

Language assessment instrument from the perspective of AAC: application among children with ASD

Instrumento de avaliação de linguagem
na perspectiva da CSA: aplicação
em crianças com TEA

Instrumento de Evaluación de Lenguaje
en la perspectiva de la CSA: aplicación
en niñas y niños con TEA

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Abstract

Introduction: There has been a considerable increase in the number of children diagnosed with Autism Spectrum Disorder and, since this group of people has a high chance of showing complex communication needs, the speech-language pathology intervention with Augmentative and Alternative Communication is essential. **Objective:** This research aims to analyze the use of a language assessment instrument through the perspective of Augmentative and Alternative Communication among children with autism spectrum disorders. **Method:** Application of the *CSA_Linguagem* instrument among children diagnosed with Autism Spectrum Disorder in situations of interaction using Augmentative and Alternative Communication graphic symbols. **Results:** the instrument allowed the researcher to observe the way each child communicates and showed how Augmentative and Alternative Communication may have positive effects on communication. **Conclusion:** The *CSA_Linguagem* instrument is easy to apply and has a low operating cost. Additionally, it allowed the researcher to determine the subjects' profile regarding the use of graphic symbols as communicative effects.

Keywords: Autism Spectrum Disorder; Evaluation Study; Nonverbal Communication; Communication Aids for Disabled.

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LMGW: responsible for study design, methodology, data collection, article draft.

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Resumo

Introdução: Há um aumento considerável do número de crianças diagnosticadas com Transtorno do Espectro do Autismo e tendo essa população grandes chances de apresentar necessidades complexas de comunicação, a intervenção fonoaudiológica com a Comunicação Suplementar e Alternativa deve ser considerada. **Objetivo:** Esta pesquisa se propõe a analisar a aplicação de um instrumento de avaliação de linguagem na perspectiva da comunicação suplementar e alternativa em crianças com transtornos do espectro do autismo. **Método:** Aplicação do instrumento CSA_Linguagem em crianças com diagnóstico de Transtorno do Espectro do Autismo, em situações de interação com a utilização de símbolos gráficos da Comunicação Suplementar e Alternativa. **Resultados:** Foi possível observar a forma de comunicação eleita pela criança e a possibilidade de efeitos positivos na comunicação com o uso da Comunicação Suplementar e Alternativa. **Conclusão:** O instrumento se mostrou operacional, de fácil aplicação e baixo custo; e possibilitou o delineamento do perfil dos sujeitos avaliados quanto à utilização de símbolos gráficos para efeitos de comunicação.

Palavras-chave: Transtorno do Espectro Autista; Estudos de Avaliação; Comunicação Não Verbal; Auxiliares de Comunicação para Pessoas com Deficiência.

Resumen

Introducción: Hay un aumento considerable en el número de niñas y niños con diagnósticos de Trastorno del Espectro del Autismo y teniendo esta población grandes posibilidades de presentar necesidades complejas de comunicación, la intervención fonoaudiológica en la Comunicación Suplementar y Alternativa debe ser considerada importante. **Objetivo:** Esta investigación se propone a analizar la aplicación de un instrumento de evaluación de lenguaje en la perspectiva de la comunicación suplementar y alternativa en las niñas y niños con trastornos del espectro del autismo. **Método:** Aplicación del instrumento CSA Lenguaje en las niñas y niños con diagnósticos de Trastorno del Espectro del Autismo, en situaciones de interacción con la utilización de símbolos gráficos de la Comunicación Suplementar y Alternativa y análisis por medio de grabaciones de vídeo. **Resultados:** Ha sido observada la forma de comunicación elegida por la niña, o por el niño, y la posibilidad de efectos positivos en la comunicación con el uso de la Comunicación Suplementar y Alternativa. **Conclusión:** El instrumento se ha mostrado operacional, de fácil aplicación y bajo costo; y ha posibilitado el delineamento del perfil de los sujetos evaluados en relación con la utilización de símbolos gráficos para efectos de comunicación.

Palabras clave: Trastorno del Espectro Autista; Estudio de Evaluación; Comunicación No Verbal; Auxiliares de Comunicación para Persona con Discapacidad.

