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Assessment of pragmatic abilities of children with autism spectrum disorders

Protocolo de avaliação de habilidades pragmáticas de crianças com transtornos do espectro do autismo

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ABSTRACT

Purpose: To propose a protocol to the assessment of pragmatic abilities of children with autism spectrum disorders, test it and compare the results with those of the Functional Communicative Profile. **Methods:** Participants were 62 children, ages 2 to 12 years without prior diagnosis of any sensorial loss or genetic syndrome. Based on video samples, speech-language pathologists answered to the proposed protocol. The results were analyzed according to their association with other protocols used in the service where the study was carried-out. **Results:** Only data about communication interactivity and use of verbal communicative mean presented significant correlations with the pragmatic aspects of language performance verified by the proposed protocol. The protocol allowed the supposition that larger experience with the child may provide more information about the child's pragmatic performance. The analysis of the use of the protocol to verify the outcomes of six-month language intervention processes also lead to relevant correlations. Just one of the 29 questions did not result in associations with any of the studied variables. **Conclusion:** So far, the results are not enough to consider that the isolated use of this tool will provide the necessary information to language assessment of intervention follow-up.

Keywords: Speech, language and hearing sciences; Social communication; Diagnosis; Autistic disorder; Language; Child

RESUMO

Objetivo: Propor um protocolo de avaliação das habilidades pragmáticas da comunicação de crianças incluídas no espectro do autismo, aplicá-lo e comparar seus resultados com os do Perfil Funcional da Comunicação. **Métodos:** Participaram deste estudo 62 crianças entre 2 e 12 anos de idade, com diagnóstico incluído no espectro do autismo e sem perdas sensoriais ou síndromes genéticas diagnosticadas. A partir de amostras em vídeo, fonoaudiólogos responderam ao protocolo proposto e os resultados foram analisados em relação a protocolos já usados no serviço em que o estudo foi realizado. **Resultados:** Apenas os dados referentes à interatividade da comunicação e ao uso do meio comunicativo verbal apresentaram correlações significativas com o desempenho nos aspectos pragmáticos da linguagem, conforme verificado pelo protocolo proposto. O protocolo foi capaz de constatar que maiores possibilidades de interação com a criança possibilitam mais dados a respeito de seu desempenho pragmático. A análise do uso do protocolo para acompanhar os resultados de seis meses de intervenção também possibilitou a identificação de correlações relevantes. Apenas uma das 29 questões não apresentou associação com nenhuma das variáveis estudadas. **Conclusão:** Os resultados obtidos até o momento não são suficientes para determinar que o uso isolado do Protocolo de Avaliação de Habilidades Pragmáticas de Crianças com Transtorno do Espectro do Autismo fornece todos os elementos necessários para a avaliação ou o acompanhamento da intervenção fonoaudiológica.

Palavras-chave: Fonoaudiologia; Comunicação social; Diagnóstico; Transtorno autístico; Linguagem; Criança

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INTRODUCTION

The pragmatic assessment of communication skills, as part of speech-language diagnosis procedures, was developed in Brazil after the publication of the ABFW – Child Language Test in the areas of Phonology, Vocabulary, Fluency and Pragmatics[1], which includes criteria for the design of the Functional Communication Profile (FCP). This publication resulted in an increase in the number of studies addressing the functional aspects of communication in different populations, such as children and adolescents with Down syndrome, hearing loss, and specific language disorders (SLD), in addition to studies on genetic syndromes.

Undoubtedly, studies on functional communication issues have increasingly addressed the autism spectrum disorders (ASD). Several studies had already been published in the last century and continued to provide scientific evidence for the speech therapy diagnosis in this population[2], as well as for the design and monitoring of therapeutic processes in language and communication.

In contrast, a relatively small number of studies have addressed the development of pragmatic skills in children without developmental or language disorders[3].

Recent international studies continue to highlight the difficulty in establishing uniform models for the assessment of pragmatic skills. Considering the notion that pragmatic analysis only makes sense in language use samples, the use of spontaneous communication samples is also advocated by several authors[4,5], who consider them more reliable to analyze individual skills, since the concepts of "appropriate" and "inappropriate" may vary in different cultures and contexts.

