

Children with High Functioning Autism: A pilot study of a training intervention to enhance pragmatic skills

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Abstract

Background: Pragmatics is agreed to be the communicative domain that is universally impaired in ASD, with variable severity across the spectrum. The difficulties experienced by children with autism in language use can limit their opportunities to socialize with peers, with a consequent higher risk of mental health problems in adolescence. Methods: The present study explored pragmatic language skills in children with ASD, aiming at evaluating the efficacy of a training conducted with a group of three children aged 8-9 years. The five

Received: April 5, 2017; *Revised:* October 10, 2017; *Accepted:* December 6, 2017

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training sessions involved activities aimed at improving pragmatic skills in conversational domains. All sessions were videotaped and analyzed following a protocol and children were pre- and post-tested using a battery of tasks for the evaluation of pragmatic language abilities. Results: Children's difficulties emerged especially in scores obtained in the language battery, whereas their behavior appeared as more appropriate in the conversational setting. Some improvements in pragmatic skills were observed at post-test. The results are discussed in terms of their educational and clinical implications. Conclusions: Enhancing social relationships of children with autism it is critical in real and everyday contexts, not only to mitigate their difficulties but also to optimize their resources.

Keywords: Autism; High functioning; Language; Pragmatic; Training; Observation.

1. Introduction

High-functioning autism (HFA) belongs to a group of neurobiological conditions known as pervasive developmental disorders, which are characterized by impairment in the development of multiple basic functions including socialization and communication, from the early stages of life. The Diagnostic and Statistical Manual-Fifth Edition (DSM-5) presented a modified classification of pervasive developmental disorders, with Asperger Syndrome (AS) and high functioning autism now incorporated into the overall category of Autism Spectrum Disorder (ASD). The diagnostic criteria for ASD include persistent deficits in social communication and interaction across multiple contexts and restricted, repetitive patterns of behavior, interests, or activities (DSM-5, 2013). This change has raised important cautions (e.g. failing to identify children who require specific treatments), as well as a wide consensus (e.g. without evidence for causative differences or treatment approaches specific to subtypes, the overall category ASD more accurately reflects the state of science) (King, Navot, Bernier, & Webb, 2014). However, it is not our intent to enter into this discussion; the key point for our purposes here is that children who have been diagnosed with either of these developmental disorders generally display deficits in social interaction, in developing, maintaining and understanding relationships, and in using verbal and nonverbal communication. With regard to communication impairments, a further question concerns the nature of the relationship between ASD and social (pragmatic) communication disorder. Recent years have seen strong debate as to whether pragmatic communication disorder is part of the autism spectrum, or an entirely separate condition (Whitehouse, Watt, Line, & Bishop, 2009; Baird & Norbury, 2016). Currently, the DSM-5 classifies social (pragmatic) communication disorder as a separate condition leading to: persistent difficulties in the social use of verbal and nonverbal communication; functional limitations in effective communication, social participation, relationships, academic achievement or occupational performance. However, as noted by Bishop (2003) and discussed by Baird and Norbury (2016), the profiles of individuals with AS/HFA and those with pragmatic disorder often largely overlap and it is not clear how the criteria for social (pragmatic) communication disorder differ from ASD. There are children with ASD who remain nonverbal, while others (AS/HFA) develop structural (lexical and syntactic) language within typical ranges. However, even if structural language appears intact, as in the case of AS/HFA,

difficulties with pragmatic language persist. Thus, pragmatics is agreed to be the communicative domain that is universally impaired in ASD, with variable severity across the spectrum regardless of the functional level and age of the individual (Young, Diehl, Morris, Hyman, & Bennetto 2005; Volden & Phillips, 2010; de Marchena & Eigsti, 2016). More specifically, in AS/HFA syntax and phonology are relatively intact, whereas difficulties occur in relation to semantics and pragmatics. Individuals with these conditions have been widely observed to encounter problems with the social use of language, especially in conversation (Tager-Flusberg, Paul, & Lord, 2005; Paul & Norbury, 2012).

The development of pragmatic skills may be defined as children's progressive ability to use context in language comprehension and expression (Sperber & Wilson, 2002; Adams, 2012). This is because linguistic information by itself does not provide the full meaning of an utterance, which is also based on contextual factors of the ongoing situation, as well as the receiver's knowledge of the world and beliefs about the speaker's assumptions (Loukusa, Leinonen, Kuusikko, Jussila, Mattila, Ryder, *et al.*, 2007). Pragmatic competence enables an individual to speak intelligibly, behave appropriately and understand the perspective of others (Lam & Yeung, 2012). Pragmatic language difficulties in AS/HFA affect both expression and comprehension. Specifically, children with AS/HFA are usually willing to communicate, but because of problems with the pragmatic aspects of language they have difficulty doing so in an appropriate manner, particularly with their peers (Adams, 2012). In general, they display verbal impairment in terms of their ability to implement cohesive devices, vary their style for different listeners as appropriate, take turns in conversation, be polite, and introduce, maintain and change topics (Paul, Orlovski, Chuba Marcinko, & Volkmar, 2009). Their conversation is often described as containing irrelevant, inappropriate, stereotypical or bizarre comments. They tend to interpret utterances literally and have difficulty understanding idioms, humor, metaphor, irony and jokes based on word play; they also present deficits in their ability to attribute mental states, such as beliefs, desires, intentions, to themselves and others (Arciuli & Brock, 2014). Their non-verbal communication may also be impaired, in terms of gesture, eye contact, body language and facial expression (Paul, 2008), as well as in terms of prosody, including pitch, loudness, voice quality and use of stress (Peppé, Cleland, Gibbon, O'Hare, & Martinez Castilla, 2011). As Parsons, Cordier, Munro, Joosten and Speyer (2017) underline, multiple competences such as social skills and emotional understanding, are strictly interconnected

