Schema theory: an introduction and its application in efl reading classroom

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ABSTRACT

The main purpose of this article is to present an introduction to the schema theory and its application in the EFL (English as Foreign Language) reading classroom. This article has a theoretical approach and it presents the foundation literature of the Schema Theory, which still influences current works on this topic. It is introduced the concepts of formal and content schemata. Furthermore, the bottom-up and top-down processing is analyzed as they are crucial elements to understand the Schema Theory. Some examples of the foregoing topics are furnished in order to clarify their understanding. The applicability of the schema theory is discussed with examples, and also it is emphasized some points that may be a hindrance to its application. Finally, it is evaluated the use of the schema theory for reading purposes as well as other elements that influence the process of reading. In the conclusion is emphasized the interdependence of all explained concepts, the understanding that there are other aspects that influence the process of reading and the relevance of the Schema Theory in current works in the field.

KEYWORDS: Schema theory. Formal schemata. Content schemata. Bottom-up processing. Top-down processing.

INTRODUCTION

The main purpose of this paper is to present an introduction to the schema theory and its application in EFL (English as Foreign Language) reading classroom. Normally, teachers are familiar with various activities and techniques to improve their students reading abilities, such as skimming, scanning, developing vocabulary skills and reading rate, among others. The schema theory is not a technique in itself; the following example will clarify an introduction to its concept. Considering the sentences below, an adaptation from the work of Rumelhart (1985):

The policeman stopped the car.

Superman stopped the car.

In which sentence was the car touched? How is it possible to know that? Taking into consideration that both sentences are out of context, yet, everybody knows (almost, at least, in the Western) that Superman has superpowers and can easily hold a car with his hands, whereas, the policeman just needs to blow his whistle to stop a car.

Consequently, it was possible to understand the sentences' meaning because there is some information that is beyond the printed text, something that is already known before. Based on this, it is possible to infer that prior knowledge was essential to understand these sentences. That is the concept of the schema theory - the use of background knowledge with the text to comprehend it. As Anderson et al. (1977, p. 369) state: "every act of comprehension involves one's knowledge of the world". In other words, it is something acquired by each person during his life, however, it is important to consider, for this person, to comprehend a text in another language is necessary to activate his resident schemata, or build up absent schemata.

Otherwise speaking, as Anderson (1999, p. 39) points out: "the meaning is reached when the reader integrates personal background knowledge, the purpose for reading, reading strategies, and the text to get the meaning". Note that Anderson (1999, p. 39) in this statement adds other elements for the comprehension of a text. He mentions not only the background knowledge, but also the purpose of reading and reading strategies, and, more importantly, he mentions the text itself – with all its features. That is what will be discussed below.

1. FORMAL AND CONTENT SCHEMATA

It should be taken into consideration that background knowledge is not restricted to cultural experiences or one's knowledge of the world only, but it is also related to the text structure. Consequently, there is a distinction between "formal schemata (background knowledge of the formal, rhetorical organizational structures of different types of texts) and content schemata (background knowledge of the content area of a text)". (CARRELL, 1983, p. 81).

Depending on the text, the reader will encounter different rhetorical structures. For instance, a scientific article is quite different from a short story. Whereas the former should be clear, impartial, with scientific terminology,

structured logically, accurate, and objective, the latter, the author has the freedom to present the text in a way it suits him, notwithstanding this, a short story has a pattern to be followed, normally the sequence is, exposition, rising action, climax, falling action, and resolution. For the readers, who are not aware of it, the teacher should prompt the formal schemata - not necessarily, using technical terms to accomplish it. The teacher should state that a scientific article has a formal logical text and a short story has phases as setting the scene, building tension, the climax, resolving the situation and, finally, the end of the story. That will be enough. The students should combine their awareness of the world with the different types of texts they will encounter in order to have an appropriate understanding of them. Furthermore, Anderson (1999) presents two different ways of processing a text: bottom-up and top-down.

