
Shadowing Techniques for Young Children with Autism: Extending ABA procedures from Home to School

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This study extends an earlier paper on home-school collaboration for children with autism (Monahan & Bryer, 2003) into classroom practice. The study details how a privately funded ABA-trained therapist assists children with autism to generalise skills learned in home-based ABA programmes into mainstream preschool education environments. The therapist acts as a "shadow" who uses ABA modelling and imitation methodology to encourage the child to attempt a range of social activities using cues previously learned in the home-based programme. In particular, this shadowing is used to facilitate social skills development with same-age peers. Case data for a child with severe autistic spectrum disorder is reported. While engaged in intensive home-based ABA interventions together with participation in government-funded special education classes, this child was also included in a mainstream setting. The therapist used a pictorial schedule board to assist with transition and PECS to assist with communication. The therapist shadowed the child's interaction with same-age peers using modelling and prompting. It is suggested that this shadowing model could be employed in more preschool settings. The shadowing approach provides professional support for the preschool staff and valuable developmental opportunities for the child to learn, alongside normally developing same-age peers, to regulate emotions and practice social and communicative skills.

Supporting developmental learning

Children with a diagnosis of autistic spectrum disorder typically do not make significant progress without considerable involvement of adults as learning partners. This pervasive developmental disorder is characterised by abnormal language and social functioning (Wing & Gould, 1979), an absence of symbolic play (Baron-Cohen, 1989), and ritualised behaviours (American Psychological Association, 1994). Additionally, these children exhibit high dependence upon adults to transition between activities and to stay on task (Bryan & Gast, 2000). A normal physical appearance paired with unusual and disruptive behaviours, can lead to decreased acceptance by peers, parents of peers, and teaching staff (Swaim & Morgan, 2001). Hence, schooling within mainstream educational facilities poses difficulties.

The current recommendation for educating children with autism suggests an individually tailored education plan, targeting emotional regulation and behavioural self-control (Baron-Cohen, 2000; Baron-Cohen, Leslie, & Frith, 1995; Gillberg, 1998; Wing, 1993). The preferred method for teaching new skills to children with autism is applied behavioural analysis (ABA), with discrete-trial-training (Lovaas, 1977, 1981;

Lovaas, Koegel, Simmons, & Long, 1973; Tender, 2002). Deficits in communication are best targeted using a pictorial exchange communication system such as PECS (Bondy & Frost, 1993; Liddle, 2001; Magiati & Howlin, 2003).

Until recently, intensive behavioural intervention was almost exclusively undertaken independently of school-based education, with parents privately funding ABA therapists to work with their children for up to 40 hours per week. It is argued by the first author that even 10-15 hours of this type of intervention assists children with autism to develop adaptive functioning skills. However, there is some concern that socioemotional skills, being taught in a one-to-one situation in the home environment, do not always transfer well to the school environment. Better communication between home-based ABA therapists and early education specialists would help. Arguably, when the school ecology supports a collaborative, interdisciplinary approach to teaching children with pervasive developmental disorders and autism, then continuity of service across learning contexts becomes a priority, communication between home and school improves, and, ultimately, the best possible learning outcomes for the child are obtained (Monahan & Bryer, 2003).

Increased pressure is being placed upon educational facilities to support the inclusion of children with autistic spectrum disorder in mainstream preschool or kindergarten classrooms. Greater awareness within the medical profession about the autistic spectrum and better screening tools have resulted in early identification of increased numbers of children as young as ages 2 and 3 years. It is well accepted that early diagnosis and intervention is critical to positive outcomes for children with autistic spectrum disorder, but many preschool teachers report that they have inadequate training to equip them to meet the needs these children, who have particular types of challenging behaviours, socioemotional difficulties, and communication deficits (McConky & Bhlirgri, 2003).

The current paper presents case data for a child with severe autistic spectrum disorder who, while being engaged in intensive home-based applied behavioural analysis (ABA) intervention and while attending a government-funded special education class, was also included in mainstream preschool education environment with the support of a privately-funded ABA-trained therapist as a "shadow." In this context, the ABA-trained therapist facilitated interaction with same-age peers by generalising the modelling and imitation procedures used in the home-based ABA intervention. Thus, the therapist "shadowed" the child, encouraging the child to attempt a range of social activities using cues and prompts previously learned in the home. Additionally, the shadow actively discouraged behaviours that cause disruption to classroom learning (the child's own and that of other students).

