

# Comparison of behavioural and natural play interventions for young children with autism

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**ABSTRACT** The article reports the results of a pilot study comparing traditional behavioural approaches and natural play interventions for young children with autism over a 10 week period. Two matched groups of eight young children with autism participated. Using a crossover design, children in both groups showed positive gains in compliance, attending, play and communication with their therapists and parents. Improvements in attending and compliance were higher following the behavioural condition compared with the natural play condition. Seven participants had reduced autism scores after the intervention. The findings suggest that behavioural and play approaches affect behaviour in different ways and that autistic symptomatology of young children may be amenable to treatment. The discussion focuses on the active ingredients of treatments and the need to base efficacy research on well-planned treatment comparisons.

**KEYWORDS**  
autism;  
behaviour  
modification;  
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Early behavioural intervention has been effective in facilitating the development of children with autism (Connor, 1998; Green, 1996). Treatments have varied in terms of intensity, length, parent involvement and the specific strategies used (Anderson et al., 1987; Birnbrauer and Leach, 1993; Koegel et al., 1982; Laski et al., 1988; Lovaas, 1987; Sheinkopf and Siegel, 1998). However, although the positive impact of behavioural techniques for individuals with autism has been clearly demonstrated, behavioural intervention programmes have not yet been systematically compared with other educational/therapeutic strategies.

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For many years the primary instructional method of behaviour therapy has been the 'discrete trial teaching format', which is an adult-initiated, massed-trial paradigm (Koegel et al., 1982; Leaf et al., 1999; Lovaas et al., 1981; Maurice et al., 1996). Nevertheless, claims of the superiority of discrete trial approaches have been debated (Prizant and Wetherby, 1998) and positive effects are also claimed for interventions involving developmental pragmatics (Prutting and Kirchner, 1987) and structured play (Wolfberg, 1995; Wolfberg and Schuler, 1999). Experience-based, playful and enjoyable interactions have been used to enhance shared attention, pretend play, initiations and responses (Wolfberg and Schuler, 1999; Zercher et al., 2001) and to promote communication (Beyer and Gammeltoft, 2000; Prizant and Wetherby, 1998).

Problems with the discrete trial format, such as limited spontaneity, lack of motivation, generalization and maintenance, have resulted in the development of the so-called 'natural language paradigm'. The NLP is claimed to resemble a normalized learning and play environment and hence to facilitate generalizations to daily living situations (Delprato, 2001; Koegel et al., 1987; Warren et al., 1984). However, comparative evaluations of different treatment methods are few in number, and there is relatively little information on their short- and long-term effects, or the differential impact on low- and high-functioning children (Green, 1996; Howlin, 1997). It is essential that comparisons between different treatments involve matched groups of participants, and that the length and intensity of training methods are comparable (Luiselli et al., 2000). Child characteristics such as chronological and developmental age, language and play level and previous therapeutic experience are crucial variables. The training experience of therapists, specific therapy plans and therapy methods, and degree of parental involvement also need to be taken into account (Gresham and MacMillan, 1998).

The present research is a pilot study which attempts to explore the following questions:

- 1 Are there beneficial effects of brief behaviour and play intervention on young children with autism?
- 2 Are qualitative communicative, social and play deficits as assessed through the Pre-Linguistic Autism Diagnostic Observation Schedule (PL-ADOS: DiLavore et al., 1995) amenable to treatment?
- 3 Do behaviour and play intervention methods differentially affect play, compliance, attention and communication?
- 4 Can parental involvement be demonstrated as a moderating factor?

## Method

### Selection of participants

Young children with autism participated who had been referred by paediatricians to the Behavioural Intervention Centre for Children, a clinic for children with autism and developmental disorders at the National University of Singapore. Out of a group of 10 potential participants, eight were selected based on pre-treatment measures. Prior to their involvement in the project the children had not received any form of intervention.

The children were aged between 28 and 44 months (see Table 1). On the Autism Diagnostic Interview-Revised (ADI-R: Lord et al., 1994) all except one child reached the cutoff point for an autism diagnosis in the core areas: social interaction, communication, interests and behaviours. Participant 1 missed the cutoff for the last category, 'restricted, repetitive behaviours and interests', by one point.

