4

Reading

Everyone knows reading is an important ability in the modern society. It is a fundamental communication tool, through which people discover new things and get new information, they develop their creativity and imagination and achieve a better understanding on a topic that may interest them. Besides, reading influences the readers' oral language performance, vocabulary and writing ability.

Although it seems to be automatic and simple, reading is actually a really complex skill that involves different cognitive processes, which are carried out in a dynamic, open and recursive way (Coscarelli & Novais, 2010). Reading requires much more than a simple decoding of graphic symbols. It demands different strategies, so that the written material can be processed.

4.1

Dual route of reading

The acquisition of reading in alphabetic systems, as proposed by Uta Frith (1985), involves three stages: the logographic, the alphabetic and the orthographic one. By the first phase, children are not aware that individual letters and letter combinations represent specific sounds. They do not understand the logic of reading. They recognize and process words as if they were any other visual objects or symbols. In the second stage, the child learns how to associate letters to sounds and how to merge them into words. He/she becomes able to read novel and nonsense words. The last phase is reached when the child is able to analyze words into orthographic units without phonological conversion. The child is able to recognize words and access their meaning automatically.

Word recognition is, therefore, one of the most fundamental processes demanded by the reading ability and it was assumed in this dissertation that written word identification can proceed in two routes – phonological and lexical (Dehaene, 2012; Coltheart, 2013).

The phonological route converts the graphemes into phonemes and a possible pronunciation is deducted. Then the word representation is accessed and meaning is achieved. Through the lexical route, the word and its meaning are immediately recognized and its pronunciation is recovered. Such route provides a direct connection to the word representation.

When words are rare or novel, and present regular orthography, we process them using a "phonological or nonlexical route", in which we first decipher the letter string, then convert it into pronunciation, and finally attempt to access the meaning of the sound pattern. Conversely, when we are confronted with words that are frequent or whose orthography are irregular, our reading takes a direct route that first recovers the identity and meaning of the word and then uses the lexical information to recover its pronunciation.

There has been a long debate on the distinct pathways to the identification of words. Some researchers argue that the phonological route is essential; while others claim that such pathway would be an initial stage, typical of the inexperienced reader. They believe that an expert reader would make use of the lexical route. It is now believed, however, that experienced readers make use of both routes automatically and in parallel. It is thus assumed that two information processing pathways coexist and supplement each other while we read (Dehaene, 2012; Coltheart, 2013).

4.2

The reading process

As mentioned above, reading integrates the dynamic operation of multiple processing domains. This skill demands lower-order processes, such as recognizing and decoding of orthographic symbols; matching these symbols to phonological representations; segmenting the syllables; synthesizing, blending and holding the phonemes in Working Memory; and recognizing words through lexical access. It also requires higher-reading skills, like conducting syntactic analysis (parsing) that enables sentences to be semantically interpreted; mapping referential units onto entities or events in the world; phrasing and organizing the text into meaningful units; and making use of contextual cues.

From a psycholinguistic perspective, it is possible to claim that the reading processing is developed, therefore, in some stages, which can be divided into two basic processes: the processing of the linguistic form and the processing of the meaning (Coscarelli, 2002). The first one is related to the lexical and to the syntactic processing, while the latter is associated to the construction of local, thematic and also external coherence.

In the lexical processing, the graphic symbols are recognized as words. Phonological, morphological, syntactic and semantic properties related to the words are thus activated within the mental lexicon. Some aspects can influence, positively or negatively, this stage, such as: the syllabic structure; the size of the word, as well as its frequency; and the probability of the word to be used in a specific syntactic, semantic and pragmatic context (Coscarelli, 2002; Coscarelli & Novais, 2010).

The resulting information is then used by other processing domains and one of them is related to the syntactic processing. This domain is responsible for constructing the syntactic representations of sentences. Canonicity and complexity of the sentence and syntactic ambiguity are some factors that can interfere on this stage. For experienced readers, the lexical and the syntactic processing tend to be automatic and unconscious (Coscarelli, 2002).