Conversely, studies based on different resources for data record and analysis have focused on searching for more objective models to assess pragmatic skills stands. An alternative aimed at the pragmatic analysis of communication is the association of functional aspects with certain forms or linguistic skills. In this context, recent studies have focused on the following topics: possibility of using similar syntactic structures with different functions and in different cultures that speak the same language[6]; interference of the linguistic repertoire with pragmatic skills[7]; use of linguistic markers in language acquisition[8], and correction and repair strategies used in different cultures and languages[9]. Arguably, however, the most enriching studies in pragmatics consider the various interfaces of language use[10,11].

The criteria for the design of the Functional Profile of Communication contained in the ABFW-Child Language Test[1] were determined from an analysis of communication in children with ASD. It is perfectly natural to further develop this instrument aiming this population, since problems with the pragmatic aspects of language are in the core of their communication difficulties.

The FCP recommends analyzing naturalistic interaction samples of at least five minutes in duration and transcribing them into a specific protocol[1]. Out of a total of 20 possibilities, the analysis identifies the communication initiatives, communicative means used, and communicative functions expressed. These procedures enable to investigate children's communication in all age groups thoroughly, which is useful not only for designing an individualized intervention project, but also for monitoring the intervention results. However, this is a laborious procedure that requires a relatively long analysis time, even for experienced professionals. More than 15 years after its initial publication, subsequent studies have indicated that the CBP offers relevant clinical elements to the analysis and intervention in the pragmatic aspects of children's communication[12,13]. However, its daily use in clinical speech therapy seems to have been restricted to private practice[14] and scientific studies[15,16].

Video-recorded image transcription software recently made available can contribute to multimodal language studies[17]. Resources like Eudico Language Annotador[18] and Computerized Language Analysis[19] undoubtedly represent major contributions to language research, facilitating the systematization of records of communicative elements including, in addition to speech, information on context and non-verbal communication. However, its clinical applicability is quite reduced as it requires to include information in the system, a procedure as laborious as the one proposed by the FCP.

Thus, relevant contribution to evidence-based speech therapy practice should come from a simpler instrument aimed at routine professional practice for the analysis of the main pragmatic communication skills and to guide intervention processes and enable monitoring.

In that scope, our goal was to propose an assessment protocol for the pragmatic communication skills of autistic children. We also aimed to apply the instrument to verify whether its results can be associated the FCP since both instruments are based on the same communication notions for children diagnosed on the autism spectrum.

METHOD

This study was approved by the Research Ethics Committee of the Faculty of Medicine of the University of São Paulo – CEP/FMUSP, protocol number 61204316.1.0000.0065. All participants were included in the research only after one of their guardians signed the Informed Consent Form.

Participants

All participants were treated at a speech therapy service specialized for children on the autism spectrum, associated with the Speech Therapy Course at the Faculty of Medicine of the University of São Paulo (FMUSP), a national reference in the area for over three decades. The following inclusion criteria were adopted:

- diagnosis included in the autism spectrum, by a neurologist or psychiatrist, according to DSM-IV[20] or DSM-5[21] criteria;
- age between 2 and 12.

The following exclusion criteria were adopted:

- presence of diagnosed sensory impairments;
- presence of diagnosed genetic syndrome.

Material

As proposed by ABFW[1], the FCP is used in the practical routine of the Laboratory of Speech-Language Pathology

Investigation in Autism Spectrum Disorders (LIF-SLD), both in the initial assessment and semiannual assessments to monitor the intervention processes.

The design of the Protocol for the Assessment of Pragmatic Skills of Children with Autism Spectrum Disorders (PAHPEA) aimed to include information on the same aspects of pragmatic performance: communication initiative, communication interactivity, communicative means used, functional diversity, and discursive skills.

The proposed protocol (Annexes 1 and 2) has 29 questions to be answered on a Likert-type scale by a speech therapist who should know the child for at least three months, and by a collaborator, also a speech therapist, who should respond to the same protocol based on observation of a video-recorded five-minute interaction segment with the speech therapist.

Procedure

The study procedure involved requesting collaborators and speech therapists from the same service to answer the Protocol for the Assessment of Pragmatic Skills of Children with Autism Spectrum Disorders (PAHPEA). To validade the protocol reliability, the procedure counted with the collaboration of ten speech therapists with different levels and characteristics of postgraduate training.

To assess the consistency of the answers provided by two independent examiners, three months after the speech therapy beginning, a therapist and a collaborating speech therapist answered the PAHPEA regarding all participants.

Six months after the first PAHPEA application, the therapists answered the protocol again for all children who had attended at least 80% of the planned therapeutic sessions aiming to verify whether the instrument could be used to monitor the intervention results.

