

## Does a treatment for increasing social skill affect the occurrence of challenging behaviors?

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### Abstract

*There is direct evidence of an inverse functional relation between children's rate of problem behaviors and their social interactions. This research was conducted with two children with autism interacting with each other and has two different purposes: the first to explore the emergence of spontaneous social behaviors in children with autism, the second to demonstrate the efficacy of a social skills training in decreasing challenging behaviors.*

*Procedures based on ABA principles (prompting and reinforcement) were used. No specific intervention on problem behaviors was applied.*

*Data showed a significant increase in spontaneous manding to peer, approach to peer, and parallel play. Problem behaviors decreased significantly as a side effect of increased social abilities.*

*These preliminary data corroborate the use of ABA procedures with ASD*

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*children in promoting the emergence of spontaneity in social behavior in peer-to-peer and child-to-adult interactions and are also in line with data in the literature that relate the acquisition of more complex social repertoires to significant reduction in problem behaviors.*

**Keywords:** Social skills; Early intervention; Behavioral training; Manding; Autism.

## 1. Introduction

Children with autism show a significant impairment in social skills. Koegel and Frea (1993) identified several deficits in the social repertoire as part of the typical behavioral pattern of children with autism, among which are reduced responding to verbal initiations from others, shortfall in using an appropriate non-verbal repertoire, and deficits in keeping eye contact with a speaker (Rimland, 1964; Waterhouse & Fein, 1978; McHale, Simeonsson, Marcus, & Olley, 1980; Bernard-Opitz, 1982; Schreibman & Mills, 1983).

Defining the core of social skills is not an easy task since this broad category includes multicomponent behavioral repertoires (McConnel, 2002). Some of these skills are basic interactive abilities that include playing with peers, engaging in purposeful activities, maintaining lesser physical distance from peers (Lord & Magill-Evans, 1995), focusing on other children, producing verbalization to others, (McGee, Feldman, & Morrier, 1997), having initiations to peers, and responding to social initiations from peers (Sigman & Ruskin, 1999). Other skills are more complex communicative abilities like social and play problem solving activities, keeping interactions, greetings others, talking on a variety of topics, giving and accepting compliments, taking turns, sharing, asking for help and helping others (Kamps, Leonard, Vernon, Digan, Delquadri, Gershon, *et al.*, 1992).

Research has shown that early interventions are effective in teaching one or more of the social behavior repertoires listed above to children with autism (Lord & Magill-Evans, 1995; McGee, *et al.*, 1997, Sigman & Ruskin, 1999), but are less effective in training spontaneous starts of conversations or interactions with others. In this context spontaneity might be defined as a response given in the absence of any verbal prompt from an adult, and it seems particularly difficult to teach and develop in children with autism at rates that maximize access to natural reinforcers (Charlop, Schreibman, & Thibodeau, 1985).

Research also shows that there is a close relationship between deficits in communication repertoires and emission of challenging behaviors (Carr & Durand, 1985; Waters & Healy, 2012). However, there is a small amount of research focused on the analysis of the inverse relationship between a child's rate of problem behaviors and social interactions and participation (Koegel, Koegel, Hurley, & Frea, 1992; Mc Connel, 2002).

## 2. Aims of the study and hypothesis

Our research has two main goals. The first is to demonstrate the efficacy of an Applied Behavior Analysis (ABA) based training in the acquisition of social skills within an interpersonal context. More specifically, this study focused on reciprocally and dependently teaching to two children with autism a) simultaneous manding towards peers and adults, b) parallel play and spontaneous approach to peers. In addition, we evaluated whether an ABA based intervention can result in an overall increase in social spontaneous interactions deriving from the combination of the above-mentioned behaviors. The second goal was to examine if an inverse relationship between social skills acquisition and challenging behaviors would occur as an effect of the training.

We were thus expecting to observe a:

- a. significant increase in spontaneous social behaviors defined as manding to peer, parallel play, and approaching peers;
- b. and a significant reduction in problem behaviors.

## 3. Methods

### 3.1. Participants

Child 1 was a four-year-old ASD boy and a Child 2 was five-year-old ASD girl. Each was diagnosed by one of the National Health System Child Psychiatry Centers in Northern Italy as having ASD. Both had been enrolled in an EIBI program for one year prior to the study.

