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Training teaching staff to facilitate spontaneous communication in children with autism: Adult Interactive Style Intervention (AISI)

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Key words: Autism, Adult Interactive Style Intervention (AISI), spontaneous communication, teacher training.

Previous research has demonstrated that the way adults interact with children with autism can have a great impact on their spontaneous communication. However, to date, few studies have focused on modifying adults' behaviour and even fewer have been conducted in school settings which actively involve teaching staff in designing the intervention. The aims of this study were twofold: (1) to explore the extent to which staff were able to build on their good practice and alter their interactive style and (2) to then assess the effects of this change on children's communication. The study used an action research methodology and involved three members of staff and six children with autism. The staff and the researcher developed an Adult Interactive Style Intervention (AISI) in partnership. This was based on two theoretical models of child development and disability. Data were collected pre- and post-intervention and at follow-up (12 months after the end of the main study) to measure change. The results showed that staff considerably increased the number of times they used AISI principles post-intervention and that this change had a significant impact on the children's spontaneous communication. All three staff took an active participatory role in the study which was considered a very positive and empowering experience.

Introduction

Difficulties in spontaneous communication are a core feature of autism (Fujiki and Brinton, 2009; Jordan, 1999; Potter and Whittaker, 2001), and a number of studies have described the frequency with which individuals with autism initiate communication, the reasons they communicate and the methods they use (Agius, 2009; Chiang et al., 2008; Chiang and Lin, 2008; Stone et al., 1997). Of equal importance but more scarce is research highlighting the difficulties staff face when teaching children with autism how to initiate communication (Kroeger and Nelson, 2006). Many of the interventions used to date may not be as successful as they could because they focus on changing the children rather than adjusting the adults' behaviour (Bradshaw, 1998). As Prizant et al. (2006) argue, the way adults interact with children can be crucial when trying to enhance the communication of children with autism.

A variety of approaches has been used to develop social communication in children with autism. Classification is not easy as there are many different taxonomies (Ospina et al., 2008; Simpson, 2005; Yoder and McDuffie, 2006). This paper classifies these approaches into two broad categories following Ingersoll and Dvortcsak's (2006) example: (1) the behavioural/naturalistic [e.g., Early Intensive Behaviour Intervention (EIBI) – Cooper, Heron and Heward, 2007; Picture Exchange Communication System – Bondy and Frost, 2002] and (2) the developmental/relationship based [e.g., Social Communication Emotional Regulation Transactional Support (SCERTS) – Prizant et al., 2006, Intensive Interaction – Nind and Hewett, 1994; 2001]. Developmental/relationship-based and behavioural/naturalistic interventions have some crucial differences in their underlying premises. Developmental/relationship-based approaches really stress the importance of adult style in developing social communication skills. In contrast, behavioural/naturalistic interventions provide some advice on adult style but this is of secondary importance, as the primary goal is to teach the child specific skills. Another very distinctive difference is that in developmental/relationship-based approaches, adults respond to all the children's attempts to communicate even their 'unconventional' and pre-intentional efforts (Manolson, 1992; Nind and Hewett, 2001), although in behavioural/naturalistic interventions, adults prompt the children for an elaborated response (Cooper et al., 2007).

Despite the differences in their theoretical underpinnings, behavioural/naturalistic and developmental/relationship-based approaches may not vary drastically in their implementation (Ingersoll and Dvortcsak, 2006). According to

The manuscript is original work, not under consideration or published elsewhere.
Note: This paper is based on the first author's PhD thesis. This is the case for another paper which was published in BJSE last December: Kossyvaki, L. Jones, G. & Guldberg, K. (2012) 'The effect of adult interactive style on the spontaneous communication of young children with autism at school'. *British Journal of Special Education*, 39 (4), pp. 173–84. Although the two papers focus on two different aspects of the study (adults' interactive style and children's spontaneous communication), there are some few overlaps which could not be avoided. It should be noted that overlaps are not exact copies.

the former, new skills should be taught in highly structured environments (with clear antecedent stimuli) in which adults are predictable, use modelling and prompts as well as systematic reinforcement (Cooper et al., 2007). The environment is set up in a way to promote children's initiations (e.g., favourite objects in sight but out of reach) and time delay procedures are put in place. In developmental/relationship-based approaches, learning is achieved through strong affect-laden relationships between the children and the adults (Ingersoll et al., 2005). Adults are advised to follow the child's lead, interpret all their communicative attempts as intentional, even the unconventional and pre-intentional ones, adjust language and social demands to their developmental level and set up the environment to evoke initiations (Ingersoll, 2010; Ingersoll et al., 2005).

