Original Article

Artigo Original

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Comprehension of ambiguity for children with Specific Language Impairment and Autism Spectrum Disorder

Compreensão de ambiguidade em crianças com Transtorno Específico de Linguagem e Fala e Transtorno do Espectro Autista

ABSTRACT

Purpose: To verify and compare the performance of children and adolescents with Specific Language Impairment (SLI) and Autism Spectrum Disorder (ASD) using a formal, standardized test that assesses language competence, more specifically comprehension of ambiguity. **Methods:** The sample comprised 19 individuals aged 6 to 14 years, of both genders, divided into two groups: ASD Group (9) and SLI Group (10). Participants were assessed using the Test of Language Competence – TLC; Ambiguous Sentences subtest (Wiig, Secord, 1989). Analysis included the comparison of the total scores in both groups. **Results:** We found significant difference between the groups, with better performance of the SLI Group compared with that of the ASD Group. **Conclusion:** It was possible to analyze and compare the performance of both groups in a metalinguistic activity. We observed better performance of the SLI group compared with that of the ASD Group in the interpretation of ambiguous information.

RESUMO

Objetivo: Verificar e comparar o desempenho de crianças e adolescentes com Transtorno Específico de Linguagem e Fala (TEL) e Transtorno do Espectro Autista (TEA) em teste formal e padronizado que avalia a competência de linguagem, especificamente em prova de ambiguidade. **Método:** A amostra foi constituída por 19 indivíduos, de 6 a 14 anos, de ambos os gêneros, divididos em dois grupos: Grupo TEA (9) e Grupo TEL (10). Utilizamos a prova de Sentenças Ambíguas do Teste de Competência de Linguagem – TLC (Wiig, Secord, 1989). Para a análise, foram comparadas as pontuações totais dos grupos. **Resultados:** Houve diferença significativa com melhor desempenho do grupo TEL em comparação ao grupo TEA. **Conclusão:** Foi possível analisar e comparar a *performance* dos grupos em atividade metalinguística e verificar melhor desempenho do grupo Transtorno Específico de Linguagem e Fala em relação ao Transtorno do Espectro Autista, na interpretação de informações ambíguas.

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INTRODUCTION

Phonetic, phonological, semantic, lexical, morphosyntactic and pragmatic linguistic abilities are fundamental for the language development of children. These skills are enhanced throughout the development process of children until adult life. Subsequently, there is an increase in the ability to understand and use words of multiple meanings, figurative language, and inference of implicit content[1,2].

These abilities, called metalanguage, are of great importance for proper verbal, academic and social performance and they also interfere in areas such as cognition, affectivity, and creativity. Metalinguistics can be understood as the ability to think about language as an object of study of conscious manipulation of the aspects that surround it[3].

Changes in these metalinguistic competencies may be manifested in a number of conditions that affect child development, such Specific Language Impairment (SLI) and Autistic Spectrum Disorder (ASD). SLI and ASD are two developmental disorders often characterized by compromised verbal reception and/or expression.

Language impairment occurs in the presence of compromised understanding and/or use of speech, writing, and/or other symbolic systems. This disorder may involve the form (phonology, morphology, and syntax), content (semantics), and/or function of language in communication (pragmatics)[4].

According to the World Health Organization (WHO: Organização Mundial de Saúde)[5], in its International Classification of Diseases - ICD 10, Specific Developmental Disorders of Speech and Language, herein simplified as Specific Language Impairment (SLI), occur when the normal modules of language acquisition are compromised from the earliest stages of development. They are essentially determined by poor performance in formal, standardized tests of receptive and expressive language and are based on the absence of physical, sensory, motor and/or intellectual changes. They may be accompanied by disturbance of interpersonal relationships and emotional and behavioral disorders. There is broad heterogeneity of profiles and no etiological generalization for all cases, which can vary in level of severity. Still, it is possible to identify problems in the reception and emission of oral language in most of them[6].

In Autistic Spectrum Disorder (ASD), the pragmatic inability is associated with the basic failures of shared attention and recognition of the other's intentions[7]. It is a neurodevelopmental disorder characterized by deficits in communication (verbal and nonverbal), social reciprocity, and patterns of restricted, repetitive interests and behaviors. Motor stereotypies and production of echolalic speech (with and without functionality), rigid adherence to routine, and hypo- and/or hypersensitivity to sensory stimuli may occur[5,8-10]. Symptoms are present from early childhood and all these factors result in a pragmatic inadequacy that persists into adulthood. Although it comprises a very heterogeneous population, it is possible to determine the degree of severity and compare the different profiles of these individuals[11].

Studies have confirmed that high-functioning autists fail to interpret metaphorical stimuli, idioms, humorous or sarcastic comments, and do not understand nonverbal cues in the course of a conversation[12-15].

Several authors[6,16-18] have investigated and described the importance of comparing SLI and ASD in their different aspects with respect to social-cognitive, psychosocial and communication skills.