2. BOTTOM-UP AND TOP-DOWN PROCESSING

The approaches based on formal and content schemata entail two different ways of understanding the information on reading, namely, bottom-up and top-down processing. Anderson (1999, p. 2) states: "bottom-up or data-driven model depends on primary the information presented by the text. That information is processed from letter features to words to meaning". That is what Anderson (1999, p. 2) calls "lower-level" reading process. In this process, the reader has a linear approach to the text, he perceives letters into words, words into phrases and, then, into sentences. The meaning will come only after all the lower levels are completed.

In contrast, top-down models are called conceptually driven "all have in common a viewing of the fluent reader as being actively engaged in hypothesis testing as he proceeds through the text". (STANOVICH, 1980, p. 34). Moreover, in the view of Treiman (2003, p.665) "With top-down processing the uptake of information is guided by individual's prior knowledge and expectations". Note that Treiman (2003, p.665) mentions 'expectations' as well, and she continues stressing that "top-down processing claims that readers form hypotheses about which words they will encounter and take in only just enough visual information to test their hypotheses". As Goodman (1967, p.126) points out: "reading is a psycholinguistic guessing game".

The example below, based on the works of Treiman (2003) will clarify this 'guessing game', or as it was mentioned in the previous paragraph, 'expectations' and 'hypothesis':

Daylight savings time ends tomorrow, and so people should remember to change their…

It is possible to infer that the word that will end this sentence could be 'clocks' or 'watches'. In top-down processing, the reader verifies which letter the word at the end of the sentence begins to confirm his expectations. That is the reader's *modus operandi* in the whole process of reading. This procedure could be extended to phrases and sentences as well. On the other hand, in bottom-down processing, the reader will always go through the word, no matter how predictable that word could be.

3. INTERACTIVE PROCESSING

In spite of having these two ways of processing the text, it is not possible to declare which one prevails. Actually, as Rumelhart (1977, p. 267) states: "Reading is neither a bottom-up, not a top-down process, but a synthesis of the two".

In fact, there should be an interaction between both ways. Reading familiar content in an unfamiliar rhetorical form or unfamiliar content in a familiar rhetorical form will be a hindrance to understanding a text properly.

Summarizing, it should be considered that,

> Reading is a multilevel interactive process; that is, the text must be analyzed at various levels, with units of analysis going from the letter to the text as a whole. In addition to processing the explicit features of the text, the reader must bring considerable preexisting knowledge to the reading comprehension process. The interaction of text-based and knowledge-based processes and of levels within each is essential to reading comprehension. Because the meaning of the text is only partially determined by the text itself, reading must be an inferential, constructive process, characterized by the formation and testing of hypotheses or models about what the text is "about," a process similar in many ways to problem-solving. (SPIRO et al., 2017, p. 22)

It is relevant to mention that besides the concepts of formal and content schemata, Spiro (2017) also emphasizes that the meaning does not only come from the text (bottom-up processing) but also it has an inferential component (top-down processing), in other words, the reader should infer, should guess, the meaning beyond the printed word. This concept is strictly correlated to what Goodman (1967) posits, "reading is a psycholinguistic guessing game". This sort of correlation is presented in many current works in Schema Theory, for instance, in An (2013), Maarof (2016), Salbego & Osborne (2016) and Xue (2019), to cite some. These foregoing authors use the foundation literature depicted here to develop their researches.

4. METACOGNITIVE SKILLS AND MOTIVATION

Despite not being directly related to the schema theory, metacognitive skills and motivation are important parts of the process of reading. Actually, both concepts are interwoven with the schema theory. When Anderson (1999, p. 39) states the need of reading strategies to get the meaning of a text, he implies when a student decides which approach he should take in a specific text, this evaluation means that he is reflecting about language – that is a metacognitive awareness for reading. Baker and Brown (1984, p. 353) define metacognitive awareness as "knowledge about ourselves, the tasks we face, and the strategies we employ." The reader unconsciously employs such knowledge to evaluate his perception and comprehension of the text and the text difficulty level. Otherwise speaking, the

student does not need to know the appropriate approach consciously, for instance, when he needs a piece of information from the entertainment section of a newspaper, he does not reflect whether he should use scanning or skimming– he just uses it. On the other hand, the teacher should guide the students through these strategies. Moreover, he also should furnish them with extensive practice, so as they can internalize specific strategies for specific texts. Further below, there will be some examples of activities to help the reader develop these strategies.