to pragmatics. So, currently definitions of pragmatic language have expanded beyond communicative functions to include also social and emotional aspects of language. This expansion reflects different underlying theoretical models, which address different methods of intervention. For example, the social model assumes that the deficits in pragmatics are related to a limitation in the development of social interaction, empathy and attachment (lack of affect in the close relationships, lack of participation in the social routines). This leads to interventions based on social inference and emotional understanding. Another possible theoretical model is the cognitive one: pragmatic difficulties derived from limitation in development of shared and mutual knowledge, event representations (limited script learning, event knowledge representation). Therefore, the focus of interventions might be building representations and managing information. There is also the linguistic model, which represents the framework of our study, which directs focus on language receptive/expressive delay, limited range of communicative intents and semantic and syntactic skills. This model leads to interventions on the conversation skills and speech acts in context.

In addition to the theoretical issues, we can mention also methodological problems in the assessment of pragmatic skills, especially when our attention is addressed to the childhood (Adams, 2003; Cummings, 2014).

First, it is essential to take age into account because pragmatic competence develops along with socio-cognitive skills, therefore some instruments are suitable for preschool age and others for school-age children (e.g. Preschool Language Assessment Instrument-PLAI-2, Blank, Rose, & Berlin, 2003; Test of Pragmatic Language-Topl-2, Phelps-Terasaki & Phelps-Gunn, 2007). Many studies have shown connections between pragmatics and theory of mind, i.e. the cognitive ability required to understand the mental states of another person (Zufferey, 2015). This may mean that the tendency of children with autism to interpret speech literally is related to deficits in their understanding of their interlocutor's mind. There is also evidence to suggest that executive functions such as planning, behavioral inhibition and cognitive flexibility are essential to pragmatic communication. Thus, it is possible that an executive dysfunction in autism, such as perseveration, could account for pragmatic oddities such as repetitive speech and preoccupation with particular topics (Lam & Yeung, 2012). Numerous researchers have found that sophisticated pragmatic development continues throughout childhood, and this development is influenced by many factors, such as children's ability to use relevant contextual information and level of ability to make inferences (Guendouzi,

Loncke, & Williams, 2011).

Second, the development of pragmatics is a complex process that involves different aspects of language (Parsons *et al.*, 2017). Therefore the chosen methodology must take the specific aims of the research into account. For example, studies often use conventional standardized language batteries or tests (for a review see Loukusa & Moilanen, 2009), designed to detect difficulties with the pragmatic aspects of language (especially pragmatic comprehension). The batteries and tests provide key information that helps to identify individuals with pragmatic language deficits and to assess their strengths and weaknesses in relation to normative data. However, these instruments are mainly focused on linguistic structure and meaning rather than on pragmatic language use. Therefore, it can happen that a child with HFA obtains scores in the normal range on traditional language measures, but may still display dysfunctional language skills in the social context.

Furthermore, the use of pragmatic language skills is defined as context-dependent, so the generally rigid structure of formal testing procedures can fail to capture flexible adjustment to changing circumstances (Adams, Lockton, Gaile, Earl, & Freed, 2012). In addition, a number of pragmatic aspects (verbosity, difficulty in maintaining a topic of conversation and nonverbal and paralinguistic aspects, such as eye gaze, gestures and prosody) cannot be detected using batteries or tests. Therefore, the observation and coding of pragmatic skills in conversational settings may be a more appropriate means of identifying how the child actually engages in communication processes with others. However, this line of enquiry has been inhibited by difficulties related to measurement. From among a number of conversational coding schemes proposed in the 1980s and 1990s in particular, we chose to adopt the Pragmatic Protocol developed by Prutting and Kirchner (1987) for the current study, because it assesses a range of parameters of pragmatic language competence that includes aspects of linguistic structure (verbal) as well as aspects of communication based on the principles governing language use (nonverbal and paralinguistic).