In addition to the above approaches, there are two theoretical frameworks which embrace the impact of adult style on children's communication, these are the transactional model of child development (Wetherby and Prizant, 2000) and the social model of disability (Rieser and Mason, 1990; Tregaskis, 2002). According to the former, adult behaviour influences and shapes children's development and communication (Prizant and Meyer, 1993). Given that communication is '*a continuous and dynamic interplay*' (Wetherby and Prizant, 2000, p. 2), adults bear the same responsibility as the children, if not more so, when communication breaks down (Aldred et al., 2001). The significance of the transactional model of child development is even greater in cases of children with autism who experience a number of communication difficulties (Bogdashina, 2005; Jordan, 1999; Prizant et al., 2006). If, for example, the adult speaks too much or does not wait long enough, the child with autism is very unlikely to initiate communication, not because they cannot do so but because the adult does not give them the chance to do so. While the transactional model focuses on the interactive interplay between individuals, the social model of disability highlights that disability cannot be seen as divorced from context and environment. It examines the extent to which their problems are socially constructed and reside outside the individuals themselves (Rieser and Mason, 1990; Tregaskis, 2002). In autism, the social model of disability assumes that individuals have difficulty in communicating spontaneously because of the way their physical, social and educational environment is set up.

Methodology

The aim of this study was to develop an Adult Interactive Style Intervention (AISI) with a view to enhancing children's spontaneous communication at school. It used an action research methodology addressing the call for more evidence-based practice in the field of special education (Odom et al., 2005; Parsons et al., 2011) and for bridging the gap between academic research and school practice (McIntyre, 2005). It differs from previous studies in the field for a number of reasons. Firstly, although the communicative styles of children with autism are better explored in natural environments and with the people known to them (Chiang, 2009; Ogletree et al., 2002), few studies have been conducted in naturalistic settings (Roos et al., 2008). Even in these cases, the researchers have either observed children's spontaneous communication and interviewed staff on what they consider a 'communication-enabling' style (Potter and Whittaker, 2001), or trained staff in already existing interventions to foster children's spontaneous communication (Hwang and Hughes, 2000; Ingersoll et al., 2005; McAteer and Wilkinson, 2009). To the authors' knowledge, there is no to date research involving school staff in the process from the outset giving them the chance to work in collaboration with the researcher to develop the intervention together.

Additionally, although the importance of using video-recording as a method of data collection has been widely acknowledged (Cummins and Hulme, 1997; Heath, Hindmarsh and Luff, 2010; Stigler, Gallimore and Hierber, 2000), there is little research using participants' own videos to give feedback and build on existing good practice (Green et al., 2010; Kennedy, 2011). The present study involved school staff in the research process from the outset and the researcher used staff videos of good practice for training them.

Setting and participants

An all-age autism specialist school in the UK with two outstanding Ofsted reports for 2007 and 2010 was selected. The school uses an eclectic approach taking elements from different interventions. These include Applied Behaviour Analysis (Cooper et al., 2007), Daily Life Therapy (Kitahara, 1984), Intensive Interaction (Caldwell, 2008; Nind and Hewett, 1994, 2001), Son-Rise (Kaufman, 1994, 2002), Treatment and Education of Autistic and related Communication Handicapped Children (Lord and Schopler, 1994) and Team Teach (Allen and Matthews, 2008). Within this school, an Early Years Foundation Stage class following the extended curriculum was selected based on the rationale that communication in these children would be at an early stage of development and that they would benefit from a communication enabling adult style.

Three members of staff agreed to participate; one teacher given the pseudonym Lorna and two Teaching Assistants (TAs) who were given the pseudonyms Amber and Emma. At the time of the study, Lorna had been working in the school for 15 years while Amber and Emma had been working there for 7 and 4 years respectively. Six children (five boys and one girl) with autism and learning difficulties also took part (see Table 1 for their details). Their ages ranged from 45 to 62 months and all had autism stated as a diagnostic category on their statements of special educational needs. The classroom teacher was asked to complete the Childhood Autism Rating Scale (Schopler, Reichler and Rochen Renner, 1988) which classified all six children as severely autistic. The children's level of learning ability was assessed using a school instrument called the Development in Areas Related to Learning (DARL) (unpublished). According to DARL, children's learning difficulties ranged from profound to mild. The Symbolic Play Test (SPT) (Lowe and Costello, 1988) was also administered by the teacher and the school's speech and language therapist.

Table 1: Details of the children in the study (n = 6) at pre-intervention (January 2010)

Children's names (pseudonyms)	Molly	Alex	Robert	Nathan	David	Oliver
Age at pre-intervention assessment (in months)	53	61	49	48	62	45
Diagnosis	Autism	Autism	Autism	Autism	Autism	Autism
CARS score	51.5	51.5	54	46	40.5	51.5
Level of learning ability (DARL, unpublished/ 1 = profound, 5 mild or no impairment)	2	3	1	2	3	2
Symbolic Play Test (Lowe and Costello, 1988)						
Score	0	2	0	3	12	1
Age equivalent in months	<12	<12	<12	<12	22	<12
Level of verbal communication	Vocalisations	Vocalisations	Vocalisations	Vocalisations	Occasional words (10–20 words)	Very little vocalisation
Frequency of spontaneous communication with adults	Not often	Often but to protest objects or actions	Not often	Not often	Often but using methods which could be perceived by the staff as challenging (e.g., crying, hitting, throwing objects)	Not often
Questionnaire for Determining Spontaneous Communication in Children (QDSCC) (unpublished)						

CARS, Childhood Autism Rating Scale.