The lack of motivation is another factor that can be detrimental to the progress of students in a reading class. For Guthrie and Wigfield apud Wharton-McDonald and Swiger (2009, p. 406) "motivation is what activates behavior. A less motivated reader spends less time reading, exerts lower cognitive effort, and is less dedicated to full comprehension than a more highly motivated reader". This statement conveys the idea that the lack of motivation affects students as a vicious circle, otherwise speaking; the less motivated reader will develop a negative approach to reading, consequently, he will read less and, then, he will have a bad performance in his reading activities.

5. APPLICATIONS OF SCHEMA THEORY IN EFL READING CLASSROOMS

Based on what was presented in this article there are some fundamental concepts that guide the applications of schema theory in reading. Its applicability will be guided based on the concepts of formal and content schemata, and 'bottom-up' and 'top-down' processing. Furthermore, it is relevant to consider the strategies the student will apply to text, and finally, yet importantly, there is the role of motivation as well.

Pre-reading activities are relevant in the application of the schema theory. These activities could be divided into two parts. One part will cover the cultural aspects of reading, the background knowledge – the reader's knowledge of the world. The other part will be related to the type of texts the reader will encounter - the rhetoric of the text.

As Carrell (1988, p. 245) states: "rather than attempting to neutralize texts, it would seem more suitable to prepare students by helping them build background knowledge on the topic prior reading, through appropriate pre-reading activities".

In order to activate the reader's background knowledge, the teacher should have an interactive approach to the text together with his students. He should ask them to make predictions about the text, make analogies and comparisons to their existing schemata. He should elicit from the class what they know about the subject and compare it with the realities of the text. This is also important to identify the relevant vocabulary that will be in the text. The use of semantic-maps is a useful procedure for dealing with vocabulary. However, despite its utility, when introducing a new vocabulary for a specific text, it is important to have it exposed from different sources – in different contexts. Normally, if the vocabulary of a specific text is presented before the students read it, certainly, they will rely on a bottom-up approach to read that text. A good technique is to introduce the readers to a Narrow Reading activity, as proposed by Krashen (2004), in other terms, to present the same content from different sources, in different texts. Both

content and formal schemata will be activated. The reader will be dealing with the same topic in different texts, but always being exposed to related vocabulary.

This activity will lead to an extensive reading activity for them. Worth noting that this sort of reading must cover topics outside the academic environment as well – there is the need for recreational reading. This kind of activity is vital to develop the reader's automaticity, because, in such fashion, the reader will develop the date-driven processing so as he will be able to transit from this processing (bottom-up) to a top-down one. Concerning the schema theory, a fluent reader is the one who has an automatized use of the bottom-up processing and, then, uses the top-down processing as a compensatory strategy.

It should be taken into consideration when activating formal and content schemata, depending on the level of the reader, the content schemata should be presented in L1, however, it is important to present the related vocabulary in L2 as discussed above.

Another point that should be emphasized is the array of texts the students will encounter. The teacher should expose their students to different types of texts – not only identifying the text structure, but also its rhetoric.

As it was mention before, the reader does not need to know the academic jargon in the reading pedagogy to have a specific approach to a text. Realia is an effective way to develop this activity. Dickens, Robertson & Hofmann (1995) define realia as "Anything which has a purpose outside of the ESL classroom and can be brought into the classroom." Considering that realia is not only related to real objects brought to class to help to teach, it also includes real information from, newspapers, magazines, travel booklets, pamphlets to cite some. Consequently, the teacher can use authentic materials for beginners to practice a specific approach to the text, for instance, he could give them a foreign newspaper and ask them to find what is on in a specific cinema. They do not know that they are scanning the newspaper, but they are effectively doing it to accomplish their tasks. Other activities can be added, such as skimming, reading for gist, summarizing among others.