As part of the follow-up routine of the speech-language intervention process in the LIF-SLD, we filmed 15-minute samples of play situations between the child and the speech-language pathologist responsible for the care. Each of these samples was analyzed as follows:

1 - identification of the five minutes of most symmetrical interaction, our research *corpus*;

2 - analysis of the *corpus* by the therapist regarding the Functional Profile of Communication, as proposed by the ABFW [1], also a routine procedure in the LIF-SLD;

3 - application of the Assessment Protocol for Pragmatic Skills of Children with Autism Spectrum Disorders – PAHPEA by the therapist and a collaborating speech therapist.

4 - new filming of the child in a situation of playful interaction with the speech therapist six months after the analyses, in addition to a new round of instruments (FCP and PAHPEA) responses by the therapists regarding all children who attended at least 80% of the scheduled sessions.

Data analysis

Statistical analysis based on the Pearson correlation test compared the results of the FCP and the observation protocol. The main issues indicated were related to the association between the CBP and the PAHPEA and the identification of the most relevant elements of the PAHPEA to determine such associations.

RESULTS

Sixty-two children aged between 2 and 12 years attended at the LIF-SLD at the FMUSP participated in this study.

Initial results compared the answers given to each participant by the two speech therapists (therapist and collaborator) on each question. Table 1 shows the results of Pearson's correlation analysis for the answers given by the therapist and the collaborator.

Questions 3 and 15 generated the strongest correlations, concerning the use of speech as a form of communication and complex sentence structures, respectively.

Question 20, in turn, generated no correlation, it ranges the child's ability to properly make clear when he/she does not feel like doing something.

Table 2 summarizes the results of the comparison of the therapists' responses at two stages of the intervention process: 3 months (to allow both therapist and child to become well acquainted) and 9 months after the intervention start, i.e., 6 months after the first data collection.

The statistical analysis of these data indicated a significant difference of 9% (p-value 0.09225) when analyzing the children's performance individually regarding the total score at the two data collection moments. Despite not statistically significant,

Table 1. Answers given by the therapist and the collaborator, according to Pearson's correlation analysis

Question	(P-value)	Question	(P-value)	Question	(P-value)
1	0.395212	11	0.337603	21	0.437627
2	0.523203	12	0.594548	22	0.422829
3	**0.849688***	13	0.575509	23	0.520999
4	0.394704	14	0.484557	24	0.561006
5	0.593322	15	**0.712813***	25	0.62237
6	0.682951	16	0.360517	26	0.633468
7	0.555534	17	0.445447	27	0.612334
8	0.601625	18	0.526115	28	0.510037
9	0.430975	19	0.326699	29	0.404926
10	0.611521	20	*0.065135#*		

*significant correlation

Table 2. Correlation between the percentage of communication interactivity verified in the Functional Communication Profile and the progress in six months of intervention verified in the Assessment Protocol of Pragmatic Skills of Children with Autism Spectrum Disorders, according to Pearson's correlation analysis

Question	P-value	Correlated
Q3	6.89E-05	0.5324
Q7	3.00E-06	0.6067
Q8	1.18E-05	0.5766
Q10	2.96E-07	0.6517
Q13	7.11E-05	0.5316
Q15	2.59E-07	0.6541
Q18	8.61E-05	0.5264
Q23	2.12E-04	0.5008
Q24	1.67E-05	0.56824
Q25	3.16E-06	0.60567
Q27	1.50E-04	-0.5108
Q27	1.50E-04	0.5108
Q28	1.39E-04	0.513
Total	3.54E-06	0.6032

Table 3. Correlation between the percentage of use of the verbal communicative means verified in the Functional Communication Profile and the progress in six months of intervention verified in the Assessment Protocol of Pragmatic Skills of Children with Autism Spectrum Disorders, according to Pearson's correlation analysis

Question	P-value	Correlated
Q2	1.01E-05	0.5799
Q3	9.48E-12	0.7896
Q5	6.98E-07	-0.6359
Q6	1.01E-06	0.6287
Q7	1.68E-07	0.6616
Q8	3.44E-07	0.649
Q10	7.06E-07	0.6356
Q12	2.57E-07	0.6542
Q13	6.20E-08	0.6783
Q15	1.21E-06	0.6253
Q16	2.45E-05	0.559
Q18	2.38E-06	0.6116
Q19	8.67E-05	0.5262
Q20	2.06E-04	0.5017
Q23	1.20E-05	0.576
Q24	8.58E-07	0.6319
Q25	1.25E-06	0.6246
Q29	1.97E-05	0.5643
Total	4.93E-09	0.7164

it is worth considering the relevance of the high individual differences found among children with ASD.

