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Schema theory to the field of reading in a foreign language teaching

RESUMO – A leitura tem sido investigada sob várias perspectivas - por lingüistas, psicolingüistas, educadores e, principalmente, por pesquisadores do ensino de segunda língua. Tais pesquisas em lingüística aplicada têm sido desenvolvidas por profissionais no cotidiano do ensino de língua inglesa, em que a leitura é uma das habilidades mais exigidas e que necessita de desenvolvimento no contexto do ensino do inglês como língua estrangeira. Nas últimas duas décadas, a teoria do esquema inspirou muitos pesquisadores nas áreas da análise do discurso e da teoria da leitura e continua exercendo forte influência, em ambas as áreas. Esse artigo elucida algumas definições sobre a teoria do esquema com referência em particular, à leitura. Contrasta pontos positivos e negativos de tal teoria e, por último, apresenta algumas contribuições no campo da leitura no contexto de língua estrangeira.

Palavras-chave: teoria do esquema, leitura, língua estrangeira.

ABSTRACT – Reading has been investigated from numerous perspectives – by Linguists, Psycholinguists, Educators and Second Language Researchers. Reading also plays a critical role in Applied Linguistics research and in the day-to-day professional life of language teacher. Similarly, Reading is one of the most required skills which needs developing in EFL context. In the last two decades, the schema theory has inspired many researchers in the area of discourse analysis and reading theory and it has continued to exert a strong influence in both areas ever since. The intention of this article is to highlight some definitions of the schema theory with particular reference to Reading. Secondly, to contrast the weaknesses and strengths of such theory and finally present some contributions to the field of Reading in a foreign language context.

Key words: schema theory, reading, foreign language.

The schema theory

The schema theory is basically an empirically unverifiable object, like a myriad of other things that are dealt with in Education, Linguistics and English Language Teaching such as intelligence quotient (IQ), Language Acquisition Device (LAD) and so on. Nevertheless, however questionable the existence behind the concept, the impact that the schema theory has had on language teaching is very real.

Let us proceed with some definitions of schemata. Cook (1997, p. 86) defines the concept of schemata as “a mental representation of a typical instance which helps people to make sense of the world more quickly because people understand new experiences by activating relevant schema in their mind.”

The origin of schema theory in the current sense is mostly frequently attributed to the British psychologist Frederick Bartlett, although Bartlett (1932) himself credits the idea to an earlier researcher. In Philosophy, the use of the word ‘schema’ goes back to Kant (the Ger-

man word is also ‘schema’). One problem with tracing the history of the term is separating its rigorous philosophical and psychological uses from causal ones and a high-flown synonym of ‘schema’.

Johnson (1998, p. 282) defines schema as “a mental framework based on past experiences developed as a means of accommodating new facts, and hence making sense of them.” Schiffrin (1994, p. 103-4) describes one version of schema theory as “a view of the means by which presuppositions are externally constructed and impose external constraints on the ways in which we understand messages.”

Rumelhart’s definition of schema:

A schema, is data structure for representing the generic concepts stored in memory. There are schemata representing our knowledge about all concepts; those underlying objects, situations, events, actions and sequences of actions. A schema contains, as part of its specifications, the network of interrelations that is believed to normally hold among the constituents of the concept in question. (Rumelhart and Brandford, 1980, p. 80)

Widdowson (1983, p. 34) has described schema as “a cognitive structure constructs which allow for the organization of information in long term memory.” Cook (1989, p. 69) puts it as: “the mind, stimulated by key words or phrases in the text or by the context, activates a knowledge schema.” Widdowson and Cook are emphasizing the cognitive characteristics of schemas which allow us to relate incoming information to previously known information.

Schemata have been called the building blocks of cognition. Generally speaking schemata include the following features:

1. *Schemata are packets of knowledge.* Schemata are the data structures representing the generic concepts stored in our memory. For example, we may have a generic concept or understanding of the word “farm.”
2. *Schemata represent knowledge at all levels from ideologies related to a concept to its use in appropriate sentence structure to the definition or spelling of a word.* For example, just as we may have a schema representing our understanding of the role of farming in our society, we have a schema to recognize farm as a noun or object in a sentence and we have a schema to help us differentiate the letters and provide the correct spelling.
3. *Schemata have variables.* The internal structure of a schema can be represented as a collection of variables which are further specified these include: land, crops, animals, farmer and machinery. Different occasions result in the different substitutions for each or some of the variables. A farm that raises cattle would vary from a farm that raises corn.
4. *Schemata embed one within another.* One schema may have a subschema, with its own subschema. For example, the variable “land” within the farm schema may also be a schema itself with variables itself such as swamp, desert, etc. In turn each of these variables may also represent a schema. In this sense schema can be compared to procedures, a hierarchical series of steps.
5. *Schemata are active processes.* Each schema has the processing capability to examine whatever data being representing. A schema breaks down and organizes incoming stimuli.
6. *Schemata are recognition devices.* Once stimuli are broken down, a schema then recognizes

data that might be relevant. Schema processing is aimed at the evaluation of “goodness-of-fit” to existing schemata from the data being presented.