Introduction

Research has pointed out an increase in the population of children diagnosed with Autism Spectrum Disorder (ASD); its incidence rate is estimated at 1.5% in developed countries¹. According to the Center for Disease Control and Prevention (CDC), in 2000 one in 150 children was diagnosed with ASD in the United States. In 2012, that number had increased to one in 68 children². In Brazil, studies have found a prevalence of 1:360, but this number is an underestimation, and further studies are needed involving a larger sample³. This increase in ASD prevalence makes it the most frequent neurologic development disorder, causing great public

health concern⁴, which is why it is so important to investigate new therapeutic interventions for these patients⁵⁻⁷. Research is intensifying, but further studies of descriptive and exploratory nature are needed, as this is a complex issue⁷.

Individuals with ASD are likely to have complex communication needs, as these indicate difficulties which are somehow associated with communication and language, even though the specific symptoms vary greatly^{7,8}. These children's communication, which may even be verbal, though limited, unsettles family members from an early stage, leading them to look for a speech therapist⁷, who then needs instruments to assess and develop a therapeutic project^{9,10}.

Thus, speech-language pathology assessment and treatment of people with ASD are critical research areas, due to the high prevalence of cases and the fact that this population has complex communication needs, which encourages researchers to investigate the benefits of using the Augmentative and Alternative Communication (AAC) in these cases^{6,11-13}.

Despite their long history, studies aimed at investigating strategies for using AAC, as well as publications documenting this research, are much more recent and still scarce. The use of Augmentative and Alternative Communication in the speech-language pathology practice has increased in recent years, but still requires further research to provide scientific evidence^{13,14}.

Following the same trend, studies focusing on AAC aiming at designing specific instruments to assess individuals with complex communication needs are also few, but there has been a slight increase in international publications in recent years¹⁵.

One study¹⁶ that used AAC in children with cerebral palsy had the aim of proposing a protocol for assessing the communication of these individuals, focusing on the means, the communicative acts, and the adjacent pairs in observational contexts.

However, there are few Brazilian¹³ and international studies investigating AAC as a therapeutic resource specifically for children with ASD. In addition, in the articles reviewed there is a predominance of experimental and quasi-experimental designs^{14,17}, with theoretical and methodological limitations, namely: the different characteristics of individuals with ASD, the heterogeneity of intervention programs, and the inadequate direction of proposed studies¹⁷ in relation to the research questions.

This scenario justifies the development of assessment instruments; consequently, a language assessment instrument (*CSA_Linguagem*) was developed in a previous study¹⁸, and, following up on that proposal, the present study focuses on the application of this instrument among a group of children with ASD, aiming to investigate its potential use by speech therapists when assessing language.

The *CSA_Linguagem* instrument proposes to assess language by exploring the use of AAC to mediate and support communicative interaction, considering the use of graphic symbols as a com-

municative resource within a dialogic context starting from playful activities to evaluate the subject's communication possibilities.

The purpose of this study was to analyze the application of this assessment instrument when evaluating language within the scope of Augmentative and Alternative Communication (AAC) among children with Autism Spectrum Disorder (ASD), to investigate the possibility of using graphic symbols as a communicative strategy when evaluating children with complex communication needs, thus promoting a discussion about the necessary adjustments to be made in conversational situations that could be guided by an AAC system for use in communication.

Method

Ethics

The present study has been approved by the Ethics Committee under number 1.227.183, in accordance with the rules of ethics established for research with human participants. The parents of, or persons responsible for, the participants in this study agreed with and signed an informed consent to their participation in the research. All identities have been preserved.

Participants and Criteria

Thirty-two children were selected (by convenience), ranging from 2 to 6 years of age, of whom 24 were males and 8 were females, who went to regular school, except for one child, who did not go to school. These children had not had any prior experience with AAC.

Inclusion criteria: signature, by the children's parents or persons responsible, of the informed consent; ages from 2 to 6; a diagnosis of ASD according to the DSM-V; children presenting with complex communication needs, according to information provided by professionals of the institutions where the research was conducted.

Exclusion criteria: children with a diagnosis or obvious signs of neurological impairment, malformations, genetic syndromes, hearing and/or visual impairments.

Data collection was carried out between July and November 2016, at the psychosocial support centers for children (*Centros de Atendimento Psicossocial Infantil - CAPSi*) of two different cities,

at the Municipal Health Department of a third city (in four public schools), and at a private clinic.