It is argued that for the autistic child, to a large extent, nonfunctional, self-stimulatory, and obsessive behaviours serve to reduce the anxiety caused by environmental uncertainty. Thus, the inclusion of a picture-exchange communication system (e.g., PECS, Bondy & Frost, 1993) or a pictorial-schedule-board, using photographs of real items in the classroom, would increase opportunities for the child to make communicative choices and reduce environmental uncertainty. This study aims, therefore, to show how an ABA-trained shadow in the classroom can facilitate appropriate social-communication behaviours, and also highlight the effectiveness of using pictorial-schedule-boards in decreasing nonfunctional behaviours within a mainstream education environment.

Brief overview of ABA techniques

In the home setting, ABA-trained therapists utilise a suite of techniques to assist children with autism to develop appropriate social-communication skills. These techniques include using PECS to communicate needs; pictorial-schedule-boards to assist with transition; modelling and imitation of appropriate reciprocal verbal and nonverbal communication skills (e.g., making eye contact and rote-learning social greetings); and cueing, prompting, and scaffolding for success outcomes. Key features of these procedures are outlined.

Modelling and imitation

Modelling and imitation procedures form the backbone of any intensive intervention using ABA and discrete-trial-training. Typically, a child is exposed to an adult—or, in some cases, another child—who "models" the correct behaviour. Then, the child is "prompted" to imitate. Failure to respond and erroneous attempts result in the therapist "assisting" the child to correct the error, subsequently ensuring that the child experiences success (or some other rewarding consequence).

Cueing, prompting, and rewarding behaviours

ABA uses behavioural shaping procedures based upon the learning theories of E. L. Thorndike and B. F. Skinner (i.e., law of effect and operant conditioning). Thorndike's *law of effect* states that behaviour followed by positive consequences will be strengthened, while behaviour followed by negative consequences will be weakened (Thorndike, 1898). Consequences (both positive and negative) affect behaviours. Skinner (1953) believed that humans learn to behave certain ways in certain environments because behaviour occurs in response to stimuli in that environment and their behaviour is reinforced by the consequence following the behaviour. Behavioural shaping encourages new behaviours by reinforcing (rewarding) successive approximations to the desired behaviour. ABA-trained therapists provide the child with a distinctive cue to prompt for each action or behaviour (i.e., a discriminating stimulus, Sd) designed to elicit a specific behavioural response from the child (R). Table 1 presents examples of discriminating stimuli and corresponding responses that become the criterion for success (i.e., rewards are initially provided for R1, but once the child has mastered this response, reward is delivered for R2 only, and so forth).

Table 1

Examples of discriminating stimuli (Sd) and approximations to desired response (R)

SD	R1	R2	R3
"Put it in the box."	Child picks up item.	Child picks up item and moves it in general direction of box.	Child picks up item and places it in the box.
"Hello, S."	S looks in direction of person talking.	"S turns to look and says hello."	"S turns and looks and says hello (name)."
"How are you today?"	Therapist models "You say, I am good, thank you", and child imitates.	Therapist models "You say, I am...", and child fills in the words.	If child does not respond within 5 seconds, therapist prompts with "I... am...g...."

Picture Exchange Communication System

For children who have little or no functional speech (e.g., poor communication skills, word-finding difficulties, or aphasia), the Picture Exchange Communication System (Bondy & Frost, 1993) is introduced as an alternate method of interactive communication. It requires an exchange of a symbol between the child and a communication partner but does not require the prerequisite skills of imitation, eye contact, and facial orientation. Additionally, it does *not* require the complex fine-motor skills required of signing. At its basic level, a symbol (e.g., a picture of a cup) is exchanged to initiate a request in the same way one might verbally request a desire to obtain something (e.g., "I want a drink, please").

