

The effects of changing the classroom play environment on the peer interactions of autistic children with an intellectual disability

Hayley Locke and Brian Fennell

Abstract

Purpose – Autistic children, particularly those with an intellectual disability, often face difficulties with early verbal development and social interaction. The science of behaviour analysis has developed procedures shown through research to help support and teach these skills. Interventions focusing solely on manipulating the antecedent stimuli in the environment are presented less frequently in the literature than those concerned with response consequences. This study aims to evaluate if changes to the classroom environment would evoke prosocial behaviours during play sessions.

Design/methodology/approach – A multiple treatment reversal design was used to compare the presence of anthropomorphic toys, pet animals and toys themed upon preferred interests, introduced on a central table within the existing play area. Data were collected on the social behaviour of peers in two primary classrooms.

Findings – For five of the six participants, all three conditions resulted in increased social behaviour compared to baseline conditions.

Originality/value – At the time of the study, social interaction opportunities were limited due to the COVID-19 pandemic restrictions, placing greater emphasis on safely encouraging opportunities within the classroom to ensure skill maintenance. Due to the reported outcomes, educators, particularly in specialised settings, should focus on evaluating their classroom environment to ensure the contents and layout support children in maintaining and generalising their social skills. Further research on the benefits of class pets is also encouraged.

Keywords Autism, Social interaction, Play, Classroom environment, Anthropomorphic toys, Preferred interests, Class pets

Paper type Research paper

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Supporting the development of social skills

The ability to interact socially with others is fundamental for building relationships. People develop social interaction skills in childhood by watching, imitating and learning from those around them (Eckerman and Stein, 1990). These skills include vocalisations, gestures, body language and facial expressions. Autistic children, particularly those with an intellectual disability, may experience challenges in sharing, imaginative play or making friends (American Psychiatric Association, 2013). They are also more likely to need support with their verbal development than typically developing children. This can impact their independence and communication skills as verbal behaviour contributes to most socially significant behaviours (Cooper *et al.*, 2020). In supporting the development of social and verbal behaviour interventions for autistic children with an intellectual disability, three key constructs can be considered: firstly, teaching the structure through modelling and prompting and interventions to

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extend vocabulary (Baker *et al.*, 1998; Boyd *et al.*, 2007; Hanley *et al.*, 2009), secondly, teaching the function through establishing contact with the relevant reinforcing properties (Baker *et al.*, 1998; Boyd *et al.*, 2007; Hanley *et al.*, 2009) and thirdly, manipulating the environment (Lodhi and Greer, 1989; O’Haire *et al.*, 2013; Quilitch and Risley, 1973) to ensure there is opportunity and motivation for these skills to be generalised outside of direct instruction. It is also important to ensure that the prerequisite skills are in repertoire, notably imitation.

What role does the classroom environment play?

Despite the importance highlighted by Quilitch and Risley (1973), minimal studies have evaluated how the materials presented in classroom free-play settings can be used to support social play and peer interactions and how the classroom environment can be an important motivating operation to complement and generalise social skills.

Schools that use the Comprehensive Application of Behaviour Analysis to Schooling (CABAS®; Greer, 2002) actively encourage arranging the classroom environment to promote independent play and group activities. Students are first taught to engage independently with materials using conditioning procedures (Nuzzolo-Gomez *et al.*, 2002). It is suggested that the toys that have been conditioned are placed within the play area; however, how to select specific toys to encourage cooperative play or peer interactions best is not detailed, a limitation also present across the wider behaviour analytic literature (Boyd *et al.*, 2007). The following findings in the literature highlight different stimuli categories that can aid social skills development.

Anthropomorphic toys. Lodhi and Greer (1989) examined the behaviour of typically developing children during solitary play with anthropomorphic or human-like and nonanthropomorphic toys (e.g. books). All participants emitted significantly more verbal behaviour and a wider range of operants in the anthropomorphic condition and little-to-no conversational units in the nonanthropomorphic condition, demonstrating that the children acted as both speakers and listeners when interacting with the anthropomorphic toys. It can, therefore, be hypothesised, as preliminary findings from a small-scale extension study (Ruff and Hewett, 2015) indicated, that introducing these stimuli during close proximity play may be an effective strategy to increase peer interactions.