It is believed that pragmatic impairment in children with ASD is more relevant because of both inadequacy of social interaction and impairments of verbal and nonverbal communication (in the absence of recognition of the other and of shared attention) compared with the performance of children with semantic-pragmatic failures and diagnosed with SLI.

Therefore, the hypothesis of this study is that although there are language impairments in both conditions, they are more pronounced in ASD. The objective of this study was to verify and compare the performance of children and adolescents with Specific Language Disorder and Autism Spectrum Disorder using a formal, standardized test that assesses language competence, more specifically comprehension of ambiguity.

METHODS

This is a case-control study (UNIFESP; Code of Professional Ethics no. 1382/10).

All parents and/or participants were informed of the methodological procedures of the study and signed an Informed Consent Form (ICF) as suggested by the Research Ethics Committee of the aforementioned institution.

Sample

The study sample comprised 19 individuals aged 6 to 14 years, of both genders, divided into two groups:

SLI Group: composed of 10 individuals with Specific Language Impairment (SLI), five females and five males, with mean age of 8 years and 7 months, diagnosed and cared at the Children's Speech and Language Therapy Clinic.

ASD Group: composed of nine individuals with Autism Spectrum Disorder (ASD), all males, with mean age of 11 years and 5 months, diagnosed by a multidisciplinary team and cared at the Research Center for Child Speech-language Pathology and Audiology - Autism Spectrum Disorder.

All individuals of both groups presented audiological and motor development results within the parameters of normality. All participants were regularly enrolled in elementary or junior high schools.

Psychological evaluation conducted through the application of the Stanford-Binet Intelligence Scale registered intelligence quotient (IQ) $\geq$ 90 in the children of the SLI group and between 60 and 70 in the children of the ASD group[19,20].

For both study groups, inclusion criteria comprised multidisciplinary diagnosis and age range, whereas exclusion criteria included presence of comorbidities such as motor, visual, physical and/or hearing impairment.

Procedures

The Ambiguous Sentences subtest of the Test of Language Competence (TLC) was used to assess the comprehension of ambiguity of study participants[21,22].

The test consists of thirteen items that involve the recognition and interpretation of different lexical meanings in an ambiguous sentence. At test level 1 (indicated for children aged 5 to 9 years), participants must choose the two correct options that identify the double-meaning from the four images presented. At test level 2 (indicated for children over 9 years old), from a given sentence, participants must provide two explanations for the meaning of the ambiguous sentence.

In this study, the score in each assessment was obtained according to the original test proposal, e.g.:

TLC Level 1: The researcher says the sentence: "*A pasta está no armário*" (the word "*pasta*" is a homonym - homophone and homograph - in Portuguese) "The folder/paste is in the cabinet". Participants must choose the two correct options from the four figures presented: toothpaste and school folder.

TLC Level 2: The researcher says the sentence: "*Tina derrubou todo o leite na manga*" (the word "*manga*" is a homonym - homophone and homograph - in Portuguese) "Tina has spilled milk on the mango/sleeve". Participants must provide two explanations for the meaning of the sentence: spilled milk on the fruit and spilled milk on the shirt sleeve.

For data analysis, the scores of the individuals of both groups were compared according to the total gross score.

Data analysis

The non-parametric Mann-Whitney test was used for data analysis. This test is indicated for comparison of two groups of information with numerical level of measurement and when samples are independent and no assumptions are made about their analysis. A level of significance of 5% was considered for all analyses.

RESULTS

Performance results were presented in the Scoring Table in the subtest of Ambiguous Sentences of the groups with Autism Spectrum Disorder (ASD) and Specific Language Impairment (SLI) (Table 1).

Statistically significant difference was observed between the two groups regarding the test scores, evidencing that individuals of the SLI group presented, on average, a larger number of correct answers in the identification of ambiguity. According

Table 1. Scores in the Test of Language Competence, subtest of Ambiguous Sentences for the ASD and SLI groups

Statistical Analysis	ASD	SLI	Mann-Whitney (p)
Mean	16.56	26.80	
Standard Deviation	8.20	6.32	0.010*
Sample Size	9	10	

*5% significance level (p)

to the data analysis, the table shows the values of the standard deviation considering sample size.

Graphic 1 shows the confidence interval for the mean of each group, mean ± 1.96 × standard deviation / √ (n-1). The values for each group were as follows: ASD group (mean of 16.56) and SLI group (mean of 26.80).

DISCUSSION

The objective of the present study was to verify and compare the performance of children and adolescents with Specific Language Impairment (SLI) and Autism Spectrum Disorder (ASD) using a formal, standardized test that assesses language competence, more specifically comprehension of ambiguity.

Although there is consensus that there are losses in the identification and interpretation of non-literal situations in both conditions, the hypothesis herein considered is that this ability is less efficient ASD. Such assumption is supported by the presence of a deficit in social cognition associated with primary language impairments.