This system of communication lends itself well to the population of children with autistic spectrum disorder who often display little understanding of the social interactive aspect of communication. Teaching a child to use picture-exchange, using either PECS symbols or *photographs of real items* in the child's environment, typically evolves through five phases. Phase one involves physically-prompted "exchange" of picture for the real item. Phase two involves encouraging "child initiation" and "searching" behaviours (i.e., the child selects picture then searches for someone to give it to). Phase three involves making "discriminations" between pictures. Phase four involves using pictures and symbols to create "sentences." Phase five involves discussing concepts and building vocabulary. Children with autism quickly learn to use PECS to exchange for desired items and to develop receptive vocabulary. Improvements in general level of communication, however, may occur more slowly (Magiati & Howlin, 2003).

Pictorial schedule board

Children with autistic spectrum disorders characteristically have difficulty regulating their emotions, especially when the situation is confusing and uncertain (e.g., transitions), when the environment is over-stimulating (e.g., lots of children talking, rhythmic noise of ceiling fans, or bright light streaming through windows), or when they become frustrated *because* they cannot articulate their needs clearly. The symbol or picture-set used for communication can also be used to provide a pictorial schedule of events. This graphic ordering is particularly beneficial to a child with autism: It prepares the child for the next transition, emphasises to the child that each activity has a distinct start and end, and assists in the understanding of time. Thus, this procedure allows the child to begin to understand and predict their world. Examples of pictorial sequence of scheduled activities can be seen in Figures 1 (a) and (b).

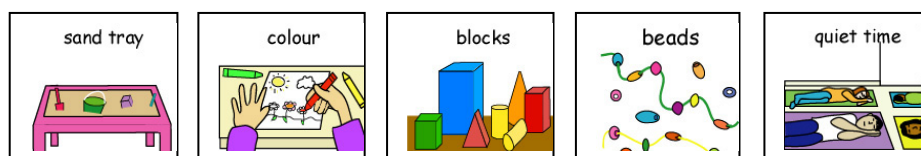


Figure 1 (a).

Example of a picture schedule for use at preschool. Symbols are from Pics for Pecs™ (Pyramid Educational Products Inc., 2002).



Figure 1 (b).

Example of a picture schedule for use at home. Symbols are from Pics for Pecs™ (Pyramid Educational Products Inc., 2002).

Case history

This case study details functional play and social-interaction data for a 3-year-old girl (known as S) who was diagnosed at age 2 with autistic spectrum disorder. She presented with restricted and repetitive patterns of behaviour (e.g., "rocking" over furniture, perimeter-walking, obsessive need to "wear" objects on all her fingers), significant delays in all areas of development, and severe communication deficits (e.g., lack of functional speech). Following diagnosis, S's parents engaged the services of an ABA-trained psychologist (the first author), and S began participating in 6-10 hours of one-to-one intensive home-based behavioural intervention per week (i.e., substantially less than the 40 hours recommended by Lovaas, 1977), targeting social and emotional development, fine and gross motor skills, functional play, and communication. Prior to S's third birthday, she began attending a government-funded special education unit (SEDU) two mornings per week, where she was placed with preschool age children with intellectual and physical disabilities. At SEDU, it was typical for one teacher with three or four teacher aides to supervise 5 to 8 children.

To provide opportunities for generalisation of play skills and to enhance social and emotional development, S was included in a private day-care and preschool centre attached to a larger private P-12 school for two full days per week alongside 3-year-old children considered to be developing normally. On these occasions, there were typically between 8 and 15 children under the supervision of one teacher and one teaching assistant. The parents privately funded one of S's ABA-trained therapists to shadow her during the morning session.

The shadow's role was to assist S to integrate into the mainstream preschool environment, assist S to follow the teachers directions, increase S's awareness of other children as social role models, facilitate social interactions with other children, assist with transitions in and out of classroom and between activities, and to discourage non-functional or self-stimulatory behaviours. A picture-exchange communication system using photographs, similar to that used in her home-based programme, was introduced to the classroom during the fifth week (session 9) to assist S with transitions between activities and to encourage her to make communicative choices. To this end, photographs of all play areas and play equipment were taken, and these were laminated. A Velcro™ tab was attached to the back of each picture. Photographs were stored in a

large A3 binder. Velcro™ was attached to the folder's front cover to create a *portable pictorial schedule board*. The shadow took responsibility for keeping the schedule current. As each activity ended or as S moved to another location, the shadow would prompt her to "Look at the board", ask "Are you finished (activity)?", prompt "Put it in the box", and then assist S to remove the photograph and place it in her "finished" box. The shadow then encouraged S to look at the picture of the next activity and facilitated her movement to that play area.