Table 2: Approaches reviewed for the development of AISI

Behavioural/naturalistic approaches
Early Intensive Behavioural Intervention (EIBI)
Incidental Teaching
Pivotal Response Training
Early Start Denver Model
Milieu Teaching
Reciprocal Imitation Training
Picture Exchange Communication System (PECS)
Developmental/relationship-based approaches
Social Communication Emotional Regulation Transactional Support (SCERTS)
Intensive Interaction
Developmental, Individual Difference, Relationship-based (DIR) model-Floortime
Musical interaction/music therapy
Son-Rise/Option
Hanen
Treatment and Education of Autistic and related Communication handicapped Children (TEACCH)
Pre-school Autism Communication Trial (PACT)
Responsive Teaching
Relationship Development Intervention (RDI)

AISI, Adult Interactive Style Intervention.

SPT assess children's spontaneous non-verbal play activities with miniature toys, which represent everyday objects. The test gives a score ranging from 0 to 24 and an age equivalent of score ranging from <12 to 36+ months. The SPT age equivalent scores for the participant children ranged from <12 months to 22 months. Their verbal communication ranged from limited vocalisation to occasional words (10–20 words) pre-intervention. They all initiated communication either infrequently or communicated in ways which were considered challenging by the staff (e.g., to protest by crying, hitting, throwing objects).

Procedure

Prior to the onset of the study. A number of approaches falling under either behavioural/naturalistic or developmental/relationship-based interventions were reviewed by the first author. A literature search was conducted from January until May 2009 using the British Education Index, Education Research Abstracts, Education Resources Information Center and Google scholar. The search terms used for the initial search were 'autism/autism spectrum disorders/ASD/autism spectrum conditions/ ASC', 'intervention(s) approach(es)/program(es)', 'communication' and 'facilitative/interactive style'. Peer-reviewed papers, conference proceedings and books were considered. The references for the sources found were also hand-searched for additional material (see Table 2 for a

detailed list of the approaches reviewed) (Kossyvaki, 2013). The focus of the review was on the advice researchers and founders of interventions give to adults (e.g., parents, teachers, professionals) in order to alter their interactive style and enable children's communication. The review resulted in a set of principles that could be used within a school setting. Conceptually, the principles were closer to the developmental/relationship-based approaches, although in the implementation level, they shared some commonalities with behavioural/naturalistic approaches.

Pre-intervention (0–2 months). Evidence on which activities are likely to elicit the most spontaneous communication is inconclusive. Some studies (e.g., Chiang, 2008, 2009; O'Reilly et al., 2005) argue that academic activities elicit more spontaneous communication, although others (e.g., Potter and Whittaker, 2001; Stone et al., 1997) claim that unstructured activities are more likely to promote spontaneous communication. Therefore, the researcher (first author) video-recorded the six children naturally interacting with the three members of staff in four different activities, which vary in the amount of their structure. These were sensory room, soft play area (both fairly unstructured) and snack time and 1 : 1 work (both structured). Two hours of footage were collected for each pupil as SCERTS (Prizant et al., 2006) suggests that to get representative data from children with autism and limited communication, it is important to observe each child for at least 2 hours across at least two different days. Extracts from the children's videos, which were collected over a period of 2 months, were used to code staff's interactive style. Each member of staff was coded for 40 minutes pre-intervention. The staff videos were selected randomly and they were 10 minutes of each of the four activities in which the children were filmed.

Development of the intervention (3–4 months). After collecting the pre-intervention video data, the researcher examined the footage to identify which principles from the literature review staff were already using. She then edited the videos and met with the staff as a group to show them the video footage which illustrated these principles in practice. The researcher asked the staff how they could build on these principles by giving examples for each child and discussing challenges and limitations. Then the staff practised these principles for a month. This practice was inspired by Video Interaction Guidance (VIG) (Kennedy, 2011). VIG is an intervention aiming to improve communication between parents and children, building on the latters' existing skills. Parents are shown edited video clips of interactions with their children while highlighting the best aspects of these within a coaching relationship. During the development of the intervention period, the researcher visited the school three times a week and had short sessions with the staff to discuss any difficulties and to explain the principles again, if necessary. When this practice period ended, the researcher conducted a focus group interview with the staff where the final set of principles was agreed and given the name AISI. All three members of staff despite some initial hesitation by the teacher agreed to include in AISI all the principles highlighted by the researcher. The teacher was rather reluctant for a number of principles which she thought might not work with young children with autism and learning difficulties by in agreement with her colleagues they decided to try all principles to the extent they could.