Procedures

Initially, the researcher contacted the persons responsible for the institutions where the study was to be conducted to present the project and opinions on the feasibility of the research; after that, meetings were held with the institutions' teams to answer questions, obtain the authorizations, and begin developing the project.

The *CSA_Linguagem*¹⁸ instrument was applied by the researcher in a room reserved by the institutions for that purpose.

The *CSA_Linguagem* instrument:

The *CSA_Linguagem* instrument had been developed in a previous study¹⁸, which presents a brief introduction of the purpose of the assessment and the guidelines suggested for application of the instrument (the venue, the proposed duration, the context of the activity, the material, and the possible responses). The instrument consists of 16 questions divided into four axes, with practical examples in each question. The responses were classified into "No", "Sometimes", "Yes", and observations (Attachment 1).

The material used in that study was composed of 12 printed and laminated cards containing symbols of the PCS system (Picture Communication Symbols), using the aided technique, i.e., low-tech thematic communication boards. The cards were broken down into three themes (music, animals and means of transportation), with four graphic designs/symbols in each theme. These themes and graphic symbols are only suggestions, and may be changed to suit the therapist's evaluation, taking into account the system's availability, and social and cultural meanings¹⁸.

Application procedures:

The researcher (R) was alone with the child in a room reserved by the institution for this purpose, according to the guidelines for application of the instrument¹⁸. A recording of up to 10 minutes was made for later analysis. The duration of the intervention was determined based on the evaluator's experience, but it might be determined by the child's attention span. In this study, a few of the children were unable to remain in the room for that

amount of time, in which cases the time spent with them was mentioned in the results.

When applying the instrument, the researcher sought interaction, relying on the AAC graphic symbols as a springboard to facilitate dialogue. The researcher constantly ascribed meaning to the child's vocalizations and actions, beyond mere metalinguistic activities, such as naming or repetition¹⁹.

The researcher interacted freely with the child, with the aim of establishing verbal and nonverbal communication within a playful scenario. She presented the three graphic symbol blocks (one theme at a time), i.e., three interactional contexts, acted out in playful situations, made comments, and asked questions about them while presenting the symbols as an aid to interpret the communicative behaviors, for example: "Look! An apple! Ah, I love apples!" "A train! Choo-choo!" "What a cute piggy!" "Let's sing a song?", pointing to and/or sticking the graphic symbol on a board with Velcro, always aiming at establishing dialogues and waiting for some reaction from the child, such as possible responses.

The entire assessment was recorded by a fixed camera, occasionally moved by the researcher if necessary. The effects the cards (graphic symbols) had on the children's behavior were written down as responses guided by the instrument, whereby only one alternative was ticked for each item assessed, and any observations associated with each item were recorded. Whenever possible, the researcher tried to write down the responses and observations during application of the instrument, but in the cases when that was not possible, she wrote down the responses and observations at a later time, after viewing the recordings.

Once the assessments had been made, the professionals (speech therapists, psychologists and/or teachers) of the institutions involved in the study asked to participate in the feedback given to the children's parents. This meeting was held with the purpose of reporting relevant information gathered during the procedure, thus contributing with reflections about strategies that may be adopted in potential subsequent interventions.

Data analysis

Data were initially analyzed by means of absolute and relative frequencies, measures of central

tendency (mean and median), and dispersion (standard deviation, minimum and maximum values).

To determine the index, values of 0, 1, and 2 were assigned for the responses “No”, “Sometimes”, and “Yes”, respectively. In the analyses with quantitative variables, first normal distribution was determined by the Komolgorov-Smirnov test. The t-Student parametric test was applied to compare the variables analyzed, and, in the correlation analysis, the Pearson test was used for parametric data, and the Spearman test for non-parametric data.

A descriptive level of 5% was assumed for statistical significance. The data were entered into Excel and analyzed using SPSS software (version 22.0 for Windows).

The videos were analyzed, and the observations were written down for confirmation and reflection on the possible responses and effects generated using AAC.

Results

According to the guidelines for application of the instrument, the researcher was alone in the room with the child in all cases but one, in which the child demanded the presence of the institution’s therapist (who did not interfere in the assessment).