When analyzing each question, less than half (1, 2, 3, 5, 12, 16, 19, 20, 22, 23, 24, 25, and 27) allowed to identify statistically significant differences between the two data collection moments.

Subsequently, we verified whether there was any correlation of the performance at the first data collection and differences in pragmatic language skills observed by the therapists between the two moments.

Only the data referring to the proportion of communication interactivity (Table 2) and the percentage use of verbal communicative means (Table 3), as verified in the FCP, showed significant correlations with language performance, as observed in the PAHPEA.

DISCUSSION

Our initial analysis of data referring to the PAHPEA revealed simultaneous expressive results in only three of the 29 questions proposed, as follows: similarity between the therapist's and the collaborator's responses, significant differences between the first and second stages of data collection, and association with the percentage of communication interactivity and the use of verbal communicative means. These issues involve the use of speech for communication and the ability to narrate past facts or stories and to comment on present events. Associations between the use of verbal communication and narrative skills with the performance and developmental prognosis of children with ASD have been described systematically in the literature[20]. Some researchers[19] report that narrative skills emerge at the interface between cognitive, social, and linguistic development related to social engagement.

When considering only the significant association between the CBP and progress in the PAHPEA, nine questions expressed relevant correlations. In addition to the use of verbal communicative means and narrative skills, these questions also involve the following elements: answers to simple matters, use of complex structures to respond, production of comments, use of complete sentences and complex structures, and shift changes in communication. Other studies have investigated these same aspects and found similar results, such as a protocol to observe pragmatic skills addressing the areas of communication initiative, responsiveness, non-verbal communication, socio-emotional attention, executive functions, and negotiation[22].

We identified relevant correlations in 18 questions when analyzing only the associations between the evolution found in the PAHPEA and the use of verbal communicative means in the first assessment. In addition to the aforementioned aspects, the questions also address interaction, use of gestures, communication efficiency, requests for action and information, symbolic game, communication initiative, and variations in facial expressions and prosody. Conversely, two questions presented significant correlations only between the proportion of communication interactivity at the beginning of data collection and the evolution identified in the PAHPEA. We also found a negative correlation with the child's habit of playing in isolation, in repetitive activities, and a positive correlation for attention and understanding of variations in facial expressions and prosody. Several studies have associated the intervention

results with non-verbal communication comprehension skills, use of symbolic play material, and cognitive skills[23-26].

Several researchers have addressed specific topics in proposing alternatives to assess communication skills in children with ASD[27], as well as those with other developmental disorders[28] and typical development[11]. The proposals involve the use of interviews[18], questionnaires[8], and samples of spontaneous communication[29]. Several variables can interfere with the identification of skills and difficulties with the pragmatic aspects of communication, such as the professional conducting the analysis[30], the context of assessment and stimulation, and the different expressions of the same language[9]. The diversity of proposals confirms that a definitive procedure for collecting data on the pragmatic abilities of children is yet to be established.

The comparison between the therapist's and the collaborator's answers evidenced that the questions that expressed significant difference simply a broader contact with the child, thus allowing to identify behaviors such as looking at the adult, using non-verbal sounds in communication, and expressing pleasure, fear, or discontent clearly.

The analysis of the differences between the early intervention process and the data from six months after the speech therapy, according to the therapist's observations, identified significant differences in 13 questions ranging the following aspects: looking at and interacting with the adult; use of speech and gestures in communication; production of requests for information and action; playing symbolic game; expressing clearly; out of context and/or non-functional gestures, emissions or behaviors; isolation, narrative, initiative, communication skills. The association of each of these elements with the intervention results must be considered individually.

Only the question addressing the inclusion of adults in the game showed no correlation with any of the studied variables; however, it should be maintained in the protocol to verify responses of other groups of children.

The main limitation of this study was the small number of participants. Certainly, both the number of children evaluated and speech therapists applying the protocol did not allow for conclusions enabling to establish definite parameters. Further studies should be carried out in different regions of the country to generate more consolidated data.

CONCLUSION

Although several researchers and clinicians continue to dedicate themselves to the development of instruments to assess pragmatic communication skills, a definite method has not been achieved to combine the necessary specificity, ease of application, and the possibility of identifying variables such as language, culture, interlocutors, and context.

Our objectives were to propose and apply the PAHPEA and compare its results with those of the FCP, as both instruments are based on the same notions regarding the communication of children diagnosed on the autism spectrum.