The difficulties experienced by children with autism in using language interpersonally in social contexts can limit their opportunities to socialize with peers and in general, as well as leading to a higher risk of mental health problems in adolescence (Underwood, McCarthy, & Tsakanikos, 2010; Tsai, 2014). Locke, Ishijima, Kasari and London (2010) found that children and adolescents with ASD reported increased feelings of loneliness and poorer friendship quality compared to typically developing peers, as a result

of reduced pragmatic language skills. These difficulties pervade the children's social interactions and they require support and effective interventions in this area in order to enhance their wellbeing and levels of social participation and inclusion in society.

For these reasons, social-pragmatic intervention is essential to reinforcing existing skills and mitigating impairments and may represent a significant component of the professional support provided to children with autism. Adams and colleagues (2012) have reported that there is little systematic evidence to demonstrate the benefits of speech and language therapy for children whose difficulties lie primarily within the pragmatic domain.

Paul (2008) reviewed the intervention methods used to improve language development (including pragmatics) in children with HFA. He concluded that while the various approaches (didactic/behavioral, naturalistic and developmental) are generally adult-mediated, providing opportunities for peer-mediated interaction in natural settings could be key to maximizing the effects of an intervention. It follows that small group activities may be a valuable means of providing children with experience of real-life social situations with adults and peers.

Recently Parsons and colleagues (2017) have conducted a systematic review of pragmatic language interventions for children with autism spectrum disorder. Considering a total of 21 papers, reporting on 18 different intervention studies, it emerges that most common methods of pragmatic language skill measurement are the behavioral observation and the parent reports measures. Also standardized lab task are administered. What it is worthy is that just one study adopted a combination of methods. The review points out also that the group interventions were significantly more effective than individually focused interventions.

Given this background, the aim of the current study was to pilot a behavioral group training intervention in pragmatic language competence with three HFA children. The training was designed to enhance a number of pragmatic skills: ability to understand the context of a conversation, metaphor and inference in discourse and ability to complete a theory of mind task.

With regard to methodology, we used both a standardized battery and a coding protocol in order to assess participants' pragmatic skills as comprehensively as possible.

Thus, our research aim was to assess the efficacy of the intervention by testing pragmatic skills before and after training, using different

methodological approaches: the language battery and the coding of the video-recorded structured activities.

2. Method

2.1. Participants

Three males (2 males aged 8 years and 1 male aged 9 years) took part in this study. All the children were recruited through the Brescia Child Neuropsychiatry Services Unit (Northern Italy) and had received a diagnosis of ASD based on DSM IV TR criteria and their scores on the Autism Diagnostic Observation Schedule (ADOS)¹⁰. Evaluation of their cognitive, language and behavioral skills supported the diagnosis of high-functioning autism. With regard to linguistic development in particular, structural language appeared to be intact, but difficulties with the pragmatic aspects of language were reported by clinicians, parents and teachers. The children were attending the second and the third grades of primary school. They and their families had access to the services of the Child Neuropsychiatry Department for individual psychological support sessions, rehabilitation and meetings between school and family. Parental informed consent has been obtained.

2.2. Procedure

In line with ethical standards for research and having obtained prior consent from the head of the Brescia Child Neuropsychiatry Services Unit, we organized a meeting with the parents to brief them about the aims of the study and the training format. The parents provided their consent. Participants were informed that the data collected would be anonymous.

The children were administered the individual tests by a researcher in a quiet room at the Child Neuropsychiatry Department, both before the training began (January) and after the program had finished (April). Compilation of the battery took about 20 minutes and the children could ask for a break whenever they wanted, in order to maintain a high level of attention.

¹⁰ Following the IQ and ADOS's scores for each child. Andrea: WPPSI IQ: 89, ADOS autistic disorder; Filippo: Leiter scale IQ: 82, ADOS autism spectrum disorder; Stefano: Leiter scale IQ: 68, ADOS autism spectrum disorder.

The training in pragmatic skills took place in the same Department and was conducted by two researchers, in collaboration with two therapists who knew the children very well and had prior experience of intervention and rehabilitation programs for children with autism. The training sessions were videotaped.

The three children were selected for the study on the basis of their individual characteristics and parental consent. We felt that it would be of value to promote positive functional interdependence during the training, therefore the specialists took the abilities of each child into account and the training was carried out with the three children together.

2.2.1. Training in Pragmatic Skills

The training sessions (five) took place weekly in February and March. Each session lasted for an hour and a half and consisted of activities that had been specifically designed to enhance pragmatic skills.

Each session followed a similar format so as to provide the children with a predictable routine. After the initial greeting and seating of the group in a circle, the researchers initiated a conversation about an event that had happened in the week or was going to happen shortly (e.g. Carnival) or about a topic proposed by a child (e.g. news of an earthquake, school trips).

Activities on specific pragmatic aspects of language followed. Having created a playful atmosphere, we introduced games based on a variety of materials (e.g. drawings, plastic objects), board games (e.g. puzzles) and role-play (e.g. grocery and ice-cream shop) depending on the goals we intended to pursue and the precise skills that we wished to stimulate. The activities were planned by the researchers who drew on the “Parliamone” program (Santoro, Mazzotta, & Lorusso, 2009) but also took the children’s preferences into account. At the end of the training session, the researchers assisted the children to reflect on what had happened. The meeting ended with a snack designed to help the children relax and create a social situation in which they could spontaneously practice using pragmatic abilities.