The intervention: AISI. AISI consists of 21 principles: 13 general principles and 8 communicative opportunities. General principles relate to the adults' body language, speech and timing, whereas communicative opportunities are situations adults set up to give the children the chance to practise spontaneous communication. Each AISI principle was clearly defined in order to collect and then compare pre- and post-intervention and follow-up data. Table 3 presents all AISI principles with detailed definitions for each one of them.

Post-intervention (5–6 months). Each member of staff was coded for the same amount of time as pre-intervention (i.e., 40 minutes) across the same four activities. The videos were selected randomly as at pre-intervention and they were 10 minutes of each of the four activities in which the children were filmed. The three members of staff also took part in a focus group interview, which was conducted in the participants' classroom after a school day and lasted about an hour. The researcher assumed the role of facilitator/moderator encouraging equal contribution from the three participants. A semi-structured interview schedule was followed during which staff were asked to give their views on the effectiveness of the AISI principles and the ease of their implementation in a busy school setting.

Follow-up (18 months). Follow-up data were collected 12 months after the end of the main study to check whether the differences measured in staff interactive style and in children's spontaneous communication were maintained. The follow-up sample consisted of just three of the six children and two members of staff, the teacher and one TA. The reason for this was that these three children and two members of staff moved to the same class the year following the study plus the researcher gained a part-time job at the school as a TA and was placed in the same classroom. Therefore, it made more sense to follow up this group rather than any other.

The main reason this study used a pre/post/follow-up design was to challenge some serious concerns that literature has raised with regard to the quality of educational action research (Zeichner, 2001). Quantitative data were collected via video recordings and qualitative data were obtained through focus group interviews. Quantitative data were necessary to show changes in the frequency of children's spontaneous communication and the extent to which staff used AISI principles at each research phase whereas qualitative data were needed to explore the impact of each AISI principle and to get a more in-depth view of the reasons for the changes. The combination of quantitative and qualitative data coming from different sources enhanced the robustness and rigour of this small-scale study.

Table 3: AISI protocol

Principles	Definitions
General principles	Principles relate to the adults' body language, speech and timing
1. Gaining the child's attention	The adult called or sang the child's name before addressing them; they may alternatively have said something like 'Hello xxx (child's name)', 'Where is xxx (child's name)?' or 'xxx's (child's name) turn' (modified from Prizant et al., 2006)
2. Establishing appropriate proximity or touch	The adult approached the child in distance less than 1 metre and might have touched them too (modified from Nind and Hewett, 2001).
3. Showing availability	The adult extended their hands towards the child having wide and questioning eyes (modified from Prizant et al., 2006).
4. Waiting for initiations	The adult set up the stage for interaction and waited for at least five seconds for the child to initiate (modified from Prizant et al., 2006).
5. Responding to all the child's communicative attempts	The adult gave the object the child asked for, took away the object they protested for, allowed them to start and terminate activities when they communicated these. In cases that the child could not finish their activity yet or have the object they wanted, the adult acknowledged the communicative attempt and indicated steps for completion of the present task (modified from Prizant et al., 2006).
6. Assigning meaning to random actions or sounds	The adult reacted as if the child's behaviour was communicative, even when it was not (modified from Christie et al., 2009).
7. Imitating the child	The adult imitated the child's verbal (e.g., vocalisations, words) or non-verbal (e.g., actions) behaviour (modified from Prizant et al., 2006).
8. Following the child's lead/focus of attention	The adult joined in what the child was doing or commented on it (modified from Prizant et al., 2006).
9. Using exaggerated pitch, facial expressions, gestures and body language	The staff used animated pitch and exaggerated facial expressions, gestures or body language (modified from Kaufman, 1994; Greenspan and Wieder, 1998).
10. Expanding on the child's communicative attempts	The adults' utterance was the length of child's utterance plus one (modified from Rogers and Dawson, 2010).
11. Using minimal speech	The adult used up to four relevant concrete words and mapped them exactly onto aspects of the situation in hand (modified from Potter and Whittaker, 2001).
12. Providing time to process information	The adult gave the child verbal or non-verbal information and provided them with at least five seconds to process the given information (modified from Nind and Powell, 2000).
13. Using non-verbal cues	The adult used symbols or pictures, objects of reference, gestures, body language, physical prompts or Makaton signs to support the child's understanding (modified from Prizant et al., 2006).
Communicative opportunities	Situations adults set up in which the child is likely to initiate communication
1. Offering choices	The adult gave a choice of activity or food without any verbal prompt; the adult might have held out two objects for the child to choose or provided the child with a photo choice board (modified from Potter and Whittaker, 2001; Prizant et al., 2006).
2. Stopping part-way	The adult stopped part-way through a child's favourite activity, when it was in its peak (modified from Potter and Whittaker, 2001).
3. Giving small portions of food or drink	The adult gave the child small portions of food or drink so that the child could ask for more (Potter and Whittaker, 2001).
4. Making items inaccessible	The adult put items in sight but out of reach so that the child needed to ask for them (Potter and Whittaker, 2001).
5. Giving the child materials they will need help with	The adult gave the child materials they could not make them work without the adult's help (e.g., wind-up toys, toys in containers) (Potter and Whittaker, 2001).
6. Contradicting the child's expectations	The adult did something out of routine or unexpected (Potter and Whittaker, 2001).
7. Giving the child non-preferred items	The adult gave the child items they were not interested in to elicit protest or comment (Potter and Whittaker, 2001).
8. 'Forgetting' something vital	The adult set up a situation where they did not do something of vital importance; this could be to give the child paper without crayons in colouring time or putting on child only one shoe (Christie et al., 2009).