Types of schema

In English Language Teaching it is often said that there are two types of schemata: formal schemata and content schemata.

a) *Formal Schemata* are described as abstract, encoded, internalized, coherent patterns of meta-linguistics, discourse and textual organization that guide our expectations in our attempt to understand meaningful pieces of language. In other words, knowledge of the language. An important issue is raised by Anderson (2000, p. 34) concerning testing: “what sort of linguistics knowledge is needed and how much of it?” In this case, the answer will in part depend upon the nature of the text and the outcomes of reading expected. Despite the common sense of the importance of language knowledge, the belief has existed for some time, that, if students cannot read well in their first language, they will be unable to read well in a second/foreign language. From such belief a pedagogical approach that concentrated in teaching students reading strategies in their first language as well as in the second language was developed, at the expense of the imparting of second language linguistic knowledge, as exemplified in Celani *et al.* (1988) about Brazilian ESP project.

b) *Content schemata* are less abstract and deal with text knowledge content. Content schemata incorporate background knowledge of the content or subject matter of the text, e.g. differences in genre, differences in structure of stories, scientific texts, newspapers, magazines, poetry, etc. Psychologists, Applied Linguists and educationists alike have long been interested in exploring content schemata. Content schemata can be specific to a culture, as culture does help to determine our life experiences and how we make sense of them. What would mean the word ‘blueberry’ mean in an EFL class where no such fruit exist? Could the word and the concept it represents mean the same thing to someone who has never eaten one? or, teaching the words to describe

the four seasons to someone who lives in a tropical desert.

The classic studies of content schemata are by Rumelhart and Bransford (1980, p. 1985) clearly show that readers need knowledge about the content of the passage in order to be able to understand it. Moreover, and arguably more important, such knowledge does not simply need to be available – it needs to be activated by the reader, or by the text, if it is to be used to facilitate accurate understanding. These studies have shown how readers can learn to activate their own schemata, and that their reading performance can improve as a result of training.

Studies on the processes involved in reading and writing are beginning to show how individuals make sense with language. Readers bring their own schemata to bear upon what they are reading. To achieve understanding, readers select the most appropriate schemata for making sense of the incoming words. Meaning tends to break down at the word level. Less proficient readers, who need vocabulary, struggle to comprehend ‘word-by-word’. If appropriate schemata are not quickly available, and the reader is forced to struggle to make sense of the words at the time of reading, the limits of short memory are quickly reached.

Carrel and Eisterhold (1983, p. 82) has stated that “the process of interpretation, according to the schema theory is guided by the principle that every input is mapped against existing schema and all aspects of that schema must be compatible with the input information.” This principle results in two basic modules of information processing, ‘bottom-up’ and ‘top-down’ processing:

a) *Bottom-up* processing is invoked by the incoming data; the features of the data enter the system through best fitting bottom level of specific schemata. The convergence of schemata can be called data-driving processing. Schema is activated in this way whenever a subschema leads to the activation of a higher-level schema. This processing occurs from part-to-whole. “Bottom-up approaches are serial, where the reader identify the printed word, recognizes graphic stimuli, decodes them to sound, recognizes words and decodes meaning.” (Anderson, 2000, p. 16). This approach has been criticized because it is associated with the largely discredited behaviorism of the 1940s and 1950s, and with the phonics approaches to the

teaching of reading that maintain that children need to learn to recognize letters before they can read words. It could also be argued that many of the psycholinguistic details of bottom-up accounts of language processing have never been well understood by actual classroom practitioners.

b) *Top-down* processing or activation, can be considered as a conceptually driven type of processing. In this type of processing the activation begins with the whole (concept, idea, word, etc.) and then searches for the parts. This approach emphasizes the importance of schemata and the reader’s contribution to the incoming text. For example, Goodman (1982, in Anderson, 2001, p. 17) claims that “reading is a ‘psychological guessing game’, in which readers guess or predict the meaning on the basis of minimal use of existing, activated, knowledge.”