Italian versions of the VB-MAPP (Sundberg, 2008) and the Vineland Adaptive Behavior Scales (Sparrow, Balla, & Cicchetti, 1984) were used to assess the areas of competence and deficit in the children. Their vocal repertoire included spontaneously emitted mands to adults in a one-to-one interaction, but no manding to peers. Both children showed problem behaviors such as crying or hitting when begging for a toy they were not playing with, hitting for attention, or hitting when they had to give back a toy or an object.

Specific problem behaviors were different for the two children. Child 1 hit other children to obtain a toy the peer was playing with, or to get peer's attention. Child 1's problem behavior was measured in term of frequency. Child 2 cried or shouted to get a toy from peers or if another child took her toys away. In addition, when asking for a toy she could shout repeatedly "I

want it, I want it, I want it....” for up to two minutes. The relevant dimension of this behavior was considered duration, and it was recorded as total duration in each session.

### *3.2. Setting and training organization*

The study took place in a clinic for treatment of autism and other developmental disorders. It was conducted over a period of 15 weeks, as a part of a program offered by local town authorities to families of children with a diagnosis of autism. Once per week the two children attended a three-hour social-skills training.

Three ABA trained professionals conducted the training. The one with the most clinical experience (the first author of this paper, hereafter called teacher) ran the training: she proposed activities based on a prearranged schedule, verbally initiated the planned activities, managed the transitions between activities, manipulated Motivating Operations to promote mand emission in children and coordinated the work of the other two professionals. The term Motivating Operations refers to any environmental variable that a) alters the effectiveness of some stimulus object or event as a reinforcer; and b) alters the current frequency of every behavior that has been reinforced by that stimulus object or event (Michael, 1982; 1983; 1988; 1993a; 1993b; 2000; Cooper, Heron, & Heward, 2007). The other two professionals played the role of “shadow tutors”. They sat near each child and prompted him/her only if he/she needed help following teacher requests. When the child did not answer, he/she was given an echoic prompt, combined with a physical one if the child had to additionally perform a physical action. No other adults or children were present during the sessions.

The three-hour time interval was structured into blocks. During each block, the teacher proposed and managed the planned activities, and alternated them with free play as well as structured play. In the while she was paying attention to suggest games that could promote mand emission, parallel play and approaching to peers.

### *3.3. Conditions and Response definitions*

Whitman, Mercurio, and Caponigri defined a social response in terms of “one child's behavior becoming mutually or reciprocally involved with a second child's behavior” (1970, p. 134). This definition seems appropriate to our research because it encompasses the wide range of abilities belonging to

social skills. Communicating their own needs, interacting with other people (both adults and peers), and playing with other children are pivotal skills for children with autism. More specifically, the definition of social skills includes the four areas that were assessed through the VB-MAPP (Sundberg, 2008) and Vineland Adaptive Behavior Scales (Sparrow, *et al.*, 1984) and were identified as being main targets for the two children in this study: a) manding to peers, b) manding to adults, c) parallel play, and d) spontaneous approaching to peers. More precisely: manding to adults and to peers was defined as the child uttering the name of the requested object or activity facing the adults or the peers respectively. Approaching to peers was defined as the child coming close to a peer in a range of 10 to 20 cm, even in the absence of any verbal or non-verbal interaction with the peer. Given a common set of toys, parallel play was defined as the child playing in the proximity (about 10-20 cm) of any other child for at least one minute. The subjects were not requested to interact with the peer or playing with the same toys.

The first three of these behaviors could be defined as either spontaneous or prompted. A prompted response was a response given after a physical or a vocal cue provided by the teacher and the shadow tutor. A spontaneous response was a response given in absence of any prompt by the teacher and controlled by events in the play setting of the children.

### 3.4. Procedure

Different procedures were adopted for each target behavior:

- Manding: Mand training requires establishing the need for the child to request something. The teacher established the motivating operations (MO) for each child in different ways. Examples of MOs included holding a piece of a toy or other component, which was needed to complete an activity, giving valued items to the other child, or showing different ways to play with the toys. If the child did not emit a mand, then when a child showed interest in either the toys or the activity, the shadow tutor provided an echoic prompt by uttering to the child the appropriate request for manding. In this latter case, we adopted a procedure based on transfer of stimulus control, specifically a transfer from an echoic response to a mand response, often known to ABA professionals as “transfer from echoic to mand” (Charlop *et al.*, 1985; Ingenmey & Van Houten, 1991). The echoic prompt was presented for three times consecutively, and each time reinforcers (the

manded object or activity) were delivered if the child replicated the prompt. After the third time, teacher waited three seconds for a spontaneous mand to occur. If the child asked for the object without any prompt (independent response), the appropriate reinforcer was delivered. If the child did not emit any request, an echoic prompt was provided again, the manded item was not delivered and the above-mentioned procedure re-started. The procedure was used to promote manding both to peers (i.e. any vocal or non-vocal response addressing a peer to obtain an object or an activity) and to adults (i.e. any vocal or non-vocal response addressing an adult to obtain an object or an activity) and was cycled until the child emitted an independent response.