Participants were separated into two comparable groups, matched on chronological age and scores on the ADI-R, the PL-ADOS and the Symbolic Play Test (SPT: Lowe and Costello, 1988). Matching also included parents' education level and whether mothers were working. Parents of children 4 and 8 had the lowest education level and their mothers had only basic proficiency in English. Bayley scores (Bayley, 1993) are also presented in Table

**Table 1** Summary of characteristics of participants

Child	CA at testing (months)	ADI-R summary score	Bayley	
			Cognitive developmental age (months)	Language developmental age (months)
<i>Behaviour/play</i>				
1	40	37	18	13
2	33	30	27	24
3	39	37	35	14
4	42	50	6	5
<i>Play/behaviour</i>				
5	42	57	26	21
6	44	27	27	22
7	42	31	26	17
8	28	40	12	7

Behaviour/play = behaviour modification followed by play interaction.

Play/behaviour = play interaction followed by behaviour modification.

CA = chronological age.

ADI-R = Autism Diagnostic Interview-Revised.

Bayley = Bayley Scales of Infant Development II.

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1, although these were not obtained until 3 months after the start of the programme, as the test material was not shipped in time for the beginning of the project.

### Procedures

**Behavioural condition** Training of the children in the behavioural group was conducted by a psychology honours graduate with 2 years' experience in behavioural techniques for children with autism. Psychology honours students taking a course in behaviour modification and one psychology graduate working with special needs children assisted her. The psychology honours graduate also served as the behavioural group coordinator.

The student trainers in the behavioural group received about 30 hours training in behaviour modification techniques plus weekly feedback. Teaching mainly followed the teaching targets and methods from discrete trial based programmes (Lovaas et al., 1981; Maurice et al., 1996).

**Play condition** A psychology graduate with 6 months' experience in teaching children with autism and 15 undergraduate volunteers conducted the play training. The psychology graduate also served as the play coordinator.

The student trainers involved in the play condition received a 5 hour training session on play, communication and basic management of behaviour problems. Students were instructed about levels of play, types of interaction games and toys, ways of enhancing imitation and communication in play and experience-based learning. Role-play was used to demonstrate and practise the natural language paradigm (Laski et al., 1988) and strategies such as interrupting behaviour chains (Hunt and Goetz, 1988). The importance of using praise and natural reinforcers was stressed. The main differences between the behavioural and play conditions are outlined in Table 2.

Training was conducted at the Behavioural Intervention Centre, where a one-way window and three ceiling mounted video cameras allowed

**Table 2 Teaching features used predominantly in behavioural and play conditions**

<i>Predominant teaching format</i>	<i>Discrete trial format</i>	<i>Natural language paradigm, play</i>
Learning context	Table-type activities	Natural play
Stimulus items	Objects, pictures, actions	Toys, actions
Reinforcers	Natural and artificial	Natural
Teaching flexibility	Prescriptive	Flexible
Teaching approach	Adult directed	Child-centred

BERNARD-OPITZ ET AL.: COMPARISON OF INTERVENTIONS unobtrusive observations. During these sessions, the first author and the coordinators set individualized intervention goals together with the caregivers. Feedback to the coordinator and student trainers was provided while they interacted with the child.

For each condition, the children received 6 hours of training from a coordinator and four student trainers. Each condition lasted 5 weeks with a total of 30 hours per child per intervention. Parents were involved in all sessions and were requested to provide 10 additional hours of therapy per week. Following 5 weeks of training in the first condition, the children were exposed to training in the second condition.

### **Validation of intervention conditions**

Students completing a master's course on behavioural analysis and intervention, who were naive to the treatment conditions, rated random samples of the videotaped home sessions. The focus was on the following: (1) nature of tasks/goals (specific, planned, consistent and tasks involving stimulus discrimination), (2) consequences (contingent, consistent and clear trainer responses), (3) management of behaviour problems (the trainer said 'no', prevented, ignored or redirected inappropriate behaviours), (4) focus on a teaching task, (5) use of massed drills, (6) artificial reinforcement (reinforcer unrelated to the task), (7) frequency of praise and (8) food reinforcer. Child and trainer enthusiasm was rated on a five-point scale where 0 and 1 indicate no/minimal enthusiasm, 2 indicates neutral, and 3 and 4 positive or very positive enthusiasm (Koegel et al., 1982). The reliabilities across all the above observation measures averaged 81.58 percent (range: 68.1 to 95.5 percent).

Within the respective conditions the distribution of teaching methods was in the expected direction. The behavioural condition was characterized by a predominance of specific tasks/goals, massed drills, contingent consequences and artificial reinforcement. The play condition was characterized by less structure, child-centred, action-based and play-oriented interactions and natural reinforcement. Child and trainer enthusiasm was comparable across intervention conditions.