The five training sessions focused on structured activities aimed at improving the children’s understanding of: conversational context, metaphor and inference in discourse and theory of mind.

We introduced the activities in increasing order of complexity.

Examples of activities targeted at promoting pragmatic language skills are reported in the table below.

Table 1 - *Pragmatic skills and related activities of the training*

Area of Pragmatic Competence	Specific Skills	Activities
Context of a conversation	Knowing where conversations are taking place and the people involved	<p><i>Activity 1:</i> The children were required to reassemble the pieces of a simple puzzle illustrating a situation (e.g. a pot on the stove) and answer questions such as: “What is going on?”, “Where is this taking place?”</p>
		<p><i>Activity 2:</i> Participants listened to short conversations (e.g. “Mom, I want that toy!”) and replied to questions about the people involved.</p>
Inference	Understanding non-explicit information	<p><i>Activity 1:</i> On the basis of a word with multiple meanings, two different pictures are shown. Then two sentences are read and the children are required to indicate which picture represents the meaning of which sentence (e.g. I am black with anger! Two beautiful kittens have been born, one of them is black).</p>
		<p><i>Activity 2:</i> Dialogues with implicit information are enacted for the children who are required to answer questions about the non-explicit information (e.g. Where does the scene take place? What are they doing?)</p>
Metaphor	Understanding the non-explicit meaning of a sentence	<p><i>Activity 1:</i> Each child is asked to draw the meaning of a metaphorical sentence (e.g. Luigi is as quick as lightning). Then the other children have to guess the metaphorical sentence represented by the drawing.</p>
		<p><i>Activity 2:</i> Drawings of several animals were hung on the wall. An incomplete metaphorical sentence was read. Children were instructed to run towards the drawing that completed the metaphor (e.g. The dad sleeps a lot! Is he a dog/cat/snail/dormouse?).</p>
Theory of mind	Understanding the mental states of self and others	<p><i>Activity 1:</i> Four similar geometric images were shown to two of the children who were asked to provide useful information to the remaining child (who could not see the images) in order to help him identify a target-image.</p>

2.3. Measures

The children were pre- and post-tested using the Pragmatic Abilities in Language Battery (Abilità Pragmatiche nel Linguaggio, Lorusso, 2009) to

assess their ability to understand metaphor, inference and specific conversational meanings, follow the dialogical structure of discourse and use skills based on theory of mind.

In addition, two independent coders following a well-defined protocol evaluated the pragmatic skills of each child by coding video footage recorded before the training (of structured activities that were not related to the pragmatic training program) and the videotape of the last training session. Approximately 2.5 hours of footage were analyzed in order to assess the children's pragmatic skills in the interactive context. The coders were blind to the purpose of the assessment and were therefore unaware that the footage had been recorded at different time points or represented pre and post-test phases of the study. Before the coders began coding the footage included in the research design, they were trained for eight hours by the researcher. During the training, the protocol was explained and discussed thoroughly and two trial videotapes were analyzed under the researcher's supervision.

Detailed descriptions of the two measures follow.

- Pragmatic Abilities in Language Battery (Abilità Pragmatiche nel Linguaggio, Lorusso, 2009) for assessing pragmatic language skills. The battery assesses five main skills: understanding of verbal and figurative metaphors (e.g., to have one's head in the clouds), appreciation of the implicit meaning of the sentences (grasping information that is not explicitly present, such as the location at which a dialogue is taking place), comprehension of the dialogic structure of a communication (completing a dialogue), understanding the meaning of particular expressions in the context of social interaction (e.g. there is a storm in the air!) and ability to make referential use of language on the basis of a theory of mind (the ability to explain a game to a person who cannot see the materials). The verbal and figurative metaphors task assesses the child's ability to see beyond the literal meaning of a sentence and access the underlying analogy. In the task assessing appreciation of the implicit meaning of sentences, short stories are presented in dialogue form and the respondent is required to provide information that is not explicitly stated in the text but must be inferred from the other information provided and the structure of the dialogue. Comprehension of the dialogic structure of a communication is assessed via comic strips with incomplete speech bubbles. Children are evaluated on their ability to identify and (verbally) complete the missing parts in line with the given dialogic

structure, context and order of speaking. The task concerning the meaning of particular expressions in social interaction examines children's ability to contextualize a sentence, on the basis of everyday experience. Finally, the ability to make referential use of language on the basis of theory of mind is assessed via a game; specifically respondents are evaluated on their representations of the knowledge already possessed by an interlocutor versus the knowledge needing to be explicated. The total score for the battery ranges from 0 to 67 and separate scores are also computed for each of the five skills individually: metaphor (0-16), inference (0-14), dialogic structure (0-12), meaning of discourse (0-10), theory of mind (0-15).