The semantic processing follows the processing of the linguistic form. At first, the meaning of sentences and relations between them are analyzed. After this local coherence, the thematic coherence is constructed. The reader associates the meaning of the sentences and larger semantic representations are constructed. The external coherence refers to the stage in which the reader makes use of his/her previous knowledge, makes inferences and interprets the text, considering its relevance. Several factors can affect the semantic processing, like: the familiarity of the reader with the subject of the text and with the textual genre; the maintenance of the topic; the organization of the text; semantic ambiguities; and the reader's previous knowledge and his/her ability to make analogies. According to Coscarelli (2002), these sub processes happen simultaneously.

4.3
Reading fluency

For a considerable time, the term "reading fluency" was only associated to word recognition speed and such aspect was not considered to be of great importance. Since the publication of the National Reading Panel (2000), however, many researchers have turned their attention to fluency in reading. This report reconceptualized this subject, highlighting new points related to it, such as the link between oral reading fluency and reading comprehension.

In spite of the fact that reading fluency has received considerable attention over the last decades, there is still not a consensual explanation for the different degrees of proficiency in reading. Some researchers, for instance, believe that readers with greater working memory capacity are able to store and process text information easily (Kintsch & van Dijk, 1978; Daneman and Carpenter, 1980; Daneman & Hannon, 2001). Other studies are focused on the fact that proficient readers have the ability to suppress irrelevant information (Gernsbacher 1997; Gernsbacher & Faust, 1991), while another line of research considers that fluency in reading is achieved when the reader gets to know more about reading strategies and uses this knowledge more efficiently (Wong, 1985; Ozuru, Dempsey & McNamara, 2009; McNamara & O'Reilly, 2010)

There are also different definitions for the term "reading fluency", but researchers seem to agree that there are three key-components related to it: accuracy in decoding; automaticity in word recognition; and appropriate use of prosody (National Reading Panel, 2000; Hudson, Lane & Pullen, 2005; Rasinski, 2006). Fluent readers are thus able to read texts easily, quickly and expressively without making much effort and with little difficulty comprehending the meaning of the text.

Word-reading accuracy is related to the ability to recognize or decode words correctly. Understanding the alphabetic principle, having the ability to blend sounds together and having a large vocabulary are important for this skill. Inaccurate word reading can influence reading fluency and comprehension and may lead to misinterpretations of the text (Hudson, Lane & Pullen, 2005).

Automaticity is the ability to perform an activity quickly, effortlessly, autonomously and without awareness (Logan, 1997). Word-recognition automaticity is, therefore, another aspect that is closely related to proficiency in reading. As suggested by LaBerge & Samuels (1974), since individuals have a limited capacity of attention and working memory in cognitive processing, word-recognition automaticity frees the processing space for higher order processes, leading to faster reading rates and more accurate comprehension. The following picture (Samuels, 1994, p. 1132) illustrates how differently beginning readers and fluent readers process texts, according to this perspective.