AISI, Adult Interactive Style Intervention.

Ethical issues

Compliance to the ethical requirements as specified by British Educational Research Association (2011) and the University of Birmingham Ethical Review Committee was monitored throughout data collection and analysis of this study. Due to the children's young age and their communication difficulties, it was not possible for them to give or deny consent. Therefore, the children's parents and staff gave informed consent prior to the onset of the study. Confidentiality and participants' anonymity were also ensured. Pseudonyms instead of the participants' real names were used throughout the research. The researcher aimed to work in the participants' best interests without adding extra work or stress on children or staff. Additional work for the staff was kept to a minimum. Both staff and children had the right to withdraw from the study at any point if they wished. If a child showed frustration as a result of being part of the study (e.g., become upset by the presence of the camera), they would automatically withdraw. None of them did so.

Results

This section presents the video and focus group interview findings in relation to the changes in adults' interactive style and its impact on the children's spontaneous communication.

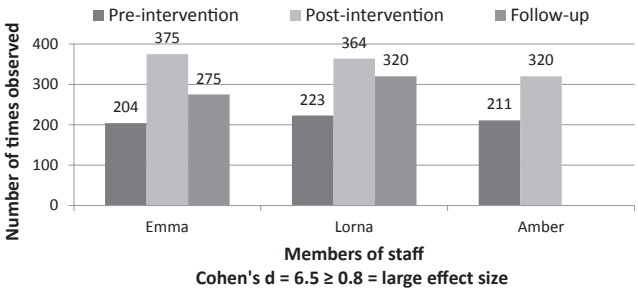
Video data

An event-sampling checklist based on the AISI principles was used to code the number of times staff used the AISI principles (40 minutes of randomly selected videos pre/post intervention and follow-up for each staff). Two hours of footage per child was coded for each research phase to measure changes in their spontaneous communication. The Checklist for the Initiation of Communication in Children with Autism (CICCA; Kossyvaki, Jones and Guldberg, 2012) was used. CICCA is an observation schedule to simultaneously code functions and methods of spontaneous communication in young children with autism and learning difficulties (e.g., functions: to request, reject an object or service; methods: simple motor actions, pictures).

Microsoft Excel was used to import data and create charts. Given the small sample size, no hypothesis test (e.g., *t*-tests, analysis of variance) was used as this would not convey anything reliable about the population. Therefore, effect size calculations and, more precisely, Cohen's d was used instead. Cohen's d is the index used to show the size of the difference between group means in terms of standard deviations (Cohen, 1988). Cohen's d gives the clinical or practical significance of the difference (Dancey and Reidy, 2002), rather than the statistical significance, which is used with larger samples. Sometimes researchers know the size of the effect they are looking for based on previous studies and carry out research to prove or challenge it. However, if there is no previous research in the area, the researcher can fall back on the values Cohen (1988) proposes; Cohen's d ≥ 0.2 shows a small effect size, ≥ 0.5 shows a medium effect size and ≥ 0.8 shows a large effect size.

Inter-rater reliability. Two qualified teachers of children with special educational needs who were blind to the aims of the study were asked to code some of the videos to check inter-rater reliability. The researcher trained the raters on separate samples of videos until an 80% agreement was achieved. Then they independently coded 21% of the pre/post intervention adult data and 22% of the pre/post intervention data on the children which were randomly selected. This exceeds the 20% minimum of sessions across conditions recommended by Reichow, Volkmar and Cicchetti (2008). A 90% inter-rater reliability agreement was reached for the staff data and an 85% inter-rater reliability agreement for the data on the children. Both are well above the minimum 80% which Reichow et al. (2008) recommend.

Figure 1: Total number of times each member of staff used the Adult Interactive Style Intervention (AISI) principles pre- and post-intervention (n = 3) and follow-up (n = 2)



Changes in the use of AISI principles by staff. At post-intervention, all three members of staff considerably increased the number of times they used AISI principles (see Figure 1). The overall Cohen's d was 6.5, exceeding by far the 0.8 cut-off for a large effect size. This means that the change in all three staff post-intervention was substantial in terms of practical/clinical significance. At follow-up, both members of staff who participated, Lorna and Emma, used more AISI principles than pre-intervention, but less than post-intervention.

Table 4 gives a detailed list of the principles which had a large effect size (Cohen's d ≥ 0.8) post-intervention meaning that their use was increased a great deal by all three staff.