- Pragmatic Protocol. The protocol is based on the checklist developed by Prutting and Kirchner (1987) and it essentially rates the pragmatic aspects of language (verbal, nonverbal, paralinguistic) as appropriate or inappropriate. The verbal parameters are: selection of a topic that is appropriate to the context, maintenance of a topic across a conversational exchange, turn-taking, repairing a conversation when a breakdown occurs, quantity of information provided (as comprehensive as required), accuracy of lexical selection, cohesion (text connection), comprehension of non-literal language (metaphor, irony), polite forms, requests. The nonverbal parameters are: physical contact, body posture, gestures, facial expressions, gaze. The paralinguistic parameters are: intelligibility, vocal intensity, prosody. A brief description of each parameter and an example is provided to the coders to guide their classification of behaviors. For example, the parameter "selection of a topic appropriate to the context" is further defined as: "introducing a subject related (referring to a subject area similar) to what is happening in the context or to a topic previously introduced by the interlocutors. Appropriate behaviors: Christmas holidays are being discussed and the child mentions gifts. Inappropriate behaviors: Christmas holidays are being discussed and the child begins to talk about what it did the day before without invoking any plausible link between this new topic and the holidays". Each parameter is rated on a 4-point-scale: 0 = inappropriate; 1 = slightly appropriate; 2 = appropriate; 3 = highly appropriate. The coder may also assign scores of 0.5, 1.5, etc. or select the option "No opportunity to observe". Separate mean scores are calculated for verbal, nonverbal and paralinguistic parameters.

3. Results

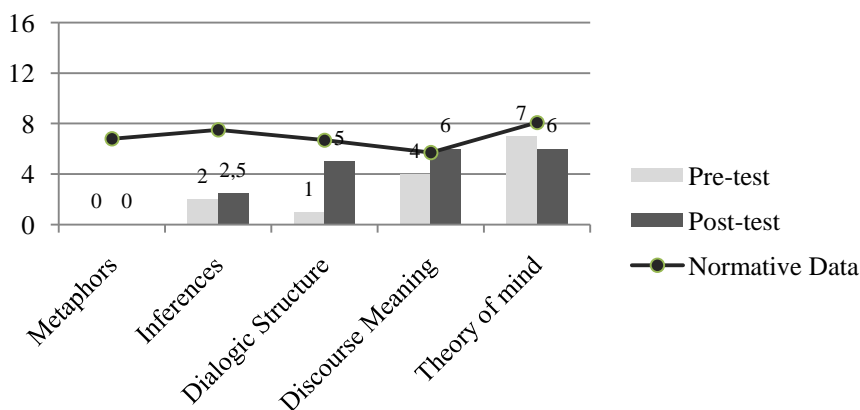
Each child's outcomes on the battery language and coding of video footage are reported below. Inter-rater agreement between the two coders for coding of the video-recorded material was over 80%¹¹.

3.1. Child 1: Andrea¹² (8 years and 9 months)

As illustrated in Figure 1, Andrea's levels of pragmatic skills, as assessed by the language battery, were generally lower than the normative standards for typically developing children of his age. At pre-test he displayed greatest difficulty in understanding of metaphors, mastering dialogic structure and grasping implicit information in a conversation (inference). The highest score that he obtained was on the theory of mind task although it too fell short of the normative level.

After the training, Andrea obtained higher scores in inference, understanding dialogic structure and the meaning of discourse than at pre-test. He displayed the greatest gain in understanding of dialogic structure.

Figure 1 - Scores on Pragmatic Abilities in Language Battery (Andrea)



With regard to the pragmatic skills observed during the structured activities and assessed using the protocol, the two coders rated Andrea's

¹¹ Inter-rater reliability was calculated for the three parameters (verbal, nonverbal and paralinguistic) taken together as a composite measure.

¹² The children have been assigned fictitious names for the purposes of this research report.

verbal pragmatic behavior as almost appropriate (pre-test Coder 1 = 1.95, Coder 2 = 1.85; post-test Coder 1 = 1.70, Coder 2 = 1.75), his nonverbal pragmatic communication as not completely appropriate (pre-test Coder 1 = 1.40, Coder 2 = 1.40; post-test Coder 1 = 1.40, Coder 2 = 1.50) and his paralinguistic language features as appropriate (pre-test Coder 1 = 2.17, Coder 2 = 2.17; post-test Coder 1 = 2.00, Coder 2 = 2.17) (See Table 2).

Concerning the verbal aspects, at both pre- and post-test, Andrea displayed almost appropriate behaviors, in relation to: selecting topics that were appropriate to the context, maintaining topics across the discourse, repairing a conversation when a breakdown occurred, providing the appropriate quantity of information and producing coherent discourse. His lowest scores, although high enough to be rated slightly appropriate, were on the nonverbal aspects, more specifically body posture, at both pre- and post-test. Finally, the coders rated Andrea's paralinguistic behavior, particularly intelligibility, as appropriate.