Observation period and method of measurement

In a home-based ABA intervention programme, an individual education plan (IEP) targeting specific learning outcomes is developed for the child. ABA is a data-driven discipline. Activities are included or removed from the programme on the basis of the changes in the ratio of independent successes to prompted successes or failures. When teaching a child with autism within a mainstream classroom environment, it is important to include a similar method to evaluate and adjust the way one teaches. For ease of data collection, the first author developed a simple evaluative instrument to enable four areas of socioemotional development to be monitored without disrupting the shadowing process (see Appendix). This instrument provides a simple observation system that can be easily modified to accommodate any behavioural objective.

For this child, behaviours of interest were communication skills, nonverbal social skills, appropriate play skills, and nonfunctional behaviours. Each was rated on a 5-point scale from 1 (lowest) to 5 (highest) indicating quantity of behaviour (e.g., none, minimal, some, a lot, continuous) or quality of behaviour (e.g., off task, poor interaction, playing by self, parallel play, shared or interactive play). In addition, the shadow rated the level of prompting provided to the child on a similar scale (e.g., hand-over-hand or maximum prompt, verbal prompting, modelling or minimal prompting, occasional prompt reminders, or supervision from a distance), such that 5 indicated maximum or most intrusive prompting and 1 indicated least intrusive prompting.

S attended two kindy sessions each week, and shadowing data were collected over a 7-week period. There were ethical and contractual reasons why a traditional "baseline, intervention, baseline, intervention" design for evaluating the effectiveness of the intervention was not an option: Home-based intensive intervention was already in place, funded by the child's parents prior to S attending the mainstream educational facility. Hence, it was not possible for the shadow to observe S, *without* providing intervention, to obtain a baseline. However, it was possible to compare the quality and quantity of specific behaviours across this 7-week period to determine whether there was any improvement in communication, social skills, and play behaviours, and any reduction in nonfunctional behaviour. Data were also compared across two naturally occurring 3-week blocks (i.e., sessions 1-6 versus sessions 9-14), mediated by a period when S was unwell (i.e., sessions 7 and 8). During the first six sessions, S participated in the classroom schedule with the shadow providing only verbal prompts and reminders. The pictorial-schedule-board was introduced in session 9 (i.e., the start of the second block of six sessions). Therefore, comparison between "shadowing with verbal intervention" and "shadowing with pictorial intervention" was possible.

Patterns of data change

Data patterns during the initial block of 6-sessions indicate an immediate positive change in the quality and quantity of socially appropriate communication and a trend towards increases in socially mediated play behaviour (see Figures 2 to 4). There was a corresponding decrease in the level of shadow prompting required (see Figure 6).

During a 2-week period during which S was ill, one of which resulted in her non-attendance at school (i.e., scheduled sessions 7 and 8), many of the previous gains were lost temporarily (see data for sessions 9 and 10). As can be seen in sessions 11 through to 14, the positive trend towards appropriate social interaction returned post-illness. It might be argued that the introduction of a new system to the classroom (i.e., session 9 corresponded with the introduction of the pictorial schedule board) was a transition that S found difficult to cope with. However, this is unlikely to be the case as S was familiar with the use of a pictorial-schedule-board in her home-based intervention programme.

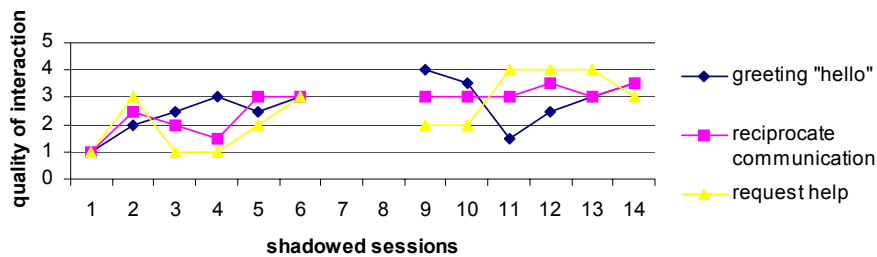


Figure 2.