Changes in children's spontaneous communication. At post-intervention, all six children increased the number of times they initiated communication. Cohen's d was calculated at 1.6, exceeding the 0.80 cut-off for a large effect size. This means that the increase was important in terms of practical/clinical significance. At follow-up, two of the three participating children either increased or maintained the number of times they communicated post-intervention. Figure 2 shows the number of times each child initiatedcommunication at pre- and post-intervention and at follow-up.

Table 4: AISI principles with large effect size post intervention (Cohen's d ≥ 0.8)

AISI principles	Cohen's d
General principles	
Imitate the child	9.88
Use minimal speech	1.90
Respond to communicative attempts	1.83
Establish proximity	1.43
Assign meaning to random actions or sounds	1.23
Expand on child's communicative attempts	1.18
Provide time	1.13
Use exaggerated pitch, facial expression, gestures and body language	0.99
Show availability	0.95
Wait for initiations	0.92
Communicative opportunities	
Offer choices	1.53
Stop part-way	1.3
Give small portions	1.05
Make items inaccessible	0.87

AISI, Adult Interactive Style Intervention.

Figure 2: Total number of times each child initiated communication pre- and post-intervention (n = 6) and follow-up (n = 3)

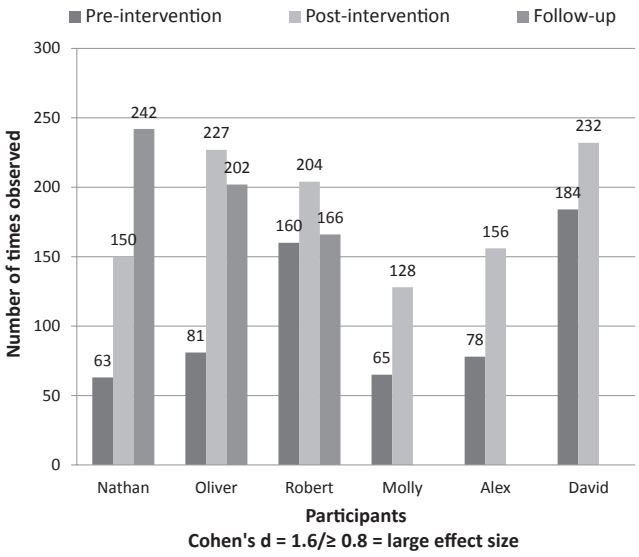


Table 5 presents the four communicative functions which had a large effect size post-intervention.

Focus group interviews

During the three focus group interviews, staff were asked to comment on AISI (i.e., its effectiveness and their experience of using it) as well as on its impact on the children's spontaneous communication. The interviews

Table 5: Communicative functions with large effect size post intervention (Cohen's d ≥ 0.8)

Communicative functions	Cohen's d
Behaviour regulation	
Request	1.67
Social interaction	
Social games	1.48
Seek attention	0.95
Express feelings	0.88

were transcribed and then coded by the first author using NVivo 10 (2012). No predetermined categories were used. Instead, the views and experiences generated by staff were categorised after the focus groups by the researcher.

Staff views on using AISI and taking part in the study. During the post-intervention and follow-up focus group interviews, the three staff presented their views on applying AISI principles in their everyday practice. Some of the AISI principles (general principles and communicative opportunities) which staff commented on are further explored here. Although using *imitation* a lot, staff raised some concerns about imitating all actions and sounds for fear of reinforcing behaviours which they felt should not be encouraged (e.g., flapping, rocking, echolalia). They also had concerns initially about *responding to all types of behaviours* for similar reasons. After being introduced to AISI, this practice changed to a great extent as they saw children's seemingly non-communicative behaviours decrease when they got a response. One member of staff thought that *minimal speech* was difficult to apply as this was against the way in which people typically speak. With regard to *establishing appropriate proximity*, staff became much more aware that they might be invading the child's personal space. *Using exaggerated pitch*, *facial expression*, *gestures and body language* was a principle that raised some concerns for the teacher, Lorna. She said she felt embarrassed to do this being observed by her colleagues and also concerned about '*jumping into children's entertainer mode'*. In terms of *waiting*, staff admitted that sometimes they were '*too eager to anticipate what the children wanted*'. Staff offered choices very frequently. They *gave choice* as part of directed activities (e.g., in art work). *Stopping part-way* through a favourite activity did not work in some cases because children '*got extremely angry or lost interest*' possibly because they did not know how to ask staff to start again. *Giving small portions of food or drink* also caused some problems with children who appeared not making the connection between the picture of a whole biscuit in the photo and the pieces of a biscuit given to them. For these children, staff wondered whether '*the battle was worth fighting?*'.

All staff felt taking part in the study was a very empowering experience. Lorna commented on the positives of team building and improving practice within a supportive environment. Emma highlighted the importance of sharing

ideas with her colleagues as a way of improving her practice and Amber focused on the significance of reflecting on their existing practice and building on this.