### **Home-based intervention and supervision**

The coordinator accompanied each student trainer on one visit per child and provided feedback. Students were assigned to specific teaching tasks, such as imitation for the behavioural trainers and sand play for the play trainers. During home sessions, student trainers used teaching and play materials based on the Psychoeducational Profile (PEP: Schopler and Reichler, 1979). The clinical psychologist (VB-O) provided supervision and feedback through videotaped sessions, written notes and discussions.

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After the first intervention condition, the progress of the child was reviewed and new or follow-up intervention goals were set for the second condition. Following completion of the second intervention condition, children were evaluated on their progress and on the treatment goals attained.

#### **Design**

A crossover design (Barlow and Hersen, 1984) was adopted. To control for the sequence of intervention, counterbalancing procedures were implemented so that four children were first exposed to the behavioural condition followed by the play condition while the remaining four children underwent the reverse.

#### **Data analysis**

**Pre- and post-intervention assessment** Prior to and following training all children were assessed on the PL-ADOS and the SPT. A master's research student not directly involved in the project administered the measures.

Pre- and post-intervention sessions were conducted by the respective coordinators of the particular experimental condition. Sessions before the intervention (pre-intervention 1), following the first intervention (post-intervention 1), and prior to and following the second intervention (pre- and post-intervention 2) were video-recorded. The two coordinators and a trained observer, who was naive to the purpose of the study, coded 5 minute interactions between the child and parents and between the child and coordinators on compliance, attending behaviour and communication. The data of the independent observer were used. Fifty percent of the video sessions were rated for inter-rater reliability regarding compliance and attending behaviour, and 40 percent were rated for communication. The mean reliabilities were 75.1 percent for compliance, 83.9 percent for attending behaviour and 86.9 percent for communication. (Details of all the measures used can be obtained from the first author.)

**Parent feedback and follow-up** Parents completed a feedback form at the end of the intervention regarding both methods and their children's progress. A telephone interview was conducted 4 months after the end of the programme to obtain information on the children's progress and on parents' continuation of intervention. Parents were asked to base their responses on their child's performance from the end of the intervention period to the time of the interview.

## Results

Beneficial effects of brief behavioural and play interventions were observed in play scores, communication and ADOS scores. Differential effects of the two treatment conditions indicated higher compliance gains for six of the eight children under the behavioural condition. Two children with lowest pre-test scores and less involved parents improved the least.

### Symbolic Play Test

Over the observation period five participants (children 1, 2, 3, 6 and 7) gained an average of 8.1 months on the SPT. The two children (4 and 8) who started off with the lowest scores (below 12 months age equivalent) did not show any improvement in performance on the test. Child 5 obtained a lower post-intervention test score. He appeared to be fatigued at the time of testing and was not likely to be performing at optimum level.

### Pre-Linguistic Autism Diagnostic Observation Schedule

All children started off at or above the cutoff of 12 for autism on communication and interaction on the PL-ADOS (Table 3). At post-intervention, seven children had reduced scores, with three (children 2, 3 and 6) falling below the cutoff for autism to PDD-NOS (cutoff of 7). One (child 5) had

**Table 3** Pre- and post-intervention test scores

Child	Symbolic Play Test age equivalent (months)		PL-ADOS (scores)					
			Communication and interaction		Play		Stereotyped behaviour and restricted interests	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
<b>Behaviour/play</b>								
1	14.0	24.5	18	16	4	3	3	2
2	14.0	20.6	17	10	2	1	1	1
3	18.0	25.8	18	8	4	0	1	0
4	<12	<12	20	17	6	4	6	4
<b>Play/behaviour</b>								
5	15.3	<12	12	3	6	3	4	1
6	18.0	24.5	15	9	2	4	5	2
7	23.2	32.4	19	15	1	2	3	0
8	<12	<12	14	20	4	4	6	3

Behaviour/play = behaviour modification followed by play interaction.

Play/behaviour = play interaction followed by behaviour modification.

PL-ADOS = Pre-Linguistic Autism Diagnostic Observation Schedule.