- Parallel play: In order to promote playing closer to each other, but without having physical contact or the need to interact, children were allowed free time to play with a big and multi-item toy, like a kitchen with pans, pots and dishes, a farm house with a number of animals, vehicles, etc. Reinforcers in the form of verbal praise or others social reinforcers (high five, clapping hands etc.) were delivered when the targeted behavior occurred. No reinforcers or prompts of any sort were delivered if a child did not play with the other child within the designated distance. The environment around them was manipulated in such a way that access to other toys or other reinforcers was restricted.
- Approaching peers: During a free time period, children received two different toys. The toys were rotated among the highly preferred toys of the two children. Each child received the toy preferred by the other one. If one child approached the other within the designated distance, he/she received verbal praise or other social stimuli from the teacher. When the children were playing beyond that distance, the teacher delivered no attention.

Different schedules of reinforcement were used during parallel play and approach-to-peers trainings. In the early sessions target behaviors were reinforced under a continuous schedule. Later, variable ratio schedules, usually a VR3, were used to promote more natural and direct contingencies of reinforcement deriving from the social interaction with the peer.

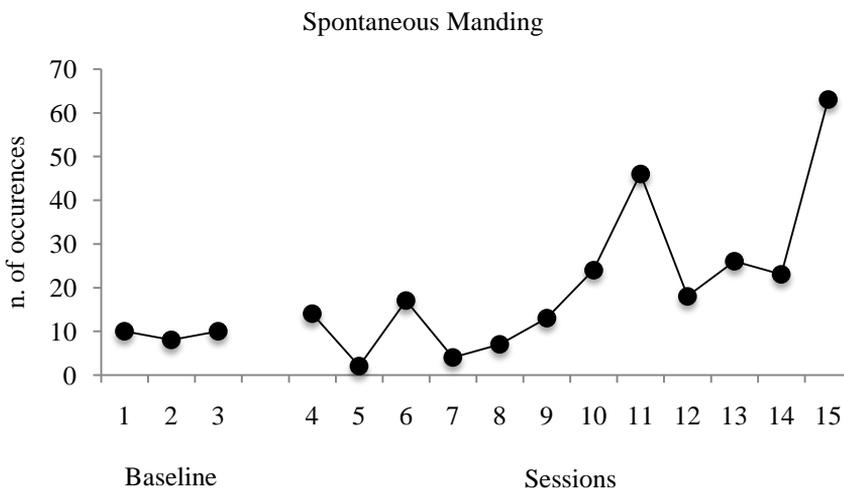
### 3.5. Measurement

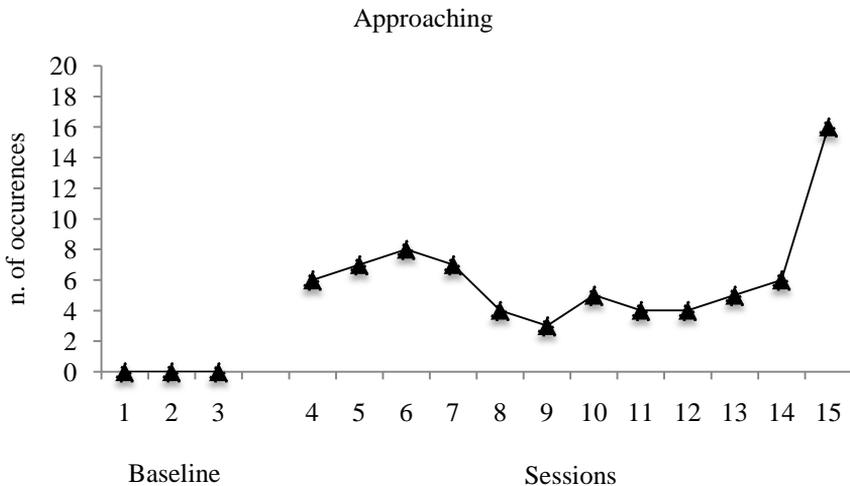
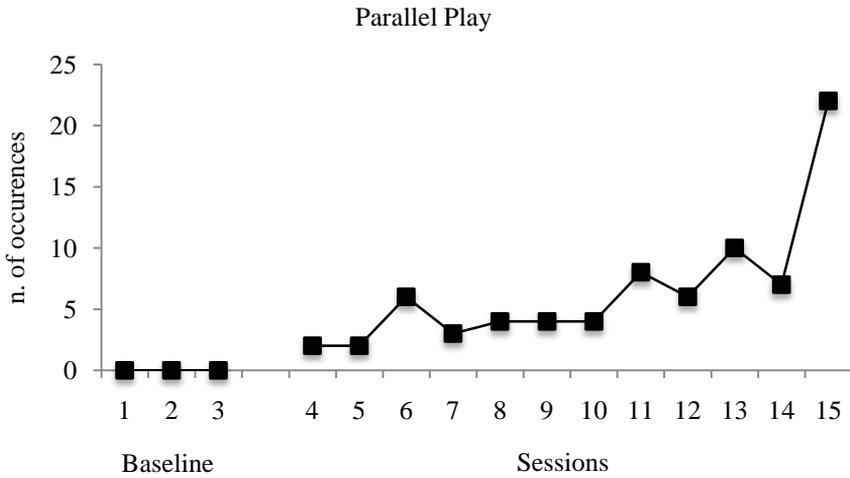
An A-B design was used in this study. During the baseline (phase A) children were observed during free play activities and during structured activities managed by the teacher. During the B phase (intervention) an observer registered the occurrence of any instance of the target behaviors on a data sheet designed for that purpose. A continuous recording procedure was used throughout the three hours of the session. Prosocial spontaneous behaviors between the two children is thought to be interdependent or, to say it differently, we should expect that increase in the prosocial behavior of one child should be reflected by an increase on the other child and viceversa. To assess this hypothesis we performed a Spearman correlation test on spontaneous behaviors considering sessions as the statistical units of analysis.

## 4. Data analysis

During baseline both children showed very low levels of the targeted behaviors, with no mands to peers and very few to adults. Figure 1 (a) shows the frequency of spontaneous behaviors emitted by Child 1 through the 15 training sessions. The first graph plots spontaneous parallel play. At baseline Child 1 showed no parallel play and his behavior progressively increased to 22 behaviors per session by the end of the training.

Figure 1a - *Frequency of spontaneous behaviors emitted by Child 1*





A similar trend can be seen in spontaneous manding both to peer and adults. During baseline Child 1 emitted very few mands. Following training frequency in manding increased. As might be expected, at the beginning number of requests fluctuated, but in the following sessions the frequency gradually and constantly increased by 530% over baseline. During baseline, it was also observed that Child 1 never approached his peer. During training approach-to-peer responses increased and showed a significant peak in the last session.