Preferred interests. One of the criteria for diagnosis of autism is “circumscribed or perseverative interests” (American Psychiatric Association, 2013), which may result in play and interactions that could be perceived as different due to a somewhat repetitive nature. Research has shown these interests can be positively included as embedded reinforcement to increase engagement with learning materials (Clarke *et al.*, 1995; Hanley *et al.*, 2009) and to support autistic children to be included in play and interactions with their peer groups (Baker *et al.*, 1998; Boyd *et al.*, 2007).

Animal presence. O’Haire *et al.* (2013) compared the social behaviours of autistic children towards their typically developing peers and adults when given access to toys or guinea pigs. Findings supported previous research (O’Haire *et al.*, 2013; Talarovičová *et al.*, 2010) that the presence of animals increased social interactions more than the presence of toys.

Background to the current research project

Previous studies on peer interaction and social behaviour usually included typically developing children among participants or as part of the intervention. Boyd *et al.* (2007) highlighted a lack of research focused solely on supporting autistic children. There is continuing growth of specialist settings in the UK solely attended by autistic children with an intellectual disability. At the time of the study, COVID-19 restrictions limited students mixing across settings, reducing peer interventions. The researcher identified a need to evaluate how the classroom environment could be manipulated to support social interactions between autistic children best and to promote generalisation and maintenance of social skills already gained during teaching

interventions. The current research project, therefore, aimed to evaluate if adding specific materials to the play area would increase the level of social behaviour between peers and if this would vary based on the pre-requisite skills of the participants.

Methods

Participants

Five males and one female, aged five to seven, participated in the study. Participants 1–3 were in Class A, and 4–6 were in Class B. All participants had a primary diagnosis of autism and associated intellectual disabilities. Each participant had an educational and health care plan ([Government UK, 2021](#)) detailing their special educational, health and social needs, including individualised outcomes to be provided by their educational placement. The identified needs that were significant to the study for all participants included developing functional communication skills, social interaction skills, play skills and peer initiations.

Consent to participate was given by parents as well as participants, who were provided with photographic and symbolic consent forms read out by the teacher.

Setting

The study took place in an independent special school in England. The pupils attended five days a week for 42 weeks of the year. Each class had a small play corner with a range of toys and books available, as well as their individual learning desks and resources. Due to COVID-19 restrictions, the pupils and staff had become a “bubble” and remained predominantly in the primary building, which consisted of six small classes.

Design/data

A multiple-treatment reversal design ([Cooper et al., 2020](#)) was selected for the study to compare the effects of the independent variables (anthropomorphic toys, preferred interests and animal presence) and to include a comparison with the baseline condition. Sessions were recorded using a video camera to aid the data collection. Continuous count data was recorded for each dependent variable during the three 5 min sessions for each condition. An average for the total social behaviours in each condition was then calculated. The proposed design and procedures were reviewed and approved by the Ethics Committee both at the school setting and at Queens University Belfast, where the researcher attended.

Procedure

In all conditions, the teachers directed pupils to the play area. They did not initiate interactions with the pupils but responded. In Condition D, teachers also redirect any inappropriate behaviour towards the animals or support the animals as needed. The conditions were presented in the following order three times daily for 5 min in each phase. They then moved to the next phase the following day. This was conducted over seven days.

Class A: A-B-A-C-A-D-A Class B: A-D-A-C-A-B-A

Condition A – baseline. The play corner contained a range of toys arranged around the edges. These toys remained and could be accessed in all conditions. There was no central table in this condition.

Condition B – toys related to preferred interests. Preference assessments were used to identify preferred interests for each participant a week before the intervention to allow for resourcing. [Cooper et al. \(2020\)](#) outline that when considering preference assessments, typically used to identify reinforcers, it is possible to determine this simply by asking the client

or significant people in their life. For those with limited language skills, pictures can be used to support. The lead class teachers were therefore asked to select pupils' three main areas of interest, and then pupils were asked to select which of these categories of toys they would like to be added to the play area from the pictures presented. Three toy sets relating to their chosen preferences were then offered on a table that was added to the play corner.

Condition C – anthropomorphic toys. A range of anthropomorphic toys, including puppets, dolls, animals, dinosaurs and Playmobil figures, were arranged on the table.

