatical skills of people who stutter. In other words, the processing of intrasentential anaphors was different between groups. This difference was not found in cross-referential anaphors (CORREIA, 2014), which implies that, for intersentential anaphors, working memory has a more active role than procedural memory.

Among the studies on reflexive anaphors, Araújo (2017) investigated the following anaphors: "*ele/a mesmo/a*" and "*ele/a próprio/a*". The author aimed at finding evidence for Chomsky's Binding Principle A by showing that such anaphors act following what is expected in Chomsky's theory. Therefore, it was expected that the anaphors were related to antecedents that were available in their connection domain (that is, the ones that were in the same clause), with unavailable antecedents being restricted in the first moment of processing. The author's expectations were confirmed through the results of the experiments carried out in the investigation. In constructions such as: "João said that José hurt himself in the amusement park", the reader related the anaphor to "José" and not to "João". In the condition in which the reader was forced to relate the anaphor to the first antecedent (as in: "Maria said that João hurt her in the amusement park"), the reading times of the critical segment were longer.

Even though all the studies reviewed so far used written stimuli in their experiments (which implies reading), none of them mentioned theories of reading. Despite not using texts in her experiment, Cunha-Lima

¹⁴ Examples: Argument in a verb phrase - "The police approached the thief at the bar. They fought him on the spot."; adjunct in a verb phrase - "The police approached the thief at the bar. They stayed with him on the spot."; argument in a noun phrase - "The police approached the thief at the bar. They made his arrest on the spot."; adjunct in a noun phrase - "The police approached the thief at the bar. They collected his ammunition on the spot".

¹⁵ Concerning the participants of the study by Correia (2014).

¹⁶ This study followed Binding Principle A, based on Chomsky (1981; 1986), which states that anaphors (which are reflexive and reciprocal) must be linked in their domain of connection (LEITÃO, 2005).

¹⁷ One of the researcher's hypotheses was that if the principles that act on intrasentential correspondences "are rooted in procedural memory and that memory component is rooted in brain structures that have neural changes in the PQG [acronym for people who stutter in BP], it is expected that these people show an atypical performance in processing this form of correspondence, since it is assumed that these linking principles are correlated with grammar, which is correlated with procedural memory" (CORREIA, 2014, p. 31-32, our comment).

(2004) reflected on the role of anaphors in the reading processes. The researcher aimed at investigating in which contexts an indefinite nominal expression could have an anaphoric reading.¹⁸ The results obtained with her experiment give support to the fact that the nominal expression does not have its value established only at the time of its processing, but it also depends on the verb and the events expressed in the sentence. The researcher discovered that the indefinite nominal expression is less informative and very sensitive to context. Results indicate that the indefinite nominal expression will only be anaphoric when it is not an argument of any finite verb that expresses an event different from that introduced by the antecedent. These findings can also be related to the costs of working memory. When encountering an indefinite expression related to a verb, the reader interprets it as new information (a new event). Within the context of the presented sentences, the new information may or may not make sense, which requires more information to be maintained so that meaning can be inferred as reading continues. It must be said that the anaphoric connection is made with a referential candidate that is active.¹⁹ This way, the creation of unnecessary referents is avoided, saving cognitive memory resources and favoring processing.

Following a perspective that considers anaphor in the context of reading, Cavalcante (2017) investigated the influence of anaphoric correspondence and humor on reading comprehension. Considering all the studies found, this is the only one that uses texts²⁰ in its experimental design. The researcher did not focus on specific anaphors and did not consider semantic and syntactic issues that could influence processing. Instead, it was expected that texts with co-referential anaphors and with humor would favor participants' comprehension. However, it was not possible to validate this hypothesis from the results obtained. This may have occurred due to several factors inherent to the investigation. In Cavalcante's study, the type of anaphor was not considered, but she avoided working with null pronouns. The author concluded that text comprehension occurs through the operation of these processes (anaphoric correspondence and humor), but not in the way expected and presented in the hypotheses. The results of the investigation allow for many possibilities concerning the role of co-referential anaphors in the processing of a text. It is possible that, by taking into consideration the results of the other studies reviewed so far, more evidence is available to evaluate how anaphors contribute to processing and how intratextual anaphoric relations can be taught in reading. It is not enough that there are anaphoric relationships in a text and that they are recognized. Depending on the purposes that one has when writing and reading a text, these relations must be constructed to consider their processing. The absence of this consideration can increase the costs for comprehension, making it difficult to produce meanings.