Quality of S's communication (greetings, reciprocal communication attempts, and requesting help). Higher scores represent higher quality prosocial interaction.

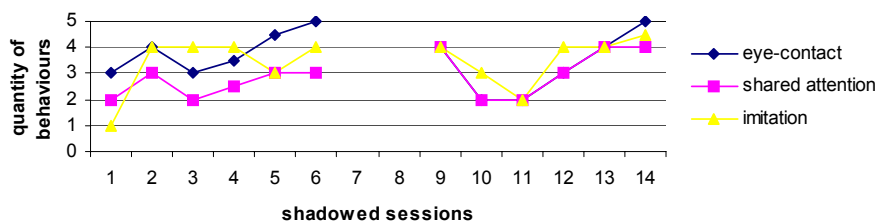


Figure 3.

Quantity of S's nonverbal social skills (eye-contact, shared attention, and imitation). Higher scores represent more prosocial interaction.

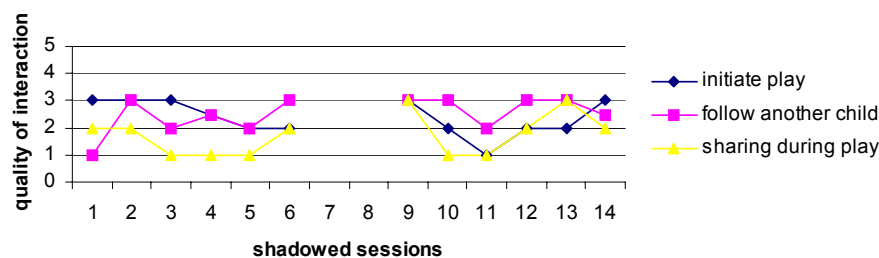


Figure 4.

Quality of S's social play skills (initiating play, following another child's lead, and sharing). Higher scores represent higher quality prosocial interaction.

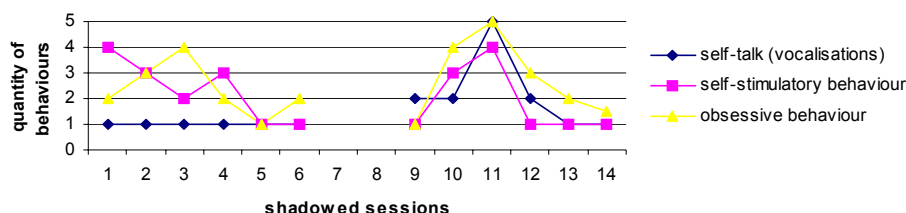


Figure 5.

Line-graph showing quantity of S's nonfunctional behaviours (self-talk, self-stimulatory behaviours, and obsessive behaviours). Higher scores represent more nonfunctional behaviour.

As can be seen in Figure 5, while obsessive and nonfunctional behaviours slowly decreased over time, there was a marked increase in these behaviours following S's illness. Transitioning from activity to activity proved to be stressful for S, and she began to obsess over hats and, for an unknown reason, any item that was pink in colour. The picture-schedule-board greatly improved S's ability to cope with transitions (particularly from outside to inside). After two sessions using the picture-schedule-board, a more dramatic reduction in S's obsessional behaviours was noted.

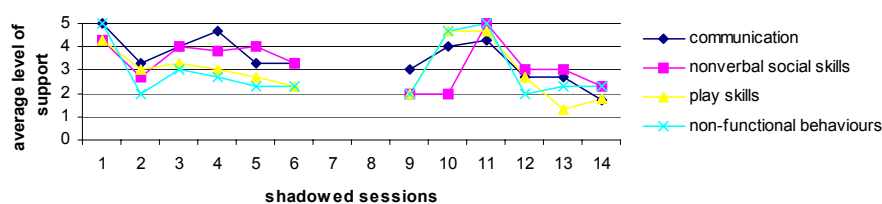


Figure 6.

Shadowing support provided by ABA-trained therapist while facilitating verbal and nonverbal communication and social play and while discouraging nonfunctional behaviours. Higher scores indicate more intrusive types of prompts and support.