Condition D – animal presence. The guinea pigs were loaned from a friend of the researcher and selected because they were regularly handled by young children. Prior to the session, the teacher outlined the rules of safe handling. A range of toys and foods were also available for the animals.

Dependent variables

The main dependent variable of interest was social behaviours, which included initiations to peers, reactions to peers and prosocial behaviours (looking at faces, smiling, laughing). Further data was collected as part of this study but has not been included in the scope of this article.

Inter-observer agreement (IOA) and procedural fidelity

A second observer collected data to calculate total count IOA on each dependent variable across one session for baseline and each intervention condition per participant. Mean agreement averaged 99% (83%–100%) for initiations to peers, 97% (67%–100%) for reactions and 85% (75%–100%) for prosocial behaviours.

Measures in place to ensure procedural fidelity included a second person checking the set-up of the play area before each session, clear guidelines and a staff briefing for those supporting. As all sessions were recorded to aid accurate data collection, both observers monitored and agreed that all staff adhered to guidance with 100% fidelity throughout.

Results

[Figure 1](#) depicts the multiple treatment reversal design used in the study, applied in reverse order for Class B to avoid sequencing effects. For easier comparison of the data, [Figure 2](#) presents the average of social behaviours across conditions.

For five of the six participants, the addition of preferred toys, anthropomorphic toys and animals all increased the average social behaviours emitted compared to the average during overall baseline conditions. For Participant 1, the anthropomorphic toys and animals increased the average.