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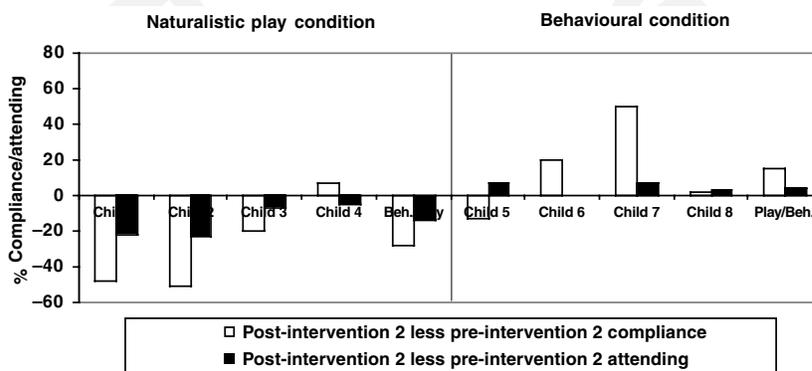
a score of 3, which is below the cutoff for PDD-NOS. With the exception of child 8 all children showed decreased scores on abnormal communication and interaction. An improvement of communication was also confirmed through video data of the child's interaction with the clinician as well as the parent. Three of the four verbal children increased the percentage of responsive and spontaneous communication. Pre-post changes across interaction partners and conditions revealed improvements in verbal communication of 55 percent for child 2, 45 percent for child 5 and 20 percent for child 6. A previously non-verbal child (3) started to talk during the intervention period.

For six of the eight children, reduced PL-ADOS scores for abnormal play were observed after the intervention. All children except child 2, whose data remained constant across pre-post assessment, showed a reduction in stereotyped behaviour and restricted interests.

**Compliance and attending with coordinators**

Figure 1 shows the degree of change in compliance and attending behaviour between the first pre- and post-intervention (post-intervention 1 less pre-intervention 1) and the second pre- and post-intervention (post-intervention 2 less pre-intervention 2). The first intervention was conducted by the behaviour coordinator for children 1 to 4 and by the play coordinator for children 5 to 8.

Independent of the sequence of interventions, more gains in compliance were observed for six of the children after the behaviour intervention compared with the play intervention (Figure 1). Three children (2, 3 and 4), who first went through the behavioural condition, increased compliant



**Figure 1** Differences in compliance and attending scores from pre to post intervention

BERNARD-OPITZ ET AL.: COMPARISON OF INTERVENTIONS responding during this condition. Another three children (6, 7 and 8) showed more compliance in the behaviour condition when this condition followed the play intervention. During the play intervention an increase in compliance was only noted for two children (4 and 6) while five of children reduced their rate of compliance after the play intervention.

Across intervention conditions attention showed a high and consistent level of above 70 percent for five children. Marked improvements across conditions were only noted for two of the children (3, 6), with one improving during the behavioural and the other during the play condition.

### **Compliance and attending with parents**

Sequential effects of the intervention conditions were obvious in the parent interaction. When the behavioural condition preceded the play intervention (behaviour/play condition), all children showed a decrease in compliance during behavioural sessions. In contrast, when the behavioural condition followed the play intervention (play/behaviour condition), compliance during the behavioural sessions showed a marked improvement for three of four children. Improvements in compliance during the play condition were observed for three children in the behaviour/play condition. One child showed improved compliance during the play sessions in the play/behaviour condition. Across conditions an improvement of compliance was noted for six of the eight children.

Attention levels with the parents showed some increase over both treatment conditions for five of the children. Seven children improved attention during the behavioural condition and five did so during the play condition. Under the behaviour/play condition, the children became more attentive following behaviour modification, but treatment gains decreased slightly in two of the participants (children 1 and 4) when they switched to the play condition.

### **Parent feedback**

Parents answered a questionnaire covering five goal areas for the two conditions. Ratings ranged from 0 to 2, with 0 indicating no improvement and 2 indicating noticeable improvement. Total scores across all participants were higher for the behavioural condition than the play condition. Five parents gave higher total scores for the five goal areas under the behavioural condition, only two preferred the play condition and one indicated equal support for both.

### **Follow-up survey**

Parents reported improvement in the areas of compliance, play, matching, social relations and communication. Seven of the children continued with

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some form of intervention. They were reported to have made gains in the areas worked on. The reported treatment methods used included incidental teaching, 'play', use of praise and reinforcement, ignoring of inappropriate behaviour and, in the case of two children, discrete trial teaching. Although most parents did not specify any 'method' or said they did not use any particular technique, their responses suggested that they had learned some of the skills applied by the trainers.

### Discussion

Even though services for children with autism have steadily increased over the last decade, parents are still faced with the difficult task of selecting cost-effective programmes that match the needs of the affected child and his/her family (Howlin, 1997). Parents are often left in a quandary if they cannot meet the 'magic bullet' of 40 hours of prescribed therapy intensity over a 2 year period demanded by intensive behaviour intervention programmes (Gresham and MacMillan, 1997; Lovaas, 1987). To assess the need for intensive programs and to justify specific treatment selection, treatment comparison research is highly relevant.