When analyzing each of the studies reported in this article, it is possible to see that, depending on the choices made, the cost for processing may be higher or lower. Both the use of the repeated name, the use of the hyperonymy or even how sentences are constructed may require more from readers working memory, which increases processing time. Working memory is a fundamental cognitive resource in the processing of written text, as it works by temporarily storing newly received information and manipulating that information to create coherence and cohesion. Thus, the results obtained by the studies reveal important aspects of the relationship between working memory and anaphoric processing, being possible to infer implications for reading comprehension and the teaching of reading. After all, processing at the microstructural level has implications for the mental representation of a text (KINTSCH; RAWSON, 2013). The construction of the anaphor is carried out at a certain level of reading comprehension (GAGNÉ; YEKOVICH; YEKOVICH, 1993), but it is

¹⁸ Some examples of sentences used by Cunha-Lima are: Indefinite and noun phrase - "My cat hunted a rat. A big, fat rat"; definite and noun phrase - "My cat hunted a rat. The big fat rat"; indefinite and finite verb - "My cat hunted a rat. A rat ran out the door"; definite and finite verb - "My cat hunted a rat. The rat ran out the door" (CUNHA-LIMA, 2004, p.188).

¹⁹ This activation can be provided by different morphological, syntactic, semantic and discursive factors.

²⁰ Considering the concept of text, from a dialogical perspective, according to which a text is the place of interaction, and the interlocutors are active and dynamic social actors that are constructed in the text (KOCH, 2006; MARCUSCHI, 2008).

shown to be integrated with other levels, such as parsing and lexical access, which, in turn, are directly related to working memory capacity. All of these aspects can and should be considered when teaching reading in the classroom.

PEDAGOGICAL IMPLICATIONS: HOW CAN THE REVIEWED STUDIES CONTRIBUTE TO THE TEACHING OF READING?

From the review of the studies that investigated anaphoric processing, it is possible to build connections and list some implications for the teaching of reading. After all, the studies conducted in laboratory had as their main objective a broader and better understanding of how language works and, more specifically, how certain linguistic features affect cognitive processing. The results and resources from the reviewed studies should influence pedagogical practice. The main concern of this article, as expressed by the studies included in the systematic review, is to know how the processing of anaphors occurs in written stimuli and reading activities to ponder and discuss the pedagogical implications for the teaching of such a complex skill that is reading.

The teaching of reading can start from different methodological approaches. If one wants to be successful, however, they need to consider linguistic, textual, (meta)cognitive, social or cultural and developmental factors related to learning (FLOOD, 1984; RUDELL; RUDELL; SINGER, 1994; KAMIL et al., 2011; ALVERMANN; UNRAU; RUDELL, 2013; SNOWLING; HULME, 2013). Based on the assumption that reading is not a competence that is naturally acquired in contexts of immersion and interaction, and that learning requires planned, substantiated and systematized practice (MCGUINNESS, 2006; SOUZA; GARCIA, 2012; SOARES, 2016), it is necessary to consider aspects related to learners (in this case, novice readers); to the professionals who are responsible for teaching (in this case, teachers²¹); to the text, which is the object of reading and without which the activity cannot be carried out; and to the context and the learning situation (ALLIENDE; CONDEMARÍN, 2005; RUDELL; UNRAU, 2013; HEINIG, 2019). Considering the scope of this study and due to limitations that are imposed on any research, two of these factors will be discussed: the text and its internal linguistic constitution, especially co-referencing, and the reader, solely concerning the cognitive aspect of processing.