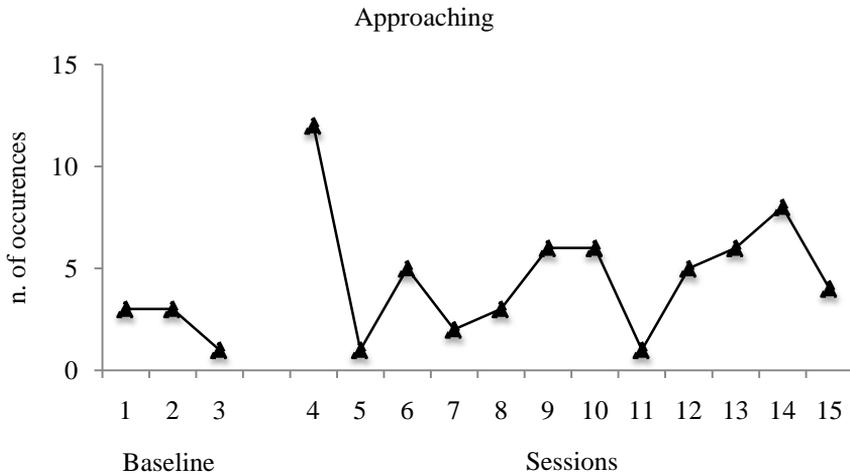


Figure 1 (b) shows the frequency of spontaneous behaviors emitted by Child 2 through the 15 training sessions. Like her peer, Child 2 never engaged in parallel play. An overall analysis of figure 1 (b) shows an initial increase in all three behaviors (parallel play, approaching, manding) after the introduction of training. Approaching and parallel play show a fluctuating trend between the 5th and 10th session while manding progressively and gradually increased. All three behaviors show a reduction at the 11th session and then they gradually increase again. Although during training behavior levels appears more variable than her peer's, at end of the sessions Child 2's manding behavior increased nearly 220% compared to baseline, while