2

Language Impairment

For some children, the development of language does not happen naturally, as in most cases. Linguistic limitations can lead to different kinds of difficulties, since they may affect children's cognitive, educational and social performances. It is extremely important, therefore, to understand the origin and the possible consequences of this kind of impairment, in order to contribute to the development of appropriate and effective methods of diagnosis and treatment (Leonard, 1998). However, this is not an easy task, considering that the resulting manifestations of language deficiencies are quite varied and may be associated with other disorders as well.

2.1

SLI (Specific Language Impairment)

Specific Language Impairment (SLI) is a developmental disorder that affects around 7% of the school-age children. It is characterized by significant language impairment whereas non-verbal cognitive abilities are preserved[1] (Leonard, 1998). Being so, the difficulties these children exhibit do not come from other neurological disorders, emotional problems, hearing and articulation deficiencies, social deprivation, or non-verbal cognition below the expected range.

There is evidence suggesting a possible genetic origin (The SLI Consortium, 2002; Bishop, 2006). However, the etiology of this syndrome is not well known yet. The diagnosis of SLI is, therefore, mostly based on exclusion criteria. That is, it is possible to assume that a child has SLI, when she/he does not show any problems external to the linguistic domain, such as those mentioned above, which could be affecting her/his linguistic development. It is also possible, however, to make use of an inclusion criterion, which is characterized by the use

[1] It is known, however, that memory deficiencies and attention difficulties may also be affected. Although the cognitive abilities are not below the standard pattern, they may be close to the typicality threshold.

of standardized tests of language ability, to identify the affected areas (Leonard, 1998).

Some problems are commonly observed in these children's linguistic production, such as deficiencies in inflectional morphology; omission of functional items; limited vocabulary; and difficulties with some syntactic structures, especially with passive sentences, relative clauses and WH- questions (Leonard, 1998; Bishop, 2001; Silveira, 2002; Martins, 2007). Despite that, the group of children with SLI is not homogeneous, given that the manifestations of this syndrome are quite diverse and can vary on the modalities of linguistic performance (production, comprehension, or both), as well as on the type of category or on the linguistic domain affected (Leonard, 1998; Friedmann & Novogrodsky, 2008).

Because of its multifaceted nature, SLI has been analyzed with regard to the possibility of existing selective deficits in several modules of language (Friedmann & Novogrodsky, 2008). Thus, considering the many levels of language analysis as possible *loci* of such syndrome, different subgroups of SLI can be characterized, whose manifestations may or may not be concomitant (Corrêa & Augusto, 2011). According to this perspective, it would be possible to consider different types of this syndrome (syntactic-SLI, lexical-SLI, phonological-SLI and pragmatic-SLI) (Friedmann & Novogrodsky, 2008).

SLI has arisen the interest of scholars from various fields, especially of Cognitive Sciences researchers, who believe that this syndrome can help comprehending the relationship between language and other cognitive domains. Because it is a "specific" language disorder, this deficit can be taken as evidence for a modular conception of the mind (Fodor, 1983). Additionally, selective impairment within the linguistic domain suggests a more finely grained modular specialization, which may depend on brain specific resources. Being so, the study of SLI can enable the identification of those aspects of language which may be considered autonomous in relation to other cognitive domains and the examination of the syntactic operations or lexical features that may be specifically impaired (Martins, 2007). A better understanding of this syndrome may also lead to the development of appropriate diagnosis methods and may, therefore, provide effective assistance to these children.

Several hypotheses have been formulated to account for the SLI manifestations in different languages. They diverge in relation to the nature of the problem – whether it would be due to a defective grammar; whether it can be ascribed to impairment in particular perceptual or cognitive processes and resources recruited in the processing of the linguistic stimuli in the course of language acquisition or in particular conditions (Jakubowicz, 2006; Martins, 2007). Two groups of hypotheses can then be identified: one group claims that SLI is caused by a limited processing capacity (Leonard, 1998; Tallal *et al.* 1996; Jakubowicz, 2006 and reference therein); while the other one considers that it actually results from a deficiency in the grammatical mechanism which underlies the linguistic performance (Jakubowicz, 2006 and reference therein).