The discussion that follows is the result of work in which considerations about the nature of the object of teaching and its composition (the text) are made. Also, how this knowledge can aid teachers in the elaboration of pedagogical proposals and projects that consider and explore text characteristics since the text is the verbal stimulus that motivates reading. Furthermore, deliberations will be made on the relationship that readers, through the active and dynamic process of producing meanings based on writing, establish with the text. This relationship is modulated by factors related to readers and their reading conditions, the environment and, as important as the others, the way the text is written and structured. As proposed by Seimetz-Rodrigues and Souza (2016, p. 63), to highlight aspects related to

textual surface, as well as to acknowledge that comprehension also depends on factors that concern readers' prior knowledge, the objectives, and conditions of reading, is to assume an integrative perspective of the reading process. According to this perspective, comprehension is the product of integration between elements related to the text and the reader. In this process, the text remains static and the reader is the element responsible

²¹ Even though it is not the focus of the study presented, it is essential to mention that the authors of this article believe the teaching of reading is the role of basic education school and must be a commitment from all areas of knowledge (NEVES et al., 2011; SOUZA; BACK; KRATOCHVIL, 2012). However, for reasons related to the specificity of the writing system and its learning process, literacy should be done by a professional with a vast knowledge of the initial teaching of reading and writing (SOUZA; JUNKES, to be published).

for the dynamics of bringing meanings to life. Therefore, this assumption has as a necessary consequence: pedagogical practices for the teaching of reading, to be effective, should consider factors regarding the text, which is the object of teaching, as well as factors concerning the reader or the learner. In other words, developing pedagogical practices requires understanding what type of demand the text places on the novice reader and, on the other hand, what type of demand is caused by the meeting of the individual characteristics of the reader and the characteristics of the text on teachers.

It is a fact that, although the teaching of the writing system and decoding skills is necessary and fundamental to the teaching of reading, it is not enough (SOLÉ, 1998; SEIMETZ-RODRIGUES; SOUZA, 2016). It is certainly not enough when considering the teaching of reading for those learners who are somewhat fluent readers. Hence, it is also required that aspects related to higher levels of comprehension be taught, aspects that go beyond word decoding and the basic internal relations of sentences. The appropriate resolution and comprehension of anaphors are related to this area. When readers can recognize that certain elements of the text are referenced in different ways using textual clues, they can understand the topic of the text, integrate the different aspects concerning that topic and create a summary (OAKHILL; CAIN; ELBRO, 2017; SOUZA; SEIMETZ-RODRIGUES; WEIRICH, 2019), forming a mental representation that can be related to their previous knowledge, thus producing meaning. But how can the teaching of reading be based on the data from research on anaphor processing?

From the studies reviewed in the present article, Cavalcante (2017) is the only one that investigated the relationship between anaphoric processing and reading comprehension directly. As it was already pointed out, one of the hypotheses presented in the study was that texts with co-referential anaphors are more easily understood. It is known that co-referential anaphors are important elements of cohesion, which help in sequential progression. In this sense, they act as resources that help in the construction of coherent mental representation (KINTSCH; RAWSON, 2013; KOCH; ELIAS, 2015; OAKHILL; CAIN; ELBRO, 2017; SOUZA; SEIMETZ-RODRIGUES; WEIRICH, 2019). The investigation carried out by Cavalcante (2017), however, does not present enough data to validate this hypothesis, which leads one to consider the results found in the other studies concerning different factors related to the study of anaphoric processing. Taken together, the results indicate that it is not enough to locate an antecedent for comprehension to take place. Depending on how this connection is constructed, processing costs can be high and, consequently, they can hinder comprehension processes, due to implications that refer to the capacity and functioning of working memory. When operating with text integration and summarization, it is important to consider the role of co-referential anaphors as textual clues that guarantee the progression of the text, but it is also important to think about the way they are carried out and constructed. How is the antecedent referred to? What is the syntactic construction in which reference and antecedent are found? What semantic information is available? These are questions to be taken into consideration in teaching, to be able to distinguish such aspects in the texts worked within the classroom.