approach showed the most fluctuation, and ultimately increasing during last session by 30% compared to baseline. Parallel play improved too. Overall data show that the two children were spending more time close together in manding toys or activities, and interacting more between themselves and with adults who were present during the sessions.

Since spontaneity is considered the crucial feature of social behavior, we combined the three target behaviors, manding to peers, approaching peers, and parallel play in non-prompted conditions to get what can be called an index of "spontaneity".

Figure 2 - Variations in the level of problem behaviors as a function of the increase of this spontaneity index

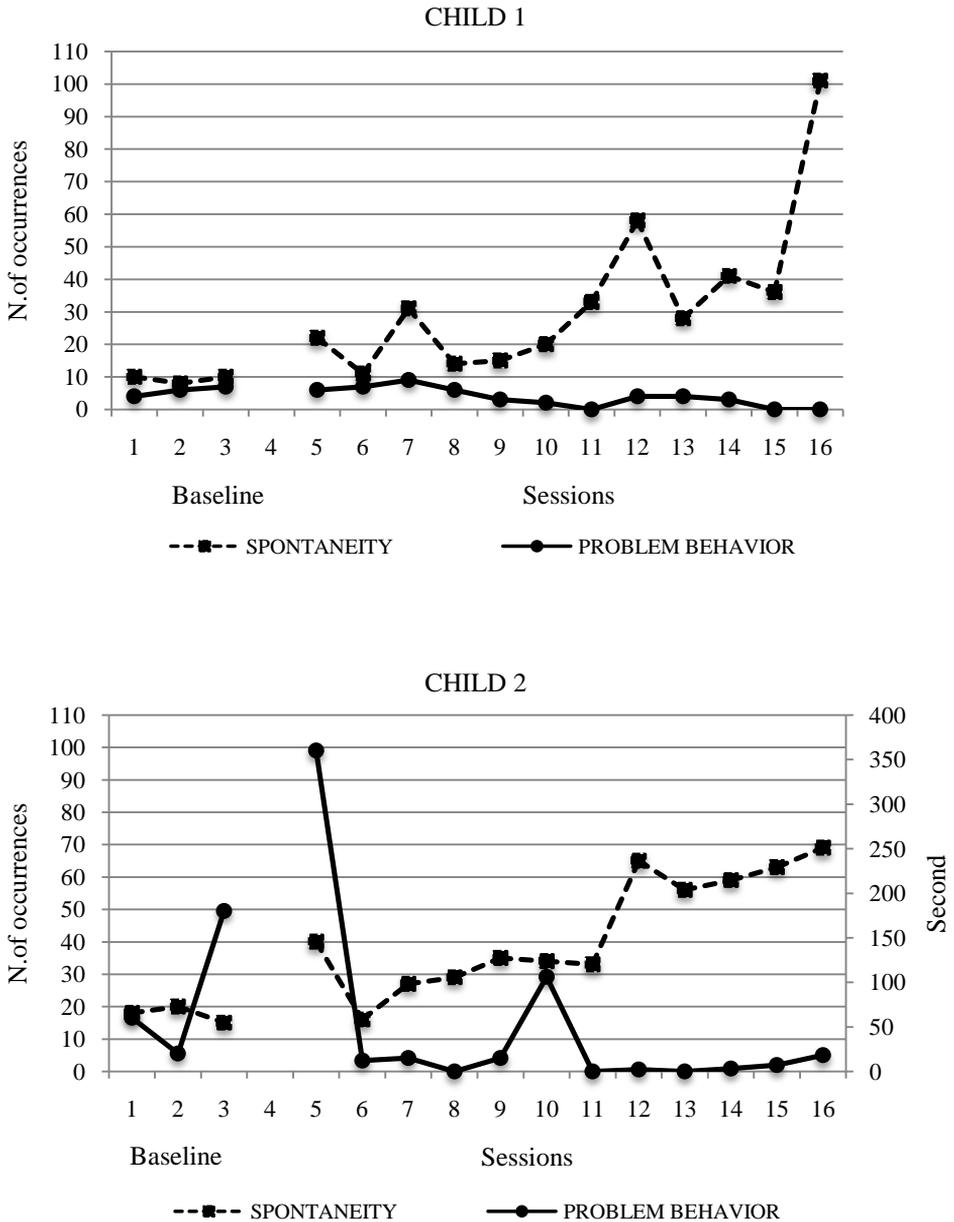
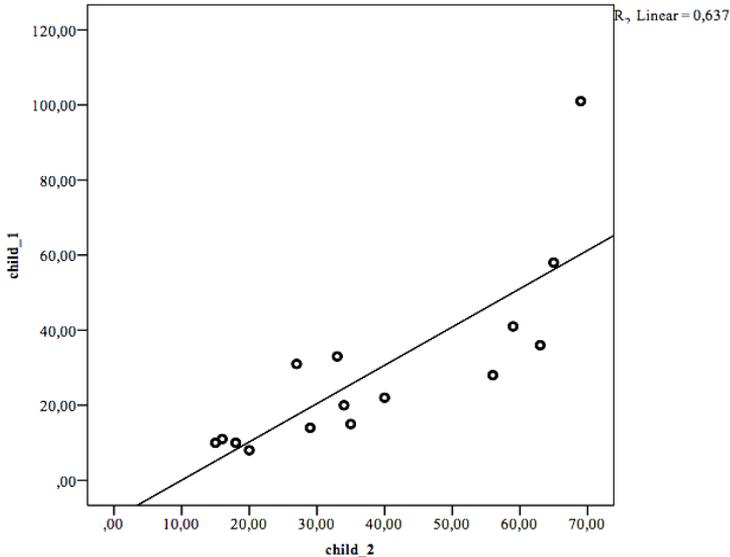