The assessments were made in different rooms, and in the bigger ones, as well as in the ones that had more visual attractions, it was difficult to get the attention of the children, who were distracted. This is a predictable behavior in cases of ASD. However, as the rooms were not chosen by the researcher, but depended on the rooms that were available in each institution, that variable could not be controlled. This indicates the need to incorporate this instruction into the guidelines for application of the *CSA_Linguagem* instrument, so it may be applied under more favorable conditions.

The time proposed for data collection was approximately 10 minutes, but during the application of the instrument there were slight variations in that time, depending on the child’s willingness to remain in the room, his or her attention level and interest in the activities suggested. In a few cases, when the child’s permanence in the room became impossible and the data had already been collected, the researcher chose to interrupt the procedure. The average duration of application of the instrument was 9.8 minutes (sd=1.4), with a 10.1 median;

minimum value was 5.9, and maximum value was 13.8 minutes.

Thirty-two children were assessed, between the ages of 2.4 and 6.7, averaging 4.6 years old (d=1.1), with a median of 4.5 years old. 75% of the children were males, and most of them (59.4%) were preschoolers.

In the Communicative Intention axis of the *CSA_Linguagem* instrument there was a significant number of children who showed interest in the symbols, expressed by their eyes and gestures (holding, grabbing, pointing, or biting). Some children demonstrated a keen interest in the Velcro on the back of the figure: they would stick the figure on the board, then take it off (apparently encouraged by the resulting noise) or rub the material on their lips (searching for sensory stimulation). This study did not differentiate between the child’s interest in the material and in the picture, as the difference between the simple exploration of the material did not matter at that point, having been considered as a sign of interest and meaning in the researcher’s speech. Most children used more than one communication resource (means used by the children to communicate), and did it unsystematically, with gestures and looks. More subjectively, the children also showed a keener interest in some specific symbols, which were later confirmed to carry some meaning for the child, to be part of his or her repertoire. For example, when the child lingered (by looking at or manipulating) on the dog symbol, the parents, once questioned, confirmed that the child had a dog.

Half the research subjects did not share the symbols spontaneously, and, when requested to do so, reacted unsystematically.

Most of the responses to verbal and nonverbal stimuli (questions and comments involving the graphic symbols) were also unsystematic, i.e., there was no significant difference between the therapist’s communication via speech or via gestures or symbols.

A minority of subjects did not emit sounds with communicative intention, and half of them emitted sounds showing the symbols in context.

There was no statistically significant difference between the subjects regarding the following variables: gender, education, and venue of collection, as described in Table 1.

The instrument allowed the researcher to determine which were the communicative resources

Table 1. Difference between means among groups according to points obtained by the instrument

Variable	Category	Index			
		n	Mean	sd	p*
Gender	Male	24	18.2	7.0	0.825
	Female	8	18.7	4.0	
Education	None/day care	9	15.7	4.4	0.140
	Pre-school/first grade	23	19.3	6.7	
Venue of collection	Guarulhos	20	18.2	7.0	0.899
	Others	12	18.5	5.2	

Abbreviations: * t-Student, n= number of subjects, sd=standard deviation

used by the subjects (looks, gestures, vocalizations, graphic symbols), whether they happened systematically or unsystematically, and showed different ways of using AAC. In the short period of assessment, the communication barrier was reduced by manipulating and using the graphic symbols being interpreted, as well as observing by searching for interaction and dialogue, and investigating whether the child is affected by this possibility of communicating beyond orality.

Discussion

This study assessed 32 children between the ages of 2 and 6, and found a prevalence of male children, as did previous Brazilian and international studies^{2,10}.

The greatest difficulties encountered during application, such as: interactional restrictions, crying, screaming, refusing to enter and/or remain in the room, are all inherent to the clinical presentation of ASD^{4,17,20,21}, as are the children's difficulties in maintaining and sharing their attention^{4,22}. Assuming that an intervention via AAC does not aim at obtaining a technological solution for communication issues, or focusing on an essentially nonverbal communication, but at allowing possibilities, interaction and participation in communicative activities with the support of AAC²³, the interest in graphic symbols is essential, and most of the children participating in the study showed that interest¹¹.