Motivation is intrinsically related to the achievements of the reader, otherwise speaking, if he understands better, he will enjoy reading, then, he will read more and, consequently, he will read faster, and then he will understand better, in a sort of virtuous cycle for the good reader.

All these foregoing procedures cited in this paragraph will build up a solid base for the student's approach to the process of reading.

6. POINTS OF DIFFICULTIES IN THE APPLICATION OF SCHEMA THEORY FOR READING PURPOSES

The schema theory is not a panacea for all the difficulties that a reader may encounter when reading in a foreign language. Notwithstanding this, it is undeniable its applicability.

However, when a reader relies on his knowledge of the world (content schemata) to interpret a text, the teachers should be aware of the accuracy of this information. If it is not activated adequately, this will induce the reader to a misinterpretation of the facts that may pose as a hindrance to comprehension.

In the example that will follow, the overreliance on top-down models, and not considering its limitations, will bring difficulties for the comprehension of the text by the student. Moreover, it is not adequate to assume that every student is a fluent reader; in fact, most of them are less proficient, therefore, more susceptible to difficulties in comprehension.

For instance, if a reader has a misconception about how life in Africa is, if he considers Africa as a single unit, analyzing the same way, for example, Liberia and Morocco, neglecting the peculiarities of each country, being, respectively, a republic and a monarchy, certainly these beliefs will interfere in his reading comprehension.

In relation to the limitations of top-down models, Eskey (1988, p. 93) states:

> [...] they tend to emphasize such higher-level skills as the prediction of meaning by means of context clues or certain kinds of background at the expense of such lower-level skills as the rapid and accurate identification of lexical and grammatical forms. (ESKEY, 1988, p. 93)

Another point that should be emphasized is the different approach to different texts. The approach should take into consideration the rhetoric, vocabulary, and syntax. Reading an academic article is much more demanding than reading the sports section of a popular newspaper. The different genres must be introduced to the reader, so as he can have an appropriate approach to each text.

The lack of an appropriate activation of the formal and content schemata could be detrimental for comprehension. As the example below shows:

The orbitozygomatic craniotomy involves making an incision in the scalp behind the hairline and removing the bone that forms the contour of the orbit and cheek. (Johns Hopkins Medicine, 2019)

Even if the reader knows some words, the content (brain tumor surgery) makes this sentence hermetic to him.

In the next example, probably, an average reader can understand all the words, in a basic sense; however, he still may find it difficult to comprehend the text, as it is in a context that he has not a clear perception of the nuances of the language.

Peter McNeal, a 60-year-old Londoner, was fired after spending half of his life at the tube.

In spite of having simple words in this sentence, it may pose some problems for its understanding. Contrary to an average reader may think, 'fired', in this case, is not related to 'fire', in the same way, that 'the tube' is not related to 'bathtub'[1]. An association of 'fire' and 'bathtub' may mislead the reader to a wrong perception

of the sentence's meaning. This is clearly an example that the meaning can come from beyond the printed text.

Another aspect that should be discussed is the proficiency of the reader in L1 before he attempts to read in L2. Alderson (1986, p.2), in the chapter, *Reading in a foreign language: a reading problem or a language problem?*, raises a question concerning the difficulties students have in reading in a foreign language. He questions if their problems stem from their inability to read in L1. Alderson (1986, p.2) posits: "it is commonly asserted by many teachers […] that the reason their students cannot read adequately in English is that they cannot read adequately in the native language, in the first place". He finalizes stating when the students have mastered the reading skills in their native language; they would have an improvement in their performance in reading in English. (ALDERSON, 1986)

Along this paper, it was recognizable hitherto that the schema theory integrates one of many threads in the process of reading, as it was cited before, the metacognitive skills and motivation. Another point to illustrate this position is related to the critical perspective of reading, which is characterized by a preoccupation with social order, different from a cognitive perspective. The critical reading is another thread to be considered whilst analyzing the process of reading. Moita Lopes (1996) points out:

> The interaction model does not consider reading as a communicative act from the perspective of how language is used in the interaction, besides that it disregards social and psychosocial aspects involved in the reading process. (MOITA LOPES, 1996, p. 139) [2]

It is undeniable the importance of social and psychosocial aspects in reading, the writer and the reader are different agents in this process of communication, they can be in different contexts and inserted in different social realities, with different purposes – this way, the act of comprehension goes beyond cognitive perspective. The critical reading takes these features into consideration; however, these aspects are beyond the scope of this paper.