Table 2 - *Scores on Pragmatic Abilities in Pragmatic Protocol (Andrea)*

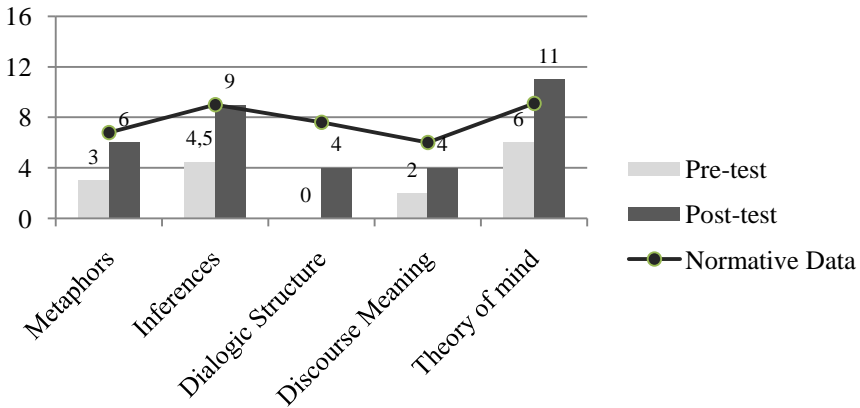
	Verbal		Nonverbal		Paralinguistic	
	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test
Coder 1	1.95	1.70	1.40	1.40	2.17	2.00
Coder 2	1.85	1.75	1.40	1.50	2.17	2.17

Note: Rating-points: 0 = inappropriate; 1 = slightly appropriate; 2 = appropriate; 3 = highly appropriate.

3.2. *Child 2: Filippo (9 years and 3 months)*

Figure 2 illustrates the gains in pragmatic skills displayed by Filippo from pre- to post-test. Specifically, at pre-test all scores fell below the normative standards, while at post-test he obtained higher scores for all the assessed skills, reaching normative levels in the ability to understand inference and theory of mind.

Figure 2 - Scores on Pragmatic Abilities in Language Battery (Filippo)



With regard to the pragmatic skills deployed during the structured activities and assessed by the two coders, Filippo was assigned a score of “slightly appropriate” on all three parameters: verbal (pre-test Coder 1 = 1.40, Coder 2 = 1.35; post-test Coder 1 = 1.60, Coder 2 = 1.60), nonverbal (pre-test Coder 1 = 1.40, Coder 2 = 1.40; post-test Coder 1 = 1.30, Coder 2 = 1.40) and paralinguistic (pre-test Coder 1 = 1.50, Coder 2 = 1.17; post-test Coder 1 = 1.50, Coder 2 = 1.33) (See Table 3). Both coders awarded a higher score at post-test for the verbal aspects of language, specifically for ability to select a topic appropriate to the context, repair a conversation and make requests. In contrast, Filippo’s scores for the nonverbal aspects of pragmatic communication remained almost unvaried at post-test. With regard to paralinguistic aspects, Coder 2 assigned a slightly higher score at post-test, specifically in relation to prosody.

Table 3 - Scores on Pragmatic Abilities in Pragmatic Protocol (Filippo)

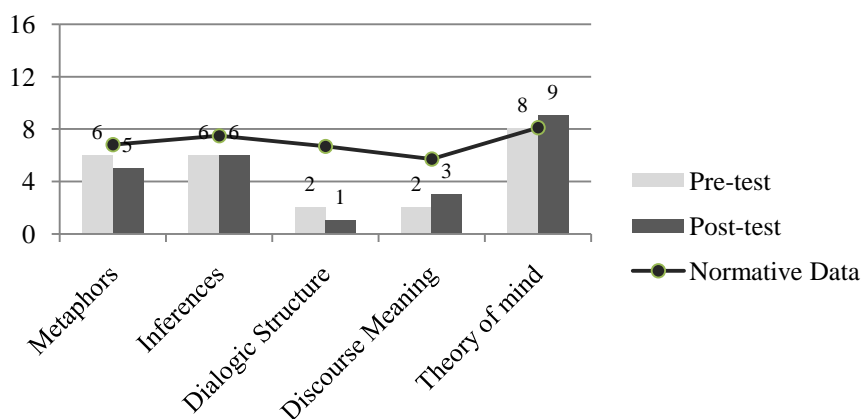
	Verbal		Nonverbal		Paralinguistic	
	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test
Coder 1	1.40	1.60	1.40	1.30	1.50	1.50
Coder 2	1.35	1.60	1.40	1.40	1.17	1.33

Note: Rating-points: 0 = inappropriate; 1 = slightly appropriate; 2 = appropriate; 3 = highly appropriate.

3.3. Child 3: Stefano (8 years and 4 months)

Figure 3 illustrates Stefano's performance on the pragmatic language battery. In general, at both pre- and post-test his scores fell below the normative standard, except on the theory of mind task. At pre-test Stefano obtained a score of 6 for metaphor and inference and a score of 8 for theory of mind. His lowest scores were for appreciation of the dialogic structure of a conversation and understanding the meaning of discourse. At post-test he scored one point less for understanding of dialogic structure and one point more for comprehension of meaning in discourse.