Staff views on changes in the children. Staff agreed that all children increased their spontaneous communication post-intervention and maintained this to a certain extent at follow-up. At post-intervention, staff thought that David and Robert increased their initiations a great deal. This finding did not concur with the video data which showed that these two children increased their initiations the least. Staff also commented on the change in Molly and Oliver's behaviour. They both became more '*people orientated*' but were using staff as tools to achieve their goals (e.g., to get the toys they wanted). At follow-up, staff agreed that both Oliver and Nathan were still initiating more than at pre-intervention but this was not the case for Robert. Staff felt Robert had a spiky profile with '*bad and good days*', so his data were inconsistent.

Discussion

The aim of the study was to explore the extent of the change in adults' interactive style and its impact on children's spontaneous communication. The findings for both staff and children are discussed separately. Comparisons with previous studies are made and potential reasons as to what these findings might mean are given.

Changes in the interactive style of staff

At post-intervention, video and focus group data showed that all three members of staff significantly changed their interactive style. At follow-up, these changes were maintained to a certain extent and there was only a slight regression to old practices. This phenomenon, which has been termed 'model drift' (Kelly and Campbell-Sadler, 2012), is common when support ends. However, the fact that the researcher worked as a part-time TA in the class concerned the year preceding the follow-up data collection might have prevented further regression. Further regression might have also been avoided due to the fact that the intervention was based on existing good practice at the school. As Kennedy (2011) argues in relation to parenting, staff in the current study were encouraged to '*become as active as possible in experiencing and thinking about their own change*' (p. 31). Using videos of their own practice taken at pre-intervention was perceived as a very empowering experience for the staff who often reported failing to notice their good practice due to their busy timetables.

The study followed Hall and Hall's (1996) advice on conducting action research (p. 12):

> *The research relationship is between equals [. . .] There is a genuine exchange. The research is negotiated.*

All three staff reported that their involvement as equal contributors in the study was a positive experience for them. They highlighted that they made changes to their practice and they also improved their ability to evaluate their practice. This echoes Tripp and Rich's (2012) views on the main benefits of using video-recordings in the classroom. Staff empowerment as a result of being part of an action research study is of great significance for a number of reasons. Staff who are listened to are likely to experience lower levels of stress and be less prone to burnout, which are both common among teaching staff working with pupils with special needs (Male and May, 1997). Additionally, literature has shown that given the increasing number of TAs and their widening role in schools, research needs to consider their feedback when researching effective teaching models (Blatchford, Russell and Webster, 2012; Vincett, Cremin and Thomas, 2005).

Although the overall change in staff interactive style had a large effect size (Cohen's d = 6.5), some principles appeared to be more used than others. Imitating the children; using minimal speech; responding to all their communicative attempts; establishing appropriate proximity; assigning meaning to random actions or sounds; expanding on their communicative attempts; providing time; using exaggerated pitch, facial expressions and body language; showing availability and waiting for initiations showed clinical significance post-intervention. Offering choices, stopping part-way through an activity, giving small portions of food or drink and making items inaccessible also had a large effect size post-intervention. Imitating the children, responding to all types of communication, using minimal speech and exaggerated facial expression and body language, waiting, stopping part-way and giving small portions of food and drink were also mentioned during the focus group interviews. A number of reasons may account for the staff preference in using these principles more than others.

Imitating was a principle that staff found difficult to implement especially at the start of the study. Mirroring the children's movements (e.g., flapping, rocking) is widely criticised by some EIBI therapists (James and Fletcher, 2011; Richman, 2001) who think that this may encourage 'inappropriate' behaviours. This was one of the reasons for staff hesitancy in using this principle initially. However, this concern seems unrealistic and of secondary importance when compared with teaching children with autism to become independent communicators. Staff eventually embraced this belief and considerably increased the use of imitation post-intervention. A possible explanation for using *minimal speech* to a great extent post-intervention is that this was already a core element of staff practice pre-intervention and it was easy for them to increase its use post-intervention. Staff acknowledged that AISI reminded them of its importance and encouraged them to use it more.

Responding to all communicative attempts was perceived as a very effective principle that staff tended to disregard at pre-intervention when children's behaviours were considered challenging (e.g., constant asking for objects when it was not time for them). When being introduced to AISI, staff were encouraged to respond to all the children's communicative attempts (e.g., pulling staff, running away) without ignoring, redirecting or trying to model a more

'appropriate' communicative method (e.g., symbols or speech). This is another point where AISI differs from some behavioural interventions in which adults' modelling of more advanced methods of communication is an integral part (Cooper, Heron and Heward, 2007). Despite being widely used post-intervention, *waiting* was a principle that caused a few difficulties for the staff. One of the TAs was initially very worried that other staff might comment on her silent moments in soft play or sensory room. The difficulty adults often have with waiting is also illustrated in Gillett and LeBlanc's (2007) study. They trained mothers of children with autism in a naturalistic approach and the component of the intervention they found most difficult was waiting for initiations.