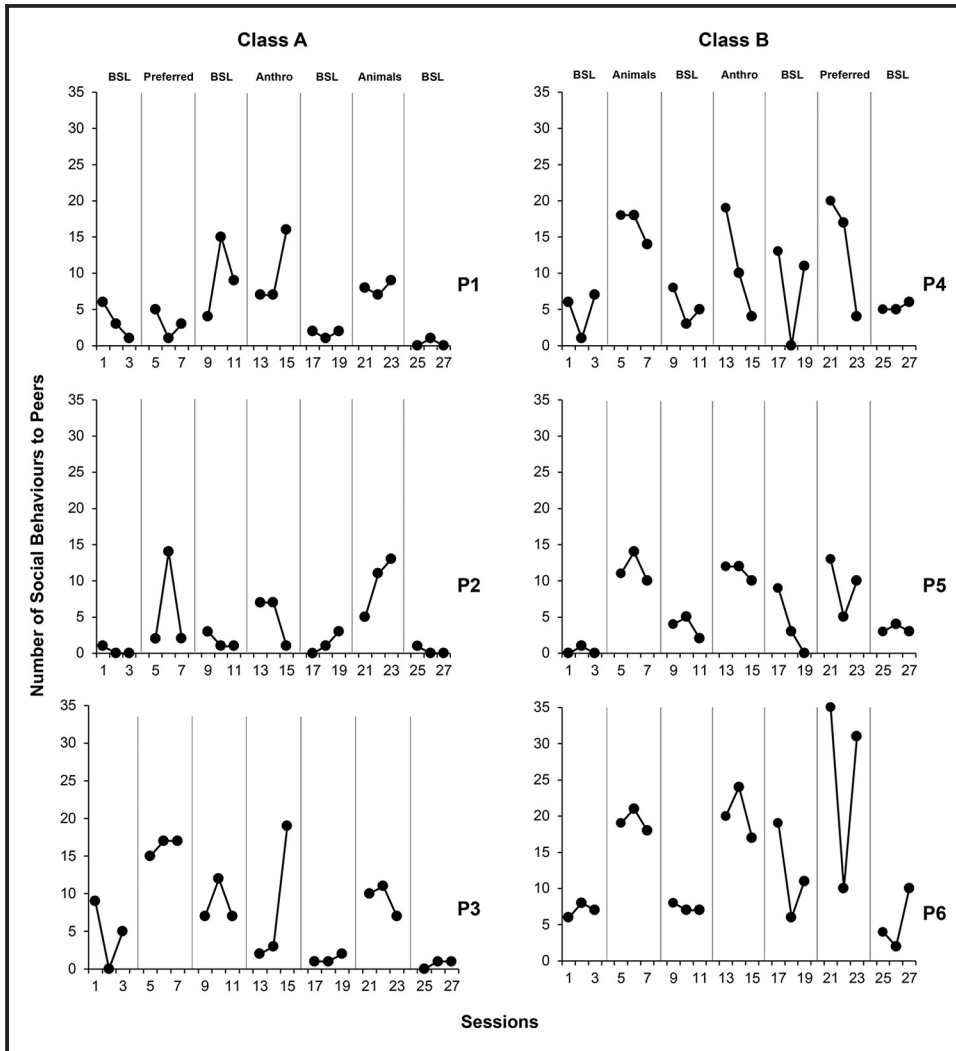
Social validity

A questionnaire was completed by the class teachers following the study. They either strongly agreed or agreed that the study was enjoyed by participants and highlighted the importance of evaluating their play areas. Both strongly agreed they would make changes based on the results. When the findings from the study were presented at an internal conference, positive feedback was given, and further classes chose to make related adjustments to their play area.

Discussion

This study sought to evaluate whether adding specific materials to the play area within a specialist classroom would increase social interactions and verbal behaviour between autistic children. It also aimed to consider whether the effectiveness of stimuli would vary

Figure 1 Each participant's total number of social behaviours per session

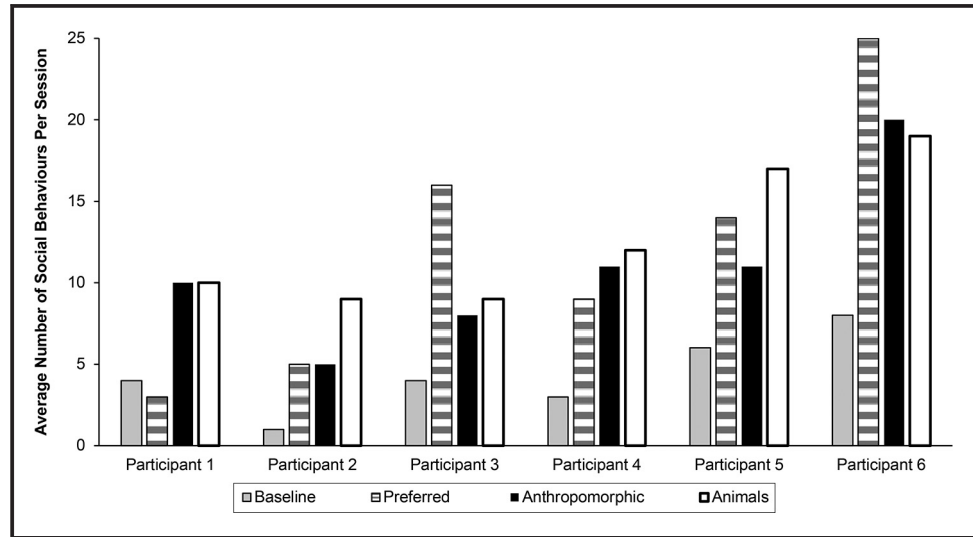


based on the participants' prerequisite skills. The results suggest that peer interactions for autistic children can be increased by introducing different antecedent stimuli selected for the study to the play area. This also extends the findings of [Quilitch and Risley \(1973\)](#) that behaviour can be changed by altering the materials available during free play.

One of the essential prerequisite skills to verbal behaviour suggested in the literature is generalised imitation ([Eckerman and Stein, 1990](#)); all participants had this in their repertoire. This skill was observed in the study where one peer would perform an action, and another would create a back-and-forth interaction by copying the action. The participants varied in the complexity of verbal behaviour demonstrated during the study. For Participant 2, high levels of labelling behaviours were observed across condition sessions. This sometimes resulted in peer reactions, particularly when near his peers around the table. He sought social reinforcement for these and often sought out the teacher when commenting.

Participant 5 had low clarity in his vocalisations. However, he still had a relatively high number of vocal interactions and was observed to support his language with gestures and object references. This highlights the importance of function in verbal behaviour and that although the structure may develop later, children may initially communicate with peers using varied forms.

Figure 2 Average number of social behaviours across conditions



Preferred interests. In Class B, the presence of preferred toys increased across all social behaviours compared to the baseline. Participant 6 was also observed using Participant 5's interest toys to attempt to engage him in a turn-taking activity.