In a more integrative perspective, Corrêa & Augusto (2011) have identified a number of possible *loci* for SLI, by considering the process whereby children extract grammatically relevant information from the linguistic stimuli in the process of identifying a grammar and the process whereby the relevant linguistic knowledge (lexical features) is accessed in production and comprehension tasks.

In the light of Corrêa (2006; 2012) and Corrêa & Augusto (2011, 2013), this dissertation considers that, in order to understand the manifestations and the causes of SLI, it is necessary to adopt a theoretical approach that integrates the psycholinguistic studies about language processing and the claims of the Minimalist Program of the Generative Linguistics.

The Integrated Model of Online Computation (MINC), developed by Corrêa and Augusto (2007), incorporates the formal mechanisms of a universal computational system, as stated in the Minimalist Program, in order to characterize the procedures involved in online comprehension and production (Corrêa & Augusto, 2009, p.52).

As discussed in chapter 3, this perspective enables the characterization of processing cost in relation to the generation of different language structures. Thus it would be possible to make predictions about the level of difficulty implied by these structures.

2.2

Dyslexia

Developmental dyslexia (henceforth, dyslexia) is a specific learning disability that is estimated to affect from 3 to 20% of people all over the world. Although a large amount of studies on dyslexia has been developed over the last decades, it remains a controversial subject in the educational, psychological and neurological areas, since there is no agreement on its definition, causes or effects.

It is widely accepted, however, that dyslexia is a common developmental disorder that may have a neurobiological origin and a hereditary component (Snowling, 2001a; Snowling, 2001b; Shaywitz & Shaywitz, 2005). Besides genetic factors, studies have been suggesting that environmental aspects, such as the family's socioeconomic backgrounds and the parents' educational level, may also contribute to dyslexia (Thambirajah, 2010a; Snowling & Hulme, 2013).

According to the International Dyslexia Association (the IDA), dyslexia is characterized by low spelling and decoding skills and by difficulties with accurate and/or fluent word recognition (Lyon et al, 2003). Children with this reading disability exhibit poor literacy abilities in spite of having adequate intelligence, normal hearing, educational opportunity and no major handicapping condition that might interfere with learning.

Phonological processing deficits have been considered to be core deficits in this disorder (Thambirajah, 2010a; Dehaene, 2012; Snowling & Hulme, 2013). This deficiency affects the development of phonological representations which, consequently, causes problems related to both phonological memory and phonological awareness[2]. Thus, many dyslexic children have difficulty in categorizing speech sounds and associating them to orthography, as well as in generalizing this knowledge. In addition to that, typical symptoms also include problems in verbal short-term and working memory, poor spelling and naming abilities, problems in nonword reading and repetition, and slow rate of literacy development[3] (Snowling, 2001a; Bishop & Snowling, 2004; Catts et al, 2005).

[2] Phonological awareness is related to the ability to identify and manipulate the phonological structure of the language.

[3] It is relevant to note that not all dyslexics will exhibit all these mentioned difficulties, since such characteristics can vary from one person to another.

Although the central problem in dyslexia is at the word level, this difficulty can lead to secondary consequences which may include poor vocabulary, impaired reading fluency and deficient reading comprehension (Lyons et al, 2003; Thambirajah, 2010a). Comorbidity with other disorders is also considerable and children with symptoms of dyslexia may present difficulties concerning other language domains, such as the semantic and syntactic ones (Catts et al, 2005; Thambirajah, 2010a).

Dyslexia is, thus, a heterogeneous disorder and the profile of dyslexic children varies according to the severity of the condition as well as to related deficits. (Thambirajah, 2010a, p 301-302). Since it is not an all-or-nothing phenomenon, it is possible to understand dyslexia in a dimensional approach where it may be considered as the lower extreme of reading abilities in the general population (Shaywitz & Shaywitz, 2005; Thambirajah, 2010a, p 304).

Despite the fact that dyslexic readers improve their reading ability over time, slow and labored reading may still be observed in adolescents and adults with this disorder. They develop compensatory strategies in order to overcome their difficulties, but there is still a gap between them and unimpaired readers, mainly in spelling and reading speed (Thambirajah, 2010b, p 384).