Possible additional reasons as to why some AISI principles increased more than others can be related to some of the staff characteristics (e.g., personality, professional status, years of experience and self-confidence) or the children's features (e.g., age, verbal abilities and frequency or type of spontaneous communication). For example, Lorna, the teacher, might have felt embarrassed to use exaggerated pitch, body language and facial expression possibly because this would go against the serious profile she had to keep as leader in the classroom. Emma was reluctant to use imitation although she considered this very effective. A possible reason that might account for this is that she could be feeling less confident than the teacher having fewer years of experience. Staff did not often use principles such as contradicting children's expectations, giving them non-preferred items and setting up situations where adults 'forget' something vital. These principles were not considered by the staff very effective with young, non-verbal autistic children who have limited speech and spontaneous communication.

Overall, staff and the researcher concluded that creativity should be a core element for all AISI principles. Staff were likely to repeat the same routines at times they came up with an idea that encouraged children's initiations (e.g., 'forget' to zip up a child's coat). However, variation needed to be considered for two main reasons. Firstly, accepting change is a common difficulty for people with autism (Bogdashina, 2005; Jordan, 1999), and secondly, repeating the same routines may promote children's rigidity rather than spontaneous communication.

Changes in the spontaneous communication of children

The video data showed that all six children considerably increased the number of times they initiated communication, post-intervention. This finding is in accordance with previous studies claiming that when adults change their interactive style, children are likely to increase their spontaneous communication (Hwang and Hughes, 2000; Ingersoll et al., 2005; McAteer and Wilkinson, 2009; Potter and Whittaker, 2001). Children mainly initiated for behaviour regulation (i.e., to request) and social interaction (i.e., to initiate social games, seek attention and express feelings). This reflects Wetherby's (1986) point that behaviour regulation (i.e., verbal or gestural communicative signals to regulate another person's behaviour; Wetherby and Woods, 2006) is the first communicative function to emerge in children with autism followed by that of social interaction (i.e., verbal or gestural communicative signals to draw another person's attention to oneself; Wetherby and Woods, 2006). The changes in children's spontaneous communication were maintained to a great extent at follow-up suggesting that when children start experiencing the benefits of communicating with adults (e.g., getting the toy they want, having fun together), they keep initiating communication. This finding is also in agreement with the focus group data where staff reported a significant increase in children's spontaneous communication. However, in the focus group interview, staff reported that the children who increased initiations the most were David and Robert. According to the video data, these two children increased their initiations the least among their classmates. Both children, though, decreased the times they protested or used behaviours which staff thought should be discouraged (e.g., kicking, self-harming). This might be a reason why they were perceived as being more communicative, post-intervention. Another possible explanation for this might be that focus group interviews are not the ideal method to collect data for such a research question when quantitative data might be better.

Due to the design of the study, both external and internal validity are limited. This means that no solid conclusions can be drawn as to whether the findings of this study can be generalised to other populations with autism or that the change in staff interactive style caused the increase in children's spontaneous communication. Hawthorn-type (Denscombe, 2010) effects (i.e., staff being aware of taking part in the study could have resulted in improving their practice) did not affect the findings, as the main aim of the study was to build on their good practice. This was one of the reasons changes in adult style were mainly measured via video data. One of the main assets of the present study is that it provides data of high ecological validity which can be directly transferred into similar settings.

Conclusions

The staff successfully changed their interactive style using many of the AISI principles. The children's spontaneous communication also showed an important increase. Interventions which include a focus on adult behaviour in addition to enhancing the development and skills of the child are needed. The main advantages of this specific intervention are that it is cost- and time-effective and it has been validated through school-based research. AISI requires staff to work collaboratively on how to implement the principles and to provide communicative opportunities within their classes, without the need to change the curriculum, timetables, equipment and resources. The fact that most of the staff training occurs within the classroom is another advantage. Such research is very timely to inform school practice. A significant number of schools are willing to spend Pupil Premium funding (i.e., funding available to schools in the UK to narrow the attainment gap between disadvantaged and affluent backgrounds) on implementing evidence-based

intervention schemes to benefit their most disadvantaged students (Ager and Pyle, 2013).

Implications for future research

What needs to be further researched is whether such an intervention can work as successfully with less experienced staff and in other types of setting (e.g., mainstream or generic special schools). It would also be interesting to try AISI with older children and those of higher cognitive ability. Training typically developing peers, parents, friends or other members of the community in AISI would also be useful avenues to explore. Additionally, training staff in other countries in using AISI has attracted some attention. Two PhD students are researching the adaptation of AISI for use in their home countries (i.e., Greece and Saudi Arabia). The impact of AISI can be explored beyond the interaction with human partners. Given the affinity many individuals with autism have for technology, the researcher has used some AISI principles to inform her work in using virtual agents and robots with children with autism. Last but not least, since this study was an exploratory piece of research to develop AISI with school staff, a next step should be to validate the intervention via a more robust research design such as control groups or randomised control trials and check its internal validity.

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