Some of the reported studies (QUEIROZ, 2009; LEITÃO; SIMÕES, 2011; CORREIA, 2014) show, for example, that the repetition of the antecedent (repeated name) increases processing costs in contexts where the distance between antecedents and anaphors is short. From a cognitive perspective, this means that when readers find the repetition of an antecedent still active in their memory, it takes more time for them to process it. On the other hand, Maia (2013) demonstrated that, in specific sentence contexts in which the anaphor refers to salient antecedents, the null pronoun can generate lower costs. All this evidence suggests that the teaching of reading must also be based on the syntactic and semantic organization of the language. In this vein, having information, discussing and knowing how to use syntax and the different “markers of cohesion at the linguistic level” (KINTSCH; RAWSON, 2013, p. 228), in other words, the different types of anaphoric reference, can guarantee the construction of connective inferences and gap filling and, therefore, participate in faster, more accurate processing with lower costs for working memory.

In general, it appears that, for experienced readers, the types of anaphor that present less processing demands are those that have less semantic information, especially if the antecedent to be referenced is in a prominent position (salience or structural focus). Thus, it can be said that automation generates a continuous flow in which working memory operates to relate the small amount of semantic information of the anaphor to compare with the salient item (the focus of the text being read). If the anaphor does not refer to the salient item, the processing cost will probably be increased, because readers need to stop reading to find the correct antecedent, which interferes with processing time and, consequently, with comprehension. On the other hand, if the text presents an element with more semantic information, it is expected that there is an objective for this – a parsimonious relationship can be established between the reader and the text –, and more memory resources can be allocated for appropriate processing.

According to Perfetti, Landi and Oakhil (2013, p. 255), “comprehension difficulties can be located in points of high processing demand, whether from syntactic sources or otherwise”. Having said that, a systematic method for the teaching of reading, which incorporates aspects related to reference and consider the different types of anaphoric constructions, can avoid the overloading of the working memory system. Such a method can also contribute to processing speed and increase comprehension, which is positive for learning. In other words, it is necessary to deconstruct the different types of anaphors to learn how to deal with them. Then, anaphors need to be automated again as a means to confer the speed and accuracy that fluent reading requires. An example of study aimed at such deconstruction is the one proposed by Souza, Seimetz-Rodrigues, and Weirich (2019), which suggests the implementation of reading guides to evaluate processes and performance and to design instructional plans that focus on exploring the text concerning readers’ previous knowledge in a given reading situation. Especially in their reading guide 1, which aims at teaching reading, the authors focus on aspects of cohesion, on the microstructure of the text, demonstrating the role of the relations between the elements in the construction of the text and also in its comprehension.

Moreover, studies reported by Perfetti, Landi and Oakhil (2013, p. 256) demonstrated that difficulties with syntax can be related to a problem in the readers’ working memory capacity, because “understanding a sentence involves remembering the words that are part of it, retrieving information from previous sentences, analyzing the sentence and other processes that require resources”. Why are the results obtained in the diverse studies presented so directly related to systematized teaching and learning to read? As previously mentioned, the establishment of co-reference is a process that implies specific linguistic knowledge to understand what is being read; it is part of conceptual and procedural knowledge, that is, it is a fundamental condition for the relationship that the reader establishes with the text (SOUZA; SEIMETZ-RODRIGUES; WEIRICH, 2019). The more experienced and knowledgeable readers are about the aspects involved in establishing co-references, the lower the processing costs, and the more easily comprehension can be established, at least as far as this aspect is concerned.

Thinking about the different ways an anaphor can be constructed, about its syntactic structure and its existing semantic relations is essential to understand how cognition operates in the face of these differences. Also, getting to know these aspects from a Psycholinguistic perspective, considering the information processing view of comprehension, has important implications for pedagogical practice. Resolving properly an anaphor means giving cohesion to the text and, in turn, giving cohesion to the text means understanding the relations established between the different parts of the text, which facilitates the processing of information and articulation with readers’ previous knowledge. Furthermore, this process creates conditions for the establishment of coherence and meanings that are relevant and related to the text. In this respect, working memory plays a fundamental role in reading. Taking into consideration that understanding language is a complex form of thinking when reading, elements should be processed sequentially, with temporary retention of information so that other concurrent and fundamental processes for comprehension continue to occur (decoding, integration, reflection ...) (SOUZA, 2004).