The present study incorporated several features of such research, such as the random assignment of matched participants to different interventions, systematic autism assessment, relevant global and behavioural measures and documentation of the integrity of the independent variables (Schreibman, 2000). Regarding our four research questions, the following trends emerged:

- 1 Behavioural and play interventions over 10 weeks resulted in positive changes across test and behaviour measures for all children. Both intervention procedures led to improvements in play, attention, compliance and communication. Least changes were noted for children 4 and 8, who had the lowest initial cognitive levels, and parents who were not actively involved with the training programme. Five participants gained an average of 8.1 months on the Symbolic Play Test over the observation period. This was paralleled by reduction in abnormal play scores on the PL-ADOS and may be related to increased attention and compliance as well as improved play skills. Again the two children (4 and 8) who began with a play score below the 12 months age equivalent did not show any improvement in performance on the test. An improvement in respondent/spontaneous speech from pre- to post-assessment was noted for four children. While this could be due to increased familiarity with the coordinators, five parents reported improved communicative skills of their children at home over the intervention period.

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- 2 After the treatment programme, autistic symptoms also showed a decline. While all eight children started at or above the cutoff for autism on the PL-ADOS, after the 10 week intervention seven children had reduced scores, with three falling below the cutoff for autism to pervasive developmental disorder not otherwise specified (PDD-NOS). One child even reduced his score to below the cutoff for PDD-NOS. The possibility that experimenter bias was involved is unlikely, since an experienced staff member not involved in the programme conducted the assessment. While unfamiliarity with the setting and lack of compliance might have contributed to lower pre-assessment scores, this argument has to be considered in all assessments, especially of young children with autism.
- 3 Differential effects of behaviour and play intervention were noted: changes in compliance, attention and communication varied with specific treatment conditions, their sequence and interaction partners. Six of the eight children showed higher compliance and skill enhancement with the behaviour coordinator compared with the play coordinator, while only two children improved their behaviour under play conditions. For the parents, compliance dropped when the behavioural condition preceded the play condition, but improved when the behavioural intervention followed the play condition. It may be speculated that parents' first use of behavioural strategies may trigger non-compliance since it conflicts with the children's previous established experience (Baker and Brightman, 1976) while it does not do so for unfamiliar interaction partners such as the behaviour trainer. Our results suggest that parents might be able to enhance their children's compliance if they move from play oriented interactions to more structured teaching styles. However because of our small sample size the above conclusions must be considered tentative.
- 4 The study also suggested that familial and cultural factors may affect children's progress. The parents of the two children who showed little improvement were less conversant in English and appeared to have difficulties conducting the intervention methods demonstrated by the trainers. It remained unclear to what extent the parents' educational level and commitment might have affected the children's progress or, conversely, how the children's level of responsiveness and severity of their conditions could influence parents' confidence and enthusiasm in teaching. Although not all parents consistently recorded their teaching hours and targets with their children, children of those who did showed the highest improvement in ADOS scores, communication and behaviour measures.

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Limitations of the study have to be considered when interpreting the data. First, although the distribution of teaching methods in the two conditions was in the expected direction, the difference was not as clear-cut as expected. While the student trainees in the behavioural condition showed higher task structures, and more repeated practice, contingent responses and the use of artificial reinforcement, the play trainers also used these methods to some extent. We cannot claim that the student trainers in the behavioural condition had sufficient expertise in this method, considering that their training only amounted to 30 hours total. Similarly the students involved in the play condition cannot be considered experts in this area. In addition the difference in trainer experience between the behavioural and play groups is a further experimental confound. Future studies in this area will need to compare these variables more systematically.

Second, the PL-ADOS is not designed to assess treatment-related changes, and future research needs to identify measures that are sensible to changes over time. It is possible that the new version (ADOS-WPS: Lord et al., 2001) may be more useful in this respect.

While only minimal gains were achieved with the two lowest-functioning children, children with such a combined biological vulnerability and psychosocial adversities, the so-called 'doubly vulnerable' (Guralnick, 1998; Rutter, 1999), should not be excluded from early intervention programmes. Improvements in methods to change parental beliefs and behaviours as well as motivating them to use functional teaching strategies may be particularly important for this group of children. Child, family, cultural context and treatment variables have to be considered when helping parents make informed decisions about treatment options.

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