Such interest is the starting point for the speech therapist's work according to this approach²⁴. In the cases of children diagnosed with ASD, graphic symbols are seldom presented; however, it is particularly important, as, in more severe cases^{8,25}, especially those with difficult communication and behavior¹¹, the possibilities of interacting and

interpreting without these symbols is much more difficult²⁶.

The results showed the use of more than one communication resource by most children, a finding supported by the literature, which emphasizes the importance of assessing every possibility of communication (gestures, looks, speech, or symbols)^{8,23}, so as to favor the subject's insertion into language via symbolization. In view of these resources, in the present study a reduced number of children used the graphic symbol as a means of communication, which shows the importance of working with graphic symbols.

In turn, the sharing of the symbol's meaning within the dialogic context (spontaneously, when requested, or in imitation) may reference the therapeutic proposals for using the AAC. In the present study, half the children did not spontaneously share the meaning of the symbols, which is in accordance with what is described in the literature as one of the difficulties inherent to the clinical presentation of ASD^{8,20}. On the other hand, more than half the subjects shared unsystematically when requested to do so, suggesting a potential effectiveness of this resource.

Regarding the emission of verbal sounds, in almost half of the subjects it was possible to attribute an unsystematic communicative intention (via intonation), but few emitted verbal sounds as a response to the stimulus provided by the graphic symbols. The subjects who did produce verbal sounds with communicative intention were those who, according to the professionals working in the institutions, showed stronger communicative responses and better prospects.

The *CSA_Linguagem* instrument proposes to assess language quantitatively, by assigning a value to the subjects' performance. However, this does not exclude in-depth, supplementary qualitative

analyses of the data obtained to describe and follow up on therapeutic processes, by comparing these two analytical procedures to seek the best solutions and possibilities of using the AAC in such a way that it suits the particular needs of each child^{26,27}.

In view of this, and mainly by analyzing the graphic symbols the children shared the most, thus showing their greatest interest, which was later confirmed by their parents as being a part of the child's repertoire, we suggest that the instrument may aid the speech therapist in reducing the communication barrier and establishing a better dialogue, by helping understand how the child's oral language and the AAC articulate. In other words: the children who performed the best were those who emitted more verbal sounds, and the graphic symbols benefitted their communication. Those whose performance was poorer communicated nonverbally; however, the graphic symbols proved to be rather significant interactional resources, especially when adopted as a springboard for interaction and dialogue.

Conclusion

The *CSA Linguagem* instrument is easy to apply and has a low operating cost, and it shows possibilities of using AAC as a strategy to support interaction and orality. Additionally, it allowed the researcher to determine the subjects' profile regarding the use of graphic symbols as communicative effects.

However, there are several limitations, especially regarding the wide variety of specific symptoms of ASD, with children exhibiting different behaviors. As it involves a wide spectrum of possibilities, and due to the difficulties presented by the very disorder, this is a complex issue. The instrument should also be applied among a larger number of children, as well as by different evaluators, with a stricter control of variables.

Lastly, we hope this study may contribute to the speech-language pathology field, as an assessment script to give support to therapeutic strategies using the AAC resources, and not only limited to ASD cases.

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Anexo 1 – CSA_Linguagem - INSTRUMENTO DE AVALIAÇÃO DE LINGUAGEM COM A COMUNICAÇÃO SUPLEMENTAR E ALTERNATIVA

Nome: _____
 Responsável: _____
 Data de nascimento: ___/___/___ Idade: _____ Gênero: () F () M
 Nível de escolaridade: () Creche () Pré-escola () não escolarizada

INSTRUÇÕES

Introdução

Este instrumento tem por objetivo avaliar as possibilidades do uso de símbolos gráficos como estratégia de comunicação em crianças com necessidades complexas de comunicação e assim promover discussão sobre os ajustes necessários em situações conversacionais que podem ser direcionadas a partir de um sistema de Comunicação Suplementar e Alternativa.

Orientações para aplicação do instrumento:

Local: Criança (C.) e terapeuta (T.) sozinhos em uma sala, preferencialmente pequena e sem atrativos visuais para haver o menos possível de dispersão e dificuldade de manutenção de foco e atenção. Se a criança demandar um acompanhante, o mesmo será admitido e receberá a instrução de não interferir.