Hence, considering that: 1. less demanding processing of anaphors is reflected in the mental representation that is created when reading a text; and 2. the processing of anaphors at lower costs depends on morphological, syntactic, semantic factors and on the type of reference made, we argue that, as do other researchers, the teaching of reading must encompass reflection on these factors. Furthermore, it is necessary to make students reflect on how co-referencing is established in the texts, on why a given referent is not always repeated in the same way every time it is retaken, and also on the more appropriate ways to retake a referent within a certain text. Such reflections will contribute to the training process of learning to read and write. As previously mentioned, it is necessary to think about language to deconstruct certain processes so that, after understood and learned, they can be restored. In this way, understanding the restrictions that underlie the different types of anaphors that can be used, and the cognitive mechanisms involved in their processing is an important step to think about language comprehension and, consequently, reading comprehension and teaching.

FINAL REMARKS

This systematic review of anaphoric processing in reading tasks aimed to map what has been researched about the theme and how research has been conducted and to propose considerations about the pedagogical implications for the teaching of reading. In general, the studies focused on investigating which anaphors generate more processing costs and in which sentential contexts using experimental designs through self-paced reading tasks, eye-tracking, and acceptability judgment tests, which reinforces the explanatory nature and experimental tradition of Psycholinguistics (PINTO, 2019). Given what has been presented about the studies, there are three main points concerning the reflections previously made, namely: working memory performance, the role of anaphor in text comprehension, and the relationship between the results obtained experimentally and the teaching of reading.

According to what is mentioned in the reviewed studies, working memory plays an important role in the processing of anaphors, since their comprehension requires maintenance and manipulation of previous sentences in memory so that the relationship between the anaphoric element and its referent can be properly established. Many of the studies presented here bring arguments that demonstrate how working memory and processing costs involved in resolving anaphors are related. Despite being constantly mentioned in data analysis, working memory is not a variable in the reported studies, nor is it controlled in any manner. Thus, there is a need for working memory to be considered a research variable, allowing for the investigation of working memory capacity, anaphor reading time and accuracy. This could help researchers identify the extent to which this memory system participates in the processing of anaphors, making it more or less efficient and cognitively demanding, as well as other factors such as type of anaphor and distance (spatial, syntactic and semantic) between anaphor and antecedent. Also, considering working memory as a research variable can help better explain its role in text comprehension, which necessarily (though not exclusively) goes through co-reference processing.

Even though reading usually involves texts, because of experimental control and the nature of the tasks employed, most studies on anaphoric processing focus on the sentence level. This choice is justified not only by the type of tasks used and experimental control but also because anaphors are related to the text microstructure, which needs to be constructed to support the text macrostructure and create a mental representation of what is being read. It is important to mention that, although we do not believe comprehension takes place linearly, there is some linearity in the processes. At the same time, there is widespread and parallel activation in which meaning construction and hypotheses development lead to a mental representation of the text. This way, even though most studies do not involve comprehension at the textual level, we understand

that the relationship takes place intrinsically due to the nature of the construction of the text. For that reason, it is relevant to discuss the relationship and the role of anaphoric processing in text comprehension, which is the objective of the dissertation we are developing. By relating anaphoric processing, working memory capacity and reading comprehension, it is possible to understand the role that anaphors, a component that acts in the microstructure of the text, plays in text comprehension and also how working memory acts in this process, within the construction of the microstructure itself as well as the text as a whole.

Having presented the review, it is also necessary to raise the discussion about the relationship between the results of the studies on anaphoric processing and learning to read (a relationship that was not explored by them), which will contribute to the elaboration of instructional teaching plans based on important scientific findings. Considering that reading is taught, there must be knowledge and consideration of the factors and elements that interfere in this complex activity. Among these, aspects of a linguistic and textual nature can lead to randomness, low range, efficiency and effectiveness in teaching, if they are not properly understood, explored and systematically taught.

Finally, it is important to emphasize that the relationship between experimental studies, theory and teaching brings an important contribution to Applied Psycholinguistics, since it sheds light on constructions and processes that are very close to the basis of learning to read when literacy at the word and phrase-level is complete and advances to the relations that construct the text and allow readers to access and produce meanings beyond basic comprehension. It is through serious work, planned, grounded, systematized and based on scientific studies (in the case of this research topic, mainly developed in public universities) that one can strongly contribute to real democracy in this country, by creating conditions to reduce social inequality regarding access to a literate culture.

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