CONCLUSION

This article provided an introduction to the schema theory. It presented its foundation literature by the prominent authors in the field, which still influences the current researchers on this topic. In this introduction is discussed the aspects such as formal and content schemata, bottom-up and top-down processing.

Consequently, based upon what is presented it is relevant to emphasize that neither the top-down processing nor the bottom-up processing has the primacy in analyzing a text. The process of reading must take into consideration both formal and content schema, otherwise speaking, not only, lexical, orthographic, syntactic and semantic knowledge, but also background knowledge processed simultaneously. In fact, it is interactive processing, otherwise speaking; a good reader uses the bottom-up processing for a lower-level comprehension (words, phrases, and sentences) and top-down processing for an inferential approach to the text, being considered this latter, a compensatory strategy.

It was also presented some elements that are important to be developed further on, such as metacognitive skills and motivation, which are, however, beyond the scope of this paper.

It is relevant to emphasize that the schema theory is just part of the process of reading, there is much more to consider, such as the influence of the reader's abilities in L1 in the reading of English, and most importantly of all aspects, the role of critical reading.

Finalizing, Carrel and Eisterhold (1986) present a recommendation to the teachers:

> Since no author can compensate for individual variation among readers, especially readers from different cultural backgrounds, this is one of the roles of the teacher in the EFL/ESL reading classroom. As teachers, we can approach this problem by manipulating either one of the two variables: the text and/or the reader. (CARRELL; EISTERHOLD, 1986, p.85)

The text should be manipulated so as not to make it so artificial because neutralizing a text to make it more palatable to the students can be demotivating – bringing this way all the aspects of the already mentioned, vicious circle (of the poor reader). Similarly, the reader can be manipulated in a fashion that helps him to activate his schemata or to provide him tools to compensate for an absent schema.

Teoria do esquema: uma introdução e sua aplicação na aula de leitura de EFL

RESUMO

O objetivo principal deste artigo é apresentar uma introdução à teoria dos esquemas e sua aplicação nas aulas de leitura em inglês como língua estrangeira (EFL). Este artigo tem uma abordagem teórica e apresenta a literatura básica da Teoria dos Esquemas, que ainda influencia os trabalhos atuais sobre esse tema. São introduzidos os conceitos de teoria dos esquemas formais e de teoria dos esquemas de conteúdo. Além disso, tanto o processamento "bottom-up" quanto o "top-down" são analisados, pois são elementos cruciais para entender a teoria dos esquemas. Alguns exemplos dos tópicos acima são apresentados para esclarecer seu entendimento. A aplicabilidade da teoria dos esquemas é discutida com exemplos, e também são enfatizados alguns pontos que podem ser um obstáculo para sua aplicação. Finalmente, é avaliado o uso da Teoria dos Esquemas para fins de leitura bem como outros elementos que influenciam no processo de leitura. Na conclusão é enfatizada a interdependência de todos os conceitos explicados, o entendimento de que existem outros aspectos que influenciam o processo de leitura e a relevância da Teoria dos Esquemas em trabalhos atuais neste campo.

PALAVRAS-CHAVE: Teoria dos esquemas. Teoria dos esquemas formal. Teoria dos esquemas de conteúdo. Processamento "bottom-up". Processamento "top-down".

NOTAS

¹ fired = dismissed; the tube = London underground (trains).

² O modelo interacional não considera a leitura como um ato comunicativo a partir da perspectiva de como a linguagem é usada na interação, além de desconsiderar aspectos sociais e psicossociais envolvidos no processo de leitura. (translated by the author).

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