For Participant 1, the majority of her preferred toys were also anthropomorphic, which makes the comparison across conditions difficult. For Participant 2, their choice of Play-Doh toys could be considered somewhat solitary, relating to the findings of [Quillitch and Risley \(1973\)](#), where toys of this nature reduced social play. Many of his interactions in this condition related to engaging with Participant 3's toys. For half of the participants, this condition had the highest average level for social interaction overall, supporting and extending findings by [Boyd et al. \(2007\)](#) that preferred stimuli can increase initiations from autistic children. Environmental stimuli relating to individual interests should, therefore, be considered an important factor in facilitating social behaviour between autistic children and their peers.

Anthropomorphic toys. The anthropomorphic toys increased social and verbal behaviours for all participants compared to baseline conditions. Increased self-talk behaviours supported Skinner's theory (1957) and Lodhi's and Greer's (1989) findings that anthropomorphic toys evoke covert and overt speaker and listener behaviours in play. The toys helped facilitate interactions between peers, further supporting the findings of [Ruff and Hewett \(2015\)](#). A large hand puppet was noticeably used to directly aid peer communication, suggesting that these may be the most effective anthropomorphic stimuli for increasing peer interactions. This may relate to puppets being designed for you to control their "voice".

Animal presence. Social behaviours also increased in this condition for all participants compared to baseline, supporting previous findings ([O'Haire et al., 2013](#)) that the presence of guinea pigs increases looking at faces and smiling compared to toys. There were also comments from the children that suggested they may have felt relaxed in this condition, including "The guinea pigs made me feel calm". The animals were also observed to evoke labelling behaviour from some participants, such as "red eyes" and "two guinea pigs". Although these comments were not necessarily directed at their peers, they did result in reactions. Receiving social reinforcement from peers highlights the function of verbal behaviour to the individual ([Skinner, 1957](#)), which likely resulted in maintaining and increasing this behaviour with their peers. It was observed that peers often seemed to communicate through the animals. For example, one peer might have said "Hi Speedy", and another directly imitated and looked at the animal and then the first peer. This supports

findings from the study ([Talarovičová et al., 2010](#)) that interactions with peers increase in the presence of guinea pigs.

Educational implications

The results suggest that peer interactions between autistic children can be supported by introducing the different antecedent stimuli selected for the study to the centre of the play area; this also extends the findings of [Quilitch and Risley \(1973\)](#) that behaviour can be changed by altering the materials available during free play. It is therefore recommended that settings that include autistic children extend this preliminary research and run regular observations of their class play spaces to evaluate the effects of the stimuli in place and the positional layout of the room. The data indicates the benefits of all conditions in the study. Anthropomorphic toys should, therefore, be made available. Classroom pets or animal visits should be considered where feasible. Pupils' individual preferences and interests should also be regularly evaluated, and toys and related resources should be included in the classroom.

Limitations

There was a small number of participants in the study, and they were relatively similar in regards to their age and levels of verbal behaviour; this was affected by the COVID-19 restrictions in place at the time of the study, limiting the researcher's access to further pupils. The results and observations suggest that the physical arrangement of the play area during the three conditions also contributed to the increase by acting as a positional prompt and reducing the response effort for interactions. A condition including solely the addition of a central table may have been useful to evaluate this further.

Future research

Extending the study to further participants across various settings would be beneficial to add to the findings. With restrictions removed and the setting having over 30 primary pupils, replications could first be carried out to include those with varied levels of verbal behaviour and different communication modalities.

The positive preliminary findings relating to the presence of animals and increased social behaviour encourage further research. Due to the unpredictable nature of some pupils, permanent classroom pets may not be practical. However, a supervised animal area within the school may be an option. The study could also be replicated within further educational settings where there is a mix of neurotypical and autistic children. This would provide the opportunity to strengthen both the findings of the present study and those of [O'Haire et al. \(2013\)](#).

Summary

Social behaviour is affected by environmental antecedent stimuli that act as motivating operations. People are more likely to start a conversation about a shared or preferred interest, animals can facilitate communication between strangers, for example, out on a dog walk or a visit to the farm, and adults often choose anthropomorphic toys to encourage early interactions with young children. The study's results suggest these may also be important stimuli to support social interactions between autistic children with an intellectual disability. As every child is different, stepping back and observing how children interact in the natural play environment with a range of stimuli provides us the opportunity to evaluate the optimum conditions for each individual to support their early social skill development, leading to positive interactions with peers.

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