Figure 3 - Scores on Pragmatic Abilities in Language Battery (Stefano)



With regard to the protocol, both coders rated pragmatic behaviors as slightly appropriate across all three parameters: verbal (pre-test Coder 1 = 1.20, Coder 2 = 1.45; post-test Coder 1 = 1.45, Coder 2 = 1.50), nonverbal (pre-test Coder 1 = 1.20, Coder 2 = 1.50; post-test Coder 1 = 1.50, Coder 2 = 1.60), paralinguistic (pre-test Coder 1 = 1.33, Coder 2 = 1.67; post-test Coder 1 = 1.50, Coder 2 = 1.67) (See Table 4). Coder 1 assigned higher scores at post-test for the verbal (specifically maintenance of topics across discourse, turn-taking, repairing a conversation when a breakdown occurred and comprehension of non-literal language), non-verbal (physical contact, body posture and facial expression) and paralinguistic (vocal intensity) aspects of language. In contrast, Coder 2 rated Stefano's performance at post-test to be almost the same as at pre-test.

Table 4 - Scores on Pragmatic Abilities in Pragmatic Protocol (Stefano)

	Verbal		Nonverbal		Paralinguistic	
	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test
Coder 1	1.20	1.45	1.20	1.50	1.33	1.50
Coder 2	1.45	1.50	1.50	1.60	1.67	1.67

Note: Rating-points: 0 = inappropriate; 1 = slightly appropriate; 2 = appropriate; 3 = highly appropriate.

4. Discussion

The current pilot study assessed the pragmatic skills of three children with HFA via a language battery and coding of video-recorded interactions, both before and after a targeted training intervention.

The results showed that all three children had difficulty with the pragmatic aspects of language assessed by the language battery. This outcome is in line with other findings reported in the literature, which suggest that children with HFA experience problems in the area of pragmatics. Specifically, the children's performance on the pragmatic language battery fell below normative standards. This means that, although their intellectual ability and structural language competence fell within or above the typical range, they still maintained pervasive limitations in their social use of language. The language battery shows up deficits in pragmatic skills with respect to typical development and provides information about the similarities and differences among individual children's performances on pragmatic language tasks. In the current study, while all the participating children displayed difficulty with the pragmatic tasks administered, each obtained a peculiar pattern of scores across the different tasks, both at the two time points and in terms of the changes occurring from pre- to post-test. With regard to the similarities, all three children scored highest on the theory of mind task (even to the extent of matching the normative standard), while all of them obtained particularly low scores on the dialogic structure task. A possible explanation for participants' theory of mind performance may lie in the structure of the task. Specifically, the child is required to explain a game to a person who cannot see the materials. This task implies the capacity to realize that there can be differences between one's own knowledge and that of others and to select the information needing to be explicitly communicated. This capacity is a basic step toward a sophisticated theory of

mind (Begeer, Gevers, Clifford, Verhoeve, Kat, Hoddenbach, *et al.*, 2011). The researcher asks the child to provide information about the game, but does not ask elaborative questions about the other person's beliefs or knowledge. Thus, it is likely that the intellectual level of children with HFA enables them to perform adequately on this task. On the contrary, the dialogic structure task demands the ability to identify the missing parts of a conversation, appreciation of how the dialogue is related to the context and knowledge of order of speaking. This task involves several skills and, in particular, it requires the ability to ask questions, which is difficult for children with autism (Doggett, Kranso, Koegel, & Koegel, 2013).

In general, the outcomes at post-test reflected improvements in the pragmatic skills assessed by the language battery. Although there was no systematic increase in scores across tasks, all the children obtained higher scores than at pre-test in at least some of the skills. Filippo in particular displayed improvement on all the pragmatic tasks. These results lead us to suppose that the same training in pragmatic language skills may impact differently on different children who probably have different areas of strength and weakness. From a clinical viewpoint, the identification of intact abilities is key to designing training that builds on existing skills. It is therefore critical to assess both children's limitations and their resources. It is probable that Filippo benefitted from the pragmatic training due to the fit between his personal resources and the skills fostered during the training activities.

Although pragmatic difficulties were also detected in the coded video-recorded interactions, overall the children's behavior appeared to be more appropriate in the conversational setting. For example, it is interesting to note that Andrea had significant difficulty in completing the language battery but during the structured training activities his verbal and non-verbal behaviors were rated as almost appropriate and his paralinguistic behaviors as appropriate.

We can state that the improvements are more visible in the language battery's assessments than in the coded video-recorded interactions. This can be explained by the fact that in the conversational setting the children's pragmatic behavior appear quite appropriate already at the pre-test. Therefore, only limited positive changes emerge at the post-test in the coders' ratings of the recorded training activities. Moreover, as found by Parsons and colleagues (2017), in the extensive review of pragmatic language interventions with children with autism, a large effect size is likely to be detected when pragmatic competences are measured through

standardized measures when compared to observational method.