Figure 2 shows variations in the level of problem behaviors as a function of the increase of this spontaneity index. Very few spontaneous behaviors

occurred at baseline for both children when problem behaviors were present. When training was introduced we observed a decrease in problem behaviors and conversely an increase in spontaneous behavior. When data of spontaneous behaviors are paralleled with the data reflecting problem behaviors for Child 2, the peaks and trough above reported are part of an extinction process. An extinction burst is present on first session of training followed by extinction in the following sessions, with spontaneous recovery on session 9. Compared to baseline results, the progressive increase of social skills paralleled a decrease of problem behaviors, which eventually zeroed around the tenth session.

For both children problem behaviors approximated zero, with a final decrease observed of 400% and 70% respectively for Child 1 and 2 when compared to baseline levels. There is a point-to-point correspondence, between increasing mand emission and decreasing problem behaviors. On those days during which children emitted few mands, both children engaged in high levels of challenging behaviors. The overall increase in spontaneous behaviors for Child 1 is nine-fold and for Child 2 is six-fold.

Figure 3 - Scatterplot collecting spontaneous behaviors of Child 1 and Child 2



When we tested the relation between the spontaneous behaviors of the two children as plotted in figure 3 they positively correlate ( $\rho_s = .86$ ;  $p < .001$ ). A linear regression analysis confirms spontaneous behaviors of Child 1 is linked to the spontaneous behavior of Child 2 ( $R^2 = .64$ ). Approximately

the 64% of the variance of the spontaneous behavior of Child 1 is explained by the spontaneous behavior of Child 2 and viceversa.

## 5. Discussion

Interventions based on Behavior Analytic principles have been demonstrated effective in increasing the frequency of time engaged in, and duration of social interactions for children with autism (Kamps, *et al.*, 1992). Authors have investigated the effect of social skill trainings in many contexts of interaction, including playing with peers, engaging in purposeful activities, playing at lesser physical distance from peers (Lord & Magill-Evans, 1995), focusing on other children, uttering to others, (McGee, *et al.*, 1997), initiating and responding to interactions with peers (Sigman & Ruskin, 1999), problem solving activities, playing, keeping interactions ongoing, greetings others, talking on a variety of topics, giving and reciprocating compliments, taking turns, sharing, asking for help, and helping others (Kamps, *et al.*, 1992).

These preliminary data corroborate the use of ABA procedures with pre-school ASD children in promoting the emergence of social behavior. The social skills training here reported was able to improve pivotal social behaviors, such as manding to peer, manding to adults, approaching to peer and parallel play.