A typical statement of top-down approach can found in Schank, cited in Anderson:

We would claim that in natural language understanding a simple rule is followed. Analysis proceeds in a top-down predictive manner. Understanding is expectation based. It is only when the expectations are useless or wrong that bottom-up processing begins. (Schank in Anderson, 2000, p. 17)

The schema theory and learning

Schema theorists in general postulate that there are three modes of learning:

1. *Accretion*: No change in the existing schema. This would be like adding another piece of data to a database. For example, if we go back to the farm schema stated earlier, soybeans could be easily added as another type of crop on a farm.
2. *Tuning*: Minor modifications to the existing schema. In this case, schema variables become more accurate with the acceptance of new information. For example, in the farm schema, land is a variable. Accepting the information that swampland is not a particularly good farmland and fine-tunes the schema by placing limitations on information that will still be consistent with the schema at work.
3. *Restructuring*: Creation of new schema by modeling or induction. A new schema created by

modeling can be described as learning by analogy. Someone without an existing schema for the concept of city, but with a schema for the concept of farm, may learn about the concept of city by modeling the new schema with the same variables (people, building, animals, equipment, etc.), and then tuning would help to further define the schema (e.g. cows would not be acceptable for the animal variable whereas dogs would).

Induction, on the other hand, is a much more complex process and according to schema theorists, it is really unnecessary and rarely occurs (Rumelhart and Brandford, 1980). Learning in this way requires that a new, completely unrecognizable stimulus repeat itself a number of times until a new schema is formed with the specific representation of that stimulus. For this to occur, some part of the system must be in existence to facilitate recognition and tracking of new, recurring information.

The strengths of the schema theory

The schema theory recognizes that prior knowledge plays an important role in a learner's efforts to learn new information: the text alone does not carry meaning, it only provides guidance for readers when they construct meaning from their previously acquired knowledge. In other words, the reader comprehends the message when he/she is able to activate or construct a schema theory that gives good account of the objects and events described. In this way, the text is never complete and the readers must supply additional material derived from their existing knowledge of the world.

According to such theory, we comprehend something only when we can relate it to something we already know – we can only relate a new experience to an experience with an exiting knowledge structure.

The schema theory also, acknowledges the role of cognition (as opposed to behaviorism) in the learning process and maintains that the context of a learning experience affects the retention and recollection of the information. It provides those of us interested in the learning process with additional tools. The reader's schemata influence how they recognize information as well as how they store it.

Considering Schema Theory, Carrel (1983, p. 569) claims that "one of the objectives to teachers is to develop independent readers outside the EFL/ESL classroom, readers whose purpose in learning

to read in English as a foreign or a second language is to learn from the text they read."

Wilson and Anderson (1986) note some contributions of schema and background knowledge to reading:

- a) A schema directs allocation of attention: A schema may help the reader to determine the important aspects of a text. A skilled reader must select what may or may not be relevant to the context of the text content and topic.
- b) A schema allows orderly searches of memory: the schema can guide the reader to the kinds of information that need to be recalled. The reader gains access to the particular information learned when the text was read.
- c) A schema facilitates editing and summarizing: A schema contains criteria of relative importance of different information. The reader can use some criteria to summarize important information and exclude secondary ones.
- d) A schema permits inferential reconstruction: The reader's schema helps him/her to generate hypothesis about the missing information in the text and point to another information that may fill the gap in the information.

In applying such theory, Carrel (1983, p. 569) suggested some practical classroom activities and techniques that could contribute to make the EFL/ESL readers "become more aware that reading is a highly interactive process between themselves and their prior knowledge, on the other hand, a text itself, on the other."

The weaknesses of the schema theory

Anderson (2000, p. 17) notes that "many psychologists and psycholinguists now question the usefulness of schema theory to account for, rather than provide a metaphor of comprehension process." He raises the issue of how prior knowledge is called up from memory, and how it is then used in 'understanding.' He claims that the schema theory does not lead to explicit definitions or predictions of the process of understanding, although it has clearly provided a powerful incentive to research into the products of understanding of first as well as second language readers.