The PAHPEA proposal aimed at a pragmatic skills assessment protocol to provide a simple application and the possibility of working as an instrument to monitor the intervention results. Evidently, the results obtained so far are not enough to determine that the isolated use of this instrument provides all the necessary elements for the assessment or follow-up of the speech therapy intervention. It should be used in conjunction with other consolidated instruments. Although one of the questions did not show any association with any of the studied variables, it is suggested to be maintained in the protocol to verify responses for other groups of children.

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Annex 1. ASSESSMENT PROTOCOL OF PRAGMATIC SKILLS OF CHILDREN WITH AUTISM SPECTRUM DISORDERS - PAHPEA

Fernandes, FDM, 2021
Child's name:_____
Date of birth:_____child's age: - age between 2 and 12.
Date of filming:_____
Therapist's name:_____

QUESTIONNAIRE FOR THE THERAPIST

Respond based on your experience with the child in the last semester.
This child:

	Always	Frequently	Sometimes	Rarely	Never
1 - Looks to the adult					
2 - Interacts with the adult					
3 - Mainly uses speech to communicate					
4 - Mainly uses mostly non-verbal sounds to communicate					
5 - Mainly uses gestures to communicate					
6 - Makes himself/herself understood easily					
7 - Answers simple questions (where is the cart?, what do you want?...)					
8 - Answers complex questions (why did he do this? what did you do at school?...)					
9 - Answers with single words or two-word phrases					
10 - Answers with complete sentences with complex structures					
11 - Interacts to ask for actions or objects					
12 - Asks for information					
13 - Makes adequate comments					
14 - Uses single words and two-word phrases to communicate					
15 - Uses complete sentences and complex structures to communicate					
16 - Gives orders					
17 - Expresses pleasure, fear, or discontent clearly					
18 - Changes communicative shifts appropriately					
19 - Plays make believe					
20 - Makes it clear when you don't want to do something properly					
21 - Uses crying, tantrums or aggression when frustrated or to interrupt some activity					
22 - Produces decontextualized or non-functional speech, sounds or gestures					
23 - Initiates communication					
24 - Tell stories or reports facts					
25 - Comments on what is happening or might happen (it will fall..., one, two, one more...)					
26 - Includes the adult in the game					
27 - Plays isolated, in repetitive activities					
28 - Is attentive and understands facial expressions and prosody					
29 - Uses facial expressions and prosodic variations to express yourself					

Annex 2. ASSESSMENT PROTOCOL OF PRAGMATIC SKILLS OF CHILDREN WITH AUTISM SPECTRUM DISORDERS - PAHPEA

Fernandes, FDM, 2021
Child's name:_____
Date of birth:_____child's age: - age between 2 and 12.
Date of filming:_____
Therapist's name:_____
Name of collaborator:_____

QUESTIONNAIRE TO BE ANSWERED BY AN COLLABORATOR (NOT THE THERAPIST)

Answer based on what is observed in the recording.
This child:

	Always	Sometimes	Never
1 - Looks to the adult			
2 - Interacts with the adult			
3 - Mainly uses speech to communicate			
4 - Mainly uses mostly non-verbal sounds to communicate			
5 - Mainly uses gestures to communicate			
6 - Makes himself/herself understood easily			
7 - Answers simple questions (where is the cart?, what do you want?...)			
8 - Answers complex questions (why did he do this? what did you do at school?...)			
9 - Answers with single words or two-word phrases			
10 - Answers with complete sentences with complex structures			
11 - Interacts to ask for actions or objects			
11 - Asks for information			
12 - Makes adequate comments			
13 - Uses single words and two-word phrases to communicate			
14 - Uses complete sentences and complex structures to communicate			
15 - Gives orders			
16 - Expresses pleasure, fear, or discontent clearly			
17 - Changes communicative shifts appropriately			
18 - Plays make believe			
19 - Makes it clear when you don't want to do something properly			
20 - Uses crying, tantrums or aggression when frustrated or to interrupt some activity			
21 - Produces decontextualized or non-functional speech, sounds or gestures			
22 - Initiates communication			
23 - Tell stories or reports facts			
24 - Comments on what is happening or might happen (it will fall..., one, two, one more...)			
25 - Includes the adult in the game			
26 - Plays isolated, in repetitive activities			
27 - Is attentive and understands facial expressions and prosody			
28 - Uses facial expressions and prosodic variations to express yourself			