Early difficulties in reading may be indicative of later reading problems. Early identification and adequate early intervention strategies are, therefore, really important to improving the literacy skills of at risk or dyslexic readers.

2.3

The overlap between SLI and dyslexia

As mentioned above, SLI and dyslexia are developmental disorders that affect a sizeable number of school-aged children (~7–10%) and that can have a considerable impact on their educational and cognitive development, as well as on their social skills.

Oral language development is closely related to the process of reading achievement. Children with specific language impairments are, therefore, at-risk readers, since they may face considerable difficulty when learning to read (Catts et al, 2008).

SLI is primarily related to difficulties in the development of oral language and can include problems in the various linguistic subdomains (semantics, pragmatics, phonological and syntax); while dyslexia is usually characterized by disabilities in phonological processing and in word reading. Although, at first glance, they seem to be two completely distinct disorders, when analyzed more closely, it is possible to notice that the association between them is closer than expected.

These developmental disorders may exhibit considerable comorbidity and overlapping manifestations. On one hand, some dyslexic children also have difficulties in semantics, syntax and pragmatics; and, on the other hand, some SLI children may show deficits in the phonological processing and subsequent reading impairment (Botting et al, 2006). However, problems in phonological processing are the main characteristics in dyslexia, while in SLI they do not seem to be main factors. Some studies have suggested, then, that it is more appropriate considering SLI and dyslexia as distinct, but potentially comorbid disorders, since overlaps are not always observed (Bishop and Snowling, 2004; Catts et al, 2005, Ramus et al, 2013).

In order to reduce the longterm effects SLI and dyslexia may cause, early detection and appropriate intervention are considerably important.

2.4

SLI and reading fluency

Researches have indicated that many children with SLI also present other associated difficulties as they grow up, such as social and behavioral difficulties, as well as non-verbal cognitive impairments. Another associated difficulty, however, is that of reading disabilities (Botting et al, 2006).

The ability to read accurately and fluently is a valued skill in all educated society. Although most children learn to read with no great difficulty, for some children, this process does not happen so easily. Approximately 10% of children exhibit significant difficulty acquiring proficient reading skills (Catts & Hogan, 2003) and a deficit in this area may cause them different consequences. It is likely

to lead to a wider disruption to learning and it may even have a long-term impact on their educational development.

Many studies support language deficits as a proximal cause of reading disabilities. Catts & Hogan (2003, p. 225) explained that:

> language problems themselves can be related to factors further down the causal chain, such as genetic or neurological abnormalities, which may have effects that go beyond language difficulties. However, current research suggests that in most cases it is the language deficits, and not these other effects, that have the most direct impact on learning to read.

Learning to read is closely related to early language skills, as well as to oral language development, and thus, language impairments can hamper such process. Studies have presented evidence for a relationship between impaired language development and reading difficulties (Bishop & Adams, 1990). They have suggested that some children with specific language impairment have poor literacy skills and show significant problems when they are learning to read (Bishop & Adams, 1990; Botting et al, 2006; Catts et al, 2002; Catts et al, 2008).

Botting et al (2006) also observed a possible relationship between SLI and reading difficulties. Their study indicated that 11-year-old children with SLI demonstrate significant reading problems. According to them, their research "suggest that poor structural knowledge of language (…) are important risk factors when identifying poor readers from the population of children with SLI at 11 years of age" (Botting et al, 2006, p. 95).

Although many studies have documented the relationship between language impairments (both specific and non-specific language impairments) and reading difficulties, the nature of this association is not clear yet.

As literacy problems may have a potential impact on one's life, it is highly important that effective programs for the early identification and treatment of reading disabilities are conducted. The early identification of children at high risk for failure in reading achievement is essential to avoid the long-term consequences that might arise from this problem.

This dissertation intends, therefore, to explore the possible relationship between language problems, more specifically impairment in the syntactic domain, and reading abilities – at the word level, for a possible overlap with dyslexia, -- and at the sentence and the discourse levels, in which reading fluency

is addressed. The oral production of SLI children was examined in relation to their reading skills.