Although the schema theory attempts to explain how new information is integrated with the old, it does not explain how completely new

information is handed in the brain. "Critics of schema theory note that it does not lead to explicit definitions or predictions of comprehension process, although it has stimulated a considerable amount of research into the products of understanding." (Anderson, 2000, p. 46)

Urquhart and Weir (1998, p.70/71) strongly disagree with the use of the term 'schema' because it is too definite and sketchy. They note four reasons for believing that schemata are not very useful in reading research:

- 1) "Schemata are often described as being 'structures' or 'templates' and are often seen as being hierarchical. On the other hand, sees schemata as being fluid and constantly capable of adapting to fresh information."
- 2) "It has been argued that the term 'schemata', as commonly used, is virtually synonymous with 'background knowledge', And hence is useless."
- 3) "Related to this is the odd fact that, at least in the L2 research literature, while schemata are frequently appealed to, they are seldom described in any detail."
- 4) "In addition to such lack of explicit description, L2 researchers entertain remarkably loose notions of the whole concept, so that schemata can be 'activated' or even 'acquired' at the top, so to speak, of a short passage of introductory reading."

Carver cited in Anderson (2000, p. 47), notes that "the schema theory applies not to normal reading (rauding) but to study reading and memorising." He claims that the schema theory is applied only when materials are relatively difficult such as when college students study relatively hard subjects.

In addition, some negative aspects of the schema theory could be summarised as follows: the schema theory views knowledge as external to the learner, information to be fed into existing, predefined structures. Most applications of the schema theory to instruction, view the process of learning as a matter of packaging the knowledge to be received by the learner.

The contributions of the schema theory to the field of reading in a foreign language teaching

There are many contributions of the schema theory to reading given the role of content schemata in reading comprehension. Learners are not passive readers in this process. They interact with the text and attempt to provide their schemata to make sense of the text, however these efforts will fail if the reader

cannot access the appropriate schemata necessary to understand a text (Carrel, 1983, p. 562). Reading comprehension depends crucially on the reader's ability to relate information from the text to his/her own existing background knowledge.

Carrel (1983, p. 562) calls our attention to the fact that teachers should be sensitive to reading problems that result from implicit cultural knowledge proposed by the text. A review of literature in EFL/ESL methodology shows that the role of cultural knowledge as a factor in reading comprehension has been an issue for some time.

Johnson (1998, p. 283) claims that "learners of a second language need practice in activating schemata in comprehension, otherwise they are likely to engage in bottom-up processing only, which will mar their ability to comprehend speedily and maturely." She points out that culture schemata may be culturally specific. The implication is that L2 learners need to be equipped with appropriate schemata if they are to comprehend properly.

In a study with forty undergraduate Brazilian EFL students, Taglieber *et al.* (1988, p. 455) indicated that the schema theory may help to explain why pre-reading activities improve reading comprehension. According to this theory, meaning is constructed through the interaction between the reader's schemata and the text. They discovered that pre-reading activities also facilitate EFL students' comprehension. The study supported Hudson's (1992) contention that "students may use their background knowledge about a reading section to override problems they are having with the language."

Conclusion

After highlighting some definitions of the schema theory, its strengths and weaknesses as well as its contributions to the field of Reading in a foreign language teaching in this paper one might conclude that the importance of background knowledge in reading is central to the schema theory and claims that reading comprehension involves background knowledge which goes beyond linguistic knowledge. Furthermore, reading a text implies an interaction between the reader's background knowledge and the text itself. The knowledge that is organised and stored in the reader's mind is called schemata. In accordance to this theory, fluent readers relate their schemata with the new information present in the text.

It is now accepted that the view of reading is a

result of two-way communication between the reader and the text, achieved through the simultaneous interaction of a bottom-up information process and top-down processing.

The schema theory, a cognitive approach, is described for representing generic concepts stored in the memory and it is a sort of framework, plan or script. Schemata are created through experiences with people, objects and events in the world.

The Schema theory brought contributions to EFL reading and in applying this theory, the teacher expect it to create meaning to the learner. Using the schema as a frame of reference for the instructor means that the instructors use advanced and comparative organisers to activate knowledge. These instructional designers should help them to bridge the gap between what learners know and what they need to know. The teacher using a variety of strategies and sources of knowledge can activate to their prior knowledge and new information they are to acquire.

Some negative aspects of the schema theory were also highlighted such as viewing knowledge as external to the learner i.e., information to be fed into existing, predefined structures. Most applications of the schema theory to instruction look at the process of learning as a matter of packaging knowledge to be received by the learner.

In addition, it is claimed that the schema theory does not lead to explicit definitions or to predictors of the process of understating and that the term 'schema' is too definite.

In sum, the schema theory is not a new issue in ELT and it has motivated many researchers in several fields such as educators, discourse analysts, psycholinguists, applied linguists whose researches have contributed to reading and have helped teachers and learners in the reading process.

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