A key point in the discussion of the data here reported is the emergence of spontaneity. In the existing literature (Charlop *et al.*, 1985), the achievement of spontaneity in social skills has always been identified as a critical point for children with autism. Research shows that spontaneity is often difficult to achieve for children with autism. They usually learn to emit mands and social behavior, but they rarely emit them spontaneously (Charlop *et al.*, 1985). This research shows that the use of interventions based on prompt delay and on transfer procedures focused on promoting the occurrence of independent responding, allow children with autism to acquire spontaneous social responding within peer-to-peer interactions.

Moreover, another important issue is demonstrating a relationship between the increase in social skills and decrease in problem behaviors. Research has underlined the close relationship between deficit in communication repertoires and emission of challenging behaviors (Carr & Durand, 1985; Waters & Healy, 2012). Yet there is little research focused on the analysis of the inverse relationship between a child's rate of problem behaviors and social interaction and participation (Koegel *et al.*, 1992; Mc

Connell, 2002). The data from this research further contribute to this field by showing that even when children acquire social skills in a peer-to-peer interaction (which could be potentially critical since both children are on the spectrum), problem behaviors decreased even in the absence of specific intervention on them.

The number of problem behaviors emitted by both children, which was very high during baseline, showed a decrease during training. Both children showed a large increase of problem behaviors at the beginning of mand training, which is consistent with the well-known phenomenon labeled as “extinction burst”. However, after few sessions, both children showed a significant reduction in problem behaviors as expected. We suggest that this is related to the new alternative repertoires the children were learning as a way to interact with other children and to express their own needs.

There is a sort of point to point correspondence between high rates of social responses and low rates of challenging behaviors and viceversa. The more skilled children become in producing spontaneous social behavior (emitting mands, playing with others and staying close to another individual) the more problem behaviors decrease. More generally the occurrence of spontaneous behaviors (as an effect of three different repertoires) seems to be correlated with a significant reduction in problem behaviors. In other words, the child approaches his/her peer more frequently and in ways that are reinforced by natural social contingencies, thus concurrently showing a decrease in the number of problem behaviors. At that point problem behavior was no longer necessary or functional.

This study was conducted with a design that emphasized external validity (ecological validity) over internal validity. There are several issues that limited the external validity of the experimental design. For example, we could not use a reversal design because we could not control whether or not the social behaviors taught in that context would be used in other social occasions when back at home. In other words, it was likely that social behavior might not return to baseline when experimental conditions were suspended. In addition, these new social behaviors allowed children to contact natural social contingencies of reinforcement provided by other peers or adults. Removing the independent variable manipulated by the teacher would not necessarily mean that other intervening variables would not maintain the behaviors. Since behaviors provided by other individuals interacting with the child might act in maintaining manding, playing, and approaching. Likewise, it was not possible to use a multiple baseline design across subjects or behaviors since each behavior is not independent in these

social conditions. To be able to formulate a mand a child must get closer to a peer and that might put the child in a parallel play situation. The data seem to confirm this hypothesis. If we look at the trend in spontaneity of the two children we notice the same general trend. For both children, all three behaviors show a gradual and steady improvement. This appears to support for the hypothesis of interdependence which was tested and confirmed by the regression analysis.

The way the center was structured and permissions connected to Italian privacy laws did not allow for a second observer or video recording of the sessions, thus making it impossible to evaluate the reliability of the observed data. In addition, it was not possible to collect follow up data for the children, given that the training was offered as part of a larger intervention program by the local government authorities within a plan to explore ways to support families of children with autism.

## 6. Conclusions

Despite the pervasive deficit in social skills and the significant impact that such deficits have on various daily activity, there are very few studies in literature that present procedures to teach them (White, Keonig, & Scahill, 2007).

The preliminary data presented in this article suggest that applied behavior analysis procedures are effective in teaching social skills. Data show increases in children manding to peers and adults, an enhancement of the frequency of approaching other individuals, an increase in spontaneity during the interaction with peers, and the corresponding decrease in problem behaviors.

Within its design limits, this exploratory research puts into evidence elements that might address future and more structured research. For example, replicating the study on a larger sample by using a multiple baseline design across subjects and could be useful to confirm the effects of manipulating such variables and maybe further assess if children generalize abilities learned in a structured context to a natural context.

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