Duração proposta: 10 minutos de interação livre com a utilização dos símbolos gráficos (sugeridos abaixo). Em caso de recusa pela criança, anotar a duração específica a cada sujeito.

Contexto da atividade: T. se apresenta à criança e interage livremente visando estabelecer comunicação verbal e/ou não verbal. Mostra os 03 blocos de símbolos gráficos descritos abaixo, apresentando um tema por vez, independentemente da ordem. Faz comentários e perguntas a respeito enquanto apresenta os símbolos. Por exemplo: "Uma maçã! Ah eu adoro maçã!" ou "Um trem! Piuí!" ou "Que porquinho fofol!" ou "Vamos cantar uma música?". Ao mesmo tempo verbaliza e mostra. T. deve apontar, pegar o símbolo gráfico e fixá-lo em uma prancha com velcro, buscando sempre o estabelecimento de atividade dialógica.

Material: Os símbolos devem ser elaborados em papel e plastificados individualmente. Sugestão de tamanho: 10 x 10 cm. Os símbolos gráficos sugeridos estão agrupados em 03 categorias semânticas: músicas, meios de transporte e animais que podem ser fixados por meio de velcro em uma prancha. Por exemplo: meios de transporte (carro, trem, caminhão, bicicleta), animais (cachorro, gato, galinha, porco) e músicas (sapo, dona aranha, palma e pintinho amarelinho) (Figura 1).



Figura 1. Exemplo de símbolos gráficos sugeridos do Picture Communication Symbols (PCS).

Procedimento de coleta de dados: As atividades devem ser integralmente filmadas com câmera fixa, para posterior análise dos itens descritos no instrumento. As respostas devem ser assinaladas em apenas uma alternativa para cada item, sendo elas: não, às vezes (conduta assistemática), sim (conduta sistemática). Se necessário, incluir observações ao final de pergunta.

Instrumento CSA_linguagem

I. Intenção comunicativa

A criança:

1. Mostra interesse pelos símbolos gráficos? Ex: A criança olha atentamente ou fixamente para o símbolo
2. Comunica-se por meio dos símbolos gráficos? Ex: A criança pega o símbolo, vocaliza e entrega para o terapeuta
3. Comunica-se por meio de gestos? Ex: A criança pega na mão do terapeuta, puxa, cutuca ou aponta algo.
4. Responde a algum comentário ou pergunta utilizando o olhar? Ex: T. pergunta: "Cadê o caminhão?" A criança olha para o símbolo do caminhão.
5. Responde com mais de um recurso de comunicação? Ex: A criança olha, aponta o símbolo, vocaliza e olha novamente para T. em resposta a algo.
6. Inicia uma interação utilizando o símbolo gráfico? Ex: A criança pega o símbolo, entrega para T. iniciando um diálogo ou uma interação.



II. Manejo funcional dos símbolos gráficos

A criança:

7. Compartilha o significado dos símbolos gráficos de forma espontânea? Ex: A criança aponta uma figura e olha para T. espontaneamente.
8. Compartilha o significado dos símbolos gráficos somente quando solicitado pela T? Ex: T. pergunta e apresenta dois símbolos como opção de resposta, "Esse ou esse?" A criança pega um dos símbolos.
9. Utiliza os símbolos gráficos reproduzindo a utilização feita por T? Ex: T. retira um símbolo da prancha, a criança faz o mesmo.

III. Respostas ao estímulo verbal e não verbal (perguntas e comentários envolvendo os símbolos gráficos)

A criança:

10. Responde quando T. se expressa apenas verbalmente? Ex: T. fala "Vamos cantar parabéns?" A criança sorri e bate palmas.
11. Responde com o suporte dos símbolos gráficos utilizadas por T.? Ex: T. diz: "Vamos cantar essa música?" (mostrando um símbolo). A criança começa a vocalizar na melodia da música representada.
12. Responde com o suporte de gestos utilizados por T.? Ex: T. gesticula uma música (batendo palma). C. olha, sorri e vocaliza cantando a música representada.

IV. Emissão de sons verbais

A criança:

13. Emite algum tipo de som com intenção comunicativa?
14. Emite sons mostrando ou olhando os símbolos gráficos?
15. Emite sons somente de forma contextualizada?
16. Emite som com entonação?