During the first 6 sessions, the shadow used hand-over hand, physical assistance, modelling and verbal prompts (i.e., previously-learned cues) to encourage S to communicate, engage in social interaction with her peers, engage in a variety of play activities, and to redirect S when she engaged in nonfunctional or obsessive behaviours. As can be seen in Figure 6, the level of prompts and support provided by the shadow in session one was most intrusive (hand-over-hand), and remained around level 3 to 4 (modeling and verbal prompts) across these next five sessions. Following S's illness, the level of prompting increased again to hand-over-hand and physical guidance. However, following the introduction of the picture-schedule-board in session 9, there was a sharp decrease in the need for such intrusive prompting (refer sessions 11-14). This observation is very encouraging. It suggests that, once a child with autism has learned how to use PECS or photographs to make communicative choices and to follow a pictorial-schedule of activities (i.e., selection, completion, removal of PEC from the sequence), then that child might be able to function in a mainstream classroom with minimal supports.

Integration challenges

S's needs in the classroom environment were higher than first anticipated. In the home-based programme, S had settled very well into her therapy routine, using a pictorial schedule board, picture-exchange, and sitting for up to one hour at a time to complete a large variety of tasks, with the one-to-one assistance of her ABA therapists. Therapists reported minimal nonfunctional and obsessional behaviour during her ABA sessions. In the classroom environment, however, S's behaviour substantially disrupted the flow of classroom routine (e.g., her audible self-stimulatory exclamations were distracting for the other children, and her inability or refusal to sit on the mat during story-time or in a chair during snack-time meant that she spent a substantial amount of time wandering aimlessly around the room). Also, during the data collection period, S stopped having sleeps during the day, and her movements around the room interrupted scheduled rest-time for other children. Her poor awareness of personal space meant she frequently stood on other children as she walked across their beds, leading to a perception that she was a risk to the safety of other children in the room.

The teaching staff and the children were finding S's presence in the room to be highly stressful. Moreover, the additional presence of a "shadow" did not initially help the situation as much as hoped. In part, extra communications between the shadow and the teacher (i.e., to explain S's behaviour or to teach a new strategy for handling that behaviour) disrupted the usual flow of the classroom communication between the teacher and her students. The teacher was committed to supporting S to the best of her ability. However, S's special needs required a substantial amount of extra time and sometimes prevented the teacher from engaging the whole class. Jennett, Harris, and Mesibov (2003) reported that teachers with a strong affiliation to the aims and goals of ABA tend to experience less stress, despite very real challenges teaching children with autistic spectrum disorders. They suggest that professional self-efficacy increases with an understanding of ABA methodology, which may serve to prevent burnout among teachers working with this population of children.

One of the aims of having an ABA-trained shadow work with a child with a disability such as autism in a mainstream education environment is to teach teaching staff how to recognise when the child is in distress, how to acknowledge the child's unique needs, and teach new techniques so they can respond to the child's needs appropriately. After consultation with the director of the centre and S's teacher, it was agreed that the shadow would "*explain* procedures during the teacher's weekly noncontact (programming) hour and act as a *model* to the teaching staff during class time." This strategy worked well. The shadow used face-to-face modeling and imitation techniques directed specifically at S, assisted S to handle impending transitions by preparing her in advance, and used least intrusive prompting. Simultaneously, the shadow was also encouraging the teaching staff to adapt their teaching style.

Some suggestions for minor modifications to group-time communication were also made. These changes included the teacher informing S what was about to occur prior to informing the whole class (e.g., "S, play time is nearly finished, then it's time to go inside."); giving a class instruction and then addressing S with the same request (e.g., "Junior Kindy, it is pack up time." "S, look at me." "S, It's time to pack up now."); using specific previously learned cues for specific actions (e.g., "S, put it in the box."); and ensuring S was not expected to wait longer than could reasonably be expected of her (e.g., after first attending to one or two other children, say "S, good waiting!" and "It's your turn to choose an activity now S.>").