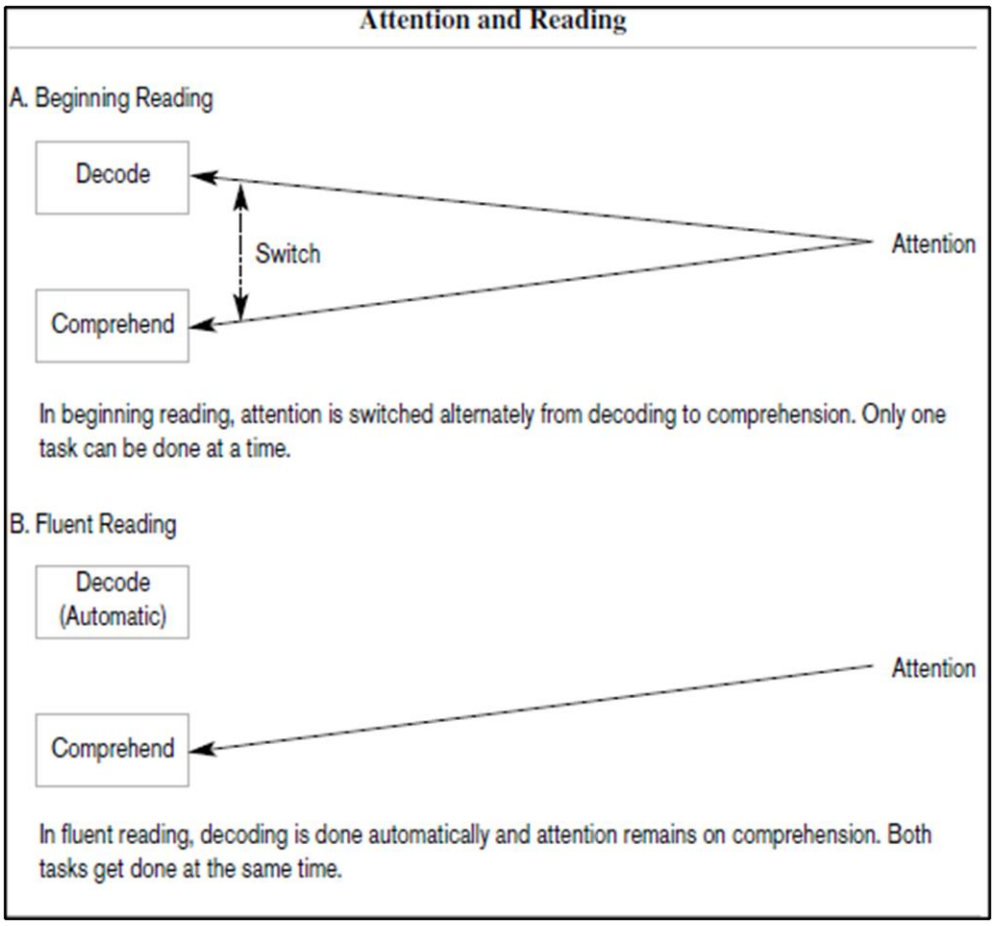

Figure 7: How beginning readers and fluent readers process texts (Samuels, 1994, p. 1132).

Some researchers point out that both lexical and post-lexical processes (i.e. processes beyond decoding) can be automatized and may play a relevant role in fluent reading and comprehension. Anema's study (2008) seems to support such hypothesis.

Prosody is another critical component of reading proficiency. This last dimension of fluency refers to the ability to read with appropriate expression, rhythm and intonation. It is, therefore, related to aspects such as: vocal pitch (fundamental frequency), loudness (acoustic intensity), rhythm (phoneme and syllable duration), and pauses (both intra and intersentential ones).

Many researchers have pointed out the strong correlation between fluency and comprehension. It is believed that each one of the dimensions of fluency has a clear connection to text comprehension. As observed by Hudson, Lane & Pullen (2005, p. 703):

> Without accurate word reading, the reader will have no access to the author's intended meaning, and inaccurate word reading can lead to misinterpretations of the text. Poor automaticity in word reading or slow, laborious movement through the text taxes the reader's capacity to construct an ongoing interpretation of the text. Poor prosody can lead to confusion through inappropriate or meaningless groupings of words or through inappropriate applications of expression.

Rasinski also pointed out the importance of prosody as well as the relation between this dimension of fluency and comprehension. According to him (2004, p. 1):

> If readers read quickly and accurately but with no expression in their voices, if they place equal emphasis on every word and have no sense of phrasing, and if they ignore most punctuation, blowing through periods and other markers that indicate pauses, then it is unlikely that they will fully understand the text.

There is still no complete understanding of the complex relation between these skills. Does prosody lead readers to achieve a better comprehension, or is it the opposite, that is, does comprehension help them read with a better prosody? It is not clear, therefore, whether fluency is a cause or a consequence of comprehension or whether this relation is reciprocal. Kuhn et al (2010, p. 237) observed that "directionality and causality between reading prosody and comprehension remain to be determined".

In oral reading, the three dimensions of fluency (accuracy, speed, and prosody) can be readily observed and we assume that prosody in oral reading can be informative of difficulties in the reading skill. But what happens in silent reading? Is there prosody in this kind of reading? Janet Fodor claims that even

during silent reading, readers project a prosodic contour. According to the Implicit Prosody Hypothesis proposed by Fodor (2002, p. 1), “even in reading, prosody is present. Even in silent reading, and even if prosody-marking punctuation is absent. Prosody is mentally projected by readers onto the written or printed word string”.

It is possible to notice that fluency is an essential skill that can be observed in all good readers. It must then be studied, so that different strategies to helping people with reading difficulties achieve a better proficiency in such ability.