Thus, from a methodological perspective, we believe it essential to combine information from standardized language tests with the observation of conversational settings. Observational data is a further means of detecting potential differences (difficulties as well as potential strengths) in children's abilities, and enables more detailed individual profiles to be built up.

Furthermore, assessing pragmatic skills across several parameters may also help to define appropriate therapeutic goals.

With regard to the efficacy of the training, the evidence of some improvement in children's pragmatics skills suggests that the intervention was useful. Nonetheless, the results should be interpreted with caution: it is important to recognize the study's limitations and some related methodological issues as discussed in the following section.

4.1. Limitations and Future Directions

The extent to which we may generalize from the current findings is limited by the sample size. The research should be replicated with a bigger number of participants in order to confirm the efficacy of this form of pragmatic language training. The validity of the study would be further enhanced by inclusion of a control group in the research design. Furthermore, given that one of the particular difficulties of children with disability is maintaining learned skills, future research should ideally involve a follow-up phase. This would provide greater insight into the relative benefits of the training.

Given that pragmatics essentially represents the social use of language, the true measure of the intervention's effectiveness would be the spontaneous use of appropriate pragmatic language in everyday life. The generalization of learning is a crucial issue in conditions of disability, because it requires metacognitive abilities, including both knowledge and control of cognitive and emotional functioning (Pons, Daniel, Lafortune, Doudin, & Albanese, 2006; Rao, Beidel, & Murray, 2008). In other words, in order to transfer to a current situation learning acquired in a different context, the child must be able to understand whether the new situation has similar features, whether the learned strategies are appropriate, what the goals are; it also needs to be able to monitor whether what it is doing is leading to the expected result and to know how to handle unexpected events.

In assessing forms of theory of mind training for children with ASD, Begeer and colleagues (2011) observed that these children often have

difficulty generalizing learned abilities, and that training can lead to gains in theory of mind skills at a conceptual level without necessarily enhancing the use of these skills in everyday life. In addition, Paul (2008) noted that children with ASD have difficulty using language in social contexts, especially with peers. On the contrary, Gevers and colleagues (2006) found significant generalization of social cognitive abilities from training to daily life, as reported by parents. But, as the authors themselves pointed out, this may depend more on parents' positive expectations than on the treatment in itself. Such empirical evidence confirms the importance of developing training aimed at helping children to transpose their newly acquired skills to daily life.

The adult, whether as a parent, teacher or therapist, has a key role to play in teaching, supporting children's learning processes by providing appropriate stimuli, and reflecting on what is going on. A number of studies (Gevers, Clifford, Mager, & Boer, 2006; Howlin, Gordon, Pasco, Wade, & Charman, 2007; Paul, 2008; Parsons *et al.*, 2017) have pointed up the importance of involving significant others (both adults and peers) to interact with children with ASD, in order to create environments that promote social inclusion and encourage use of the skills learned during training in real life settings. In particular, Paul (2008) suggested that in order to maximize the effect of an intervention, opportunities for peer-mediated interaction with trained peers in natural settings should be provided. Also the involvement of parents and teachers who have received targeted training (see Parsons *et al.* 2017 for a review on pragmatic interventions) facilitates significant language development (Sussman, 2012).

Parents and teachers have a valuable role to play not only in training, to help the children generalize the skills acquired and provide a sense of continuity, but also during the assessment phase. As noted by Volden and Phillips (2010), ratings of pragmatic skills by someone who knows the child are an alternative to the assessments of researchers and clinicians. Parent and teacher reports, while subject to the risk of subjective interpretation, offer distinct advantages. Teachers and parents have the opportunity to observe the child's use of language in natural, authentic settings (home and school), and this enables them to capture salient aspects of children's pragmatic behaviors that may be difficult to elicit in test situations or during structured activities or may occur relatively infrequently. Ultimately they have the opportunity to observe the child in the course of everyday life, which is where pragmatic problems are likely to be most pronounced. Furthermore, because they know the child well, they are more likely to represent its

child's typical level of functioning and be less influenced by daily fluctuations. This is borne out by our own previous studies with children with HFA in which parents provided rich information about their children's abilities as well as helping the research team to interpret the data collected (Farina, Businaro, Brambilla, Albanese, Mancuso, Biondi, *et al.*, 2012; Businaro, Lupi, Molteni, Gitti, Polo, Farina, *et al.*, 2015).

A further caveat concerns the pragmatic protocol used in this study, which was based on the checklist proposed by Prutting and Kirchner (1987). We suggest that further assessment of the instrument's psychometric properties is required before firm conclusions may be drawn from the data.

In conclusion, while we are aware of the preliminary nature of the present pilot study, we believe that our effort provides strong encouragement for future research aimed at developing new and even more specific and sensitive methods for measuring pragmatic skills in children with autism and designing and implementing effective training programs.

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