It is interesting to note that S's ability to initiate both communicative greetings and play activities with the other children remained comparatively weak despite the shadows' attempts to facilitate interactions with same-age peers. Part of the reason for this may be that the other children are "giving up" in trying to communicate with a typically nonresponsive S: Unusual and disruptive behaviours do little to encourage acceptance by peers, despite adult modelling (Swaim & Morgan, 2001). One way to overcome this problem might be to teach normally developing peers *how* to communicate with the nonverbal autistic child using PECS. Of relevance to this suggestion is an observation made during session 9 when the class teacher used the group mat-time to explain to S's classmates that S needed the visual schedule board to help her "talk" because "S can't use her words like we do." The children accepted this explanation and that morning showed great interest in S's communication folder.

Implications: Suitability of mainstreaming for children with autism

Unlike children with other types of intellectual disability (e.g., Downs Syndrome), even high-functioning children with autistic spectrum disorder continue to experience difficulty relating to peers and coping with social situations into adulthood. Many parents express concern about the suitability of full-inclusion or mainstreaming (part-time placement in mainstream classroom alongside normally-developing peers) for their autistic children (Kasari, Freeman, Bauminger & Alkin, 1999). Some parents and professionals advocate for autism-specific education facilities that can offer specific interventions known to help children with autism (e.g., discrete-trial-training). Nevertheless, early intervention incorporating social skills training within a supportive preschool environment (e.g., a preschool classroom supported by a classroom aide or

"shadow", trained in ABA methodology) should not be dismissed outright, even for children with severe autism.

The case data presented in this paper revealed a marked reduction in obsessive and self-stimulatory behaviour following the introduction of a pictorial-schedule-board to the classroom. It also showed an increase in socially appropriate behaviours paired with a marked decrease in the level of prompting required by the shadow after only 3 weeks. This study provides preliminary evidence that a shadow trained in ABA methodology can blend in to a mainstream classroom, assist the autistic child to follow the classroom schedule, facilitate social interactions, model practical communication techniques to teachers and children, and maintain records of the child's interaction for ongoing analysis. Fortunately for S, one private school on the Gold Coastⁱ has embraced this opportunity. It is suggested that this shadowing model be employed in other private and public preschool settings, providing children with autism an invaluable opportunity to learn to regulate emotions, develop social and communicative skills by observing and imitating and playing alongside normally developing same-age peers, while simultaneously providing professional support for the preschool staff. The next issue will be, of course, who should pay for this important service?

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Appendix

Observation Form (Monahan, 2004)

Child's Name:	
Date:	Therapist:
Context:	
Play Duration:	Other Child/ren:

Communication Skills:

Objectives	Quality	Therapist Shadow
1. Greets others ("hello"/ wave)	1 2 3 4 5	1 2 3 4 5
2. Reciprocates communication	1 2 3 4 5	1 2 3 4 5
3. Asks for assistance ("help")	1 2 3 4 5	1 2 3 4 5
General Communication Comments:		

Nonverbal Social Skills:

Objectives	Quantity	Therapist Shadow
1. Appropriate eye contact	1 2 3 4 5	1 2 3 4 5
2. Shared Attention	1 2 3 4 5	1 2 3 4 5
3. Imitation	1 2 3 4 5	1 2 3 4 5
General Social Skills Comments:		

Play Skills:

Objectives	Quality	Therapist Shadow
1. Initiates play with others	1 2 3 4 5	1 2 3 4 5
2. Plays alongside another child	1 2 3 4 5	1 2 3 4 5
3. Shares/negotiates	1 2 3 4 5	1 2 3 4 5
General Play Skills Comments:		

Behaviours:

Objectives	Quantity	Therapist Shadow
1. Self Talk (Scripts)	1 2 3 4 5	1 2 3 4 5
2. Self Stimulatory Behaviour	1 2 3 4 5	1 2 3 4 5
3. Obsessive Behaviour	1 2 3 4 5	1 2 3 4 5
General Behaviour Comments:		

QUALITY CODE:

- (1) off task
- (2) poor interaction
- (3) play alone
- (4) parallel play
- (5) shared play

QUANTITY CODE:

- (1) not at all
- (2) minimal
- (3) some
- (4) a lot
- (5) continual

THERAPIST SHADOW CODE:

- (5) hand-over-hand, maximum prompts
- (4) verbal or visual prompts
- (3) model, minimum prompts
- (2) < 1m, occasional prompt reminders
- (1) > 1m, Supervision only