The specific literature has described that both individuals with SLI and with ASD present difficulties in integrating linguistic information in the resolution of double-meaning messages[12]. These difficulties in interpreting lexical ambiguity may arise in part from the deficits in semantic knowledge and sentence processing. In addition, they may also reflect deficiency in the abilities of memory and attention required to develop mental representations of verbal stimuli.

According to the results obtained, participants of the SLI group showed greater recognition of the ambiguous lexical contents presented in the assessment compared with that of participants of the ASD group.

It is possible to state that individuals of the ASD group presented greater difficulty in interpreting information because of the primary failures inherent to this condition, such as impairment in eye contact, shared attention, recognition, and attribution of mental states to the interlocutors. Such disabilities may have influenced their understanding of ambiguous contexts, considering
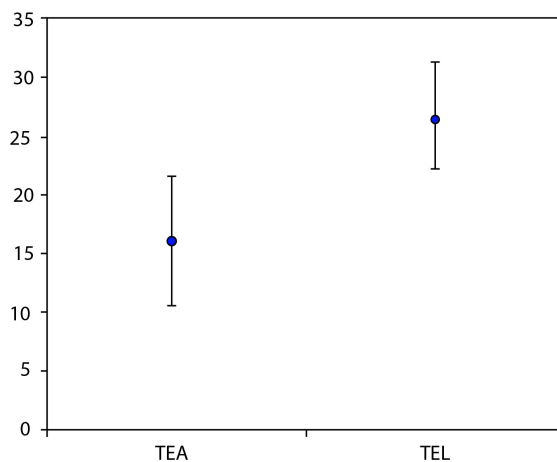
Caption: Confidence interval for the mean: mean ± 1.96 x standard deviation / √ (n-1)
Graphic 1. Ambiguous sentences - Confidence interval (CI) for the mean

that autistic individuals tend to have a literal interpretation, without realizing inferences.

Therefore, these failures entail the incomprehension of metaphors, ironies, and puns, which require metalinguistic and pragmatic skills.

Furthermore, a study[23] investigated the ability to identify ambiguous lexical contents of individuals separated into four distinct groups: Language Impairment(LI), Autism Spectrum Disorder (with language impairment, ALI), Autism Spectrum Disorder (with verbal ability within the normal range, ASO) and Typical Development (TD). In terms of test accuracy, the two groups without language impairment (ASO and TD) showed greater familiarity with ambiguous words compared with the LI and ALI groups. According to the authors, the results revealed poorer vocabulary levels in the two latter groups. There was also a longer latency time for response and fewer benefits were observed when the individuals were exposed to contextual facilitation. The authors hypothesized that these findings may result from failures in the central coherence theory.

In these individuals, the central coherence theory refers to a tendency towards information processing focused on details, and when double-meaning context is considered, probably there are losses in the detection of nonverbal cues that could indicate the real meaning of a message.

Other researchers have described that autists present inability to understand metalinguistic tricks and maneuvers that compose and enrich language and that they also lack the ability to plan and make changes in their own actions in face of an unexpected or unknown context[1,7,24,25].

Regarding Specific Language Impairment, studies refer to the inability to structure language and its phonological, syntactic and semantic subsystems, with less emphasis on pragmatics, whose alteration must be caused by a deficient linguistic basis and, therefore, is considered as a secondary flaw[6,26]. The acquisition of language in children with SLI can occur in an atypical, slow and hierarchical way, starting with the semantic class of concrete representation nouns, which is the most easily acquired grammatical category[27-29].

We believe that failure to understand double-meaning stimuli arises from altered lexical access, memory impairment, reduced vocabulary inventory, and linguistic impairment that will result in non-perception of language variability, that is, the understanding that words that have the same sound may have different meanings associated with a specific context.

In addition to the previously mentioned reasons to justify the better results presented by the SLI group in the recognition of ambiguity, the differences in the intellectual performance between the groups should be considered. As observed, the ASD group obtained indices below average in the intelligence scale, whereas the SLI group showed indices within the normal range. These data confirm the influence and impact of cognitive aspects in the process of language acquisition and development.

In conclusion, we believe that studying the perception of ambiguity in individuals with Specific Language Impairment and Autism Spectrum Disorder is of fundamental importance, because this ability will influence the social insertion of these individuals in communicative and conversational media in their personal, academic, or professional lives.

We believe that studies comparing the performance of individuals in tasks of metalinguistic abilities pre- and post-speech-language pathology intervention are also promising to provide data to improve clinical practice and to better understand the linguistic and cognitive abilities of these individuals.

CONCLUSION

It was possible to analyze and compare the performance of both groups in a metalinguistic activity. Better performance of the Specific Language Impairment group (SLI) compared with that of the Autistic Spectrum Disorder group (ASD) was observed in the interpretation of ambiguous information.

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Author contributions

MKI was responsible for the collection and classification of data, literature search for discussion, and writing of the manuscript; ACT contributed with the collection, classification and analysis of data, and was responsible for the study design and writing of the manuscript; JP contributed with data analysis and was the study adviser. The present study has received no financial support and the authors declare no conflicts of interest.