

**LANCET SUPPLEMENT**

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**PRE-SCHOOL AUTISM COMMUNICATION TRIAL (PACT)  
INTERVENTION PROCEDURE**

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## 1. OVERVIEW

PACT (Pre-school Autism Communication Therapy) is a theory based, parent-mediated and video-aided intervention designed to improve social communication competencies in children with autism spectrum disorders (ASD). The principles of PACT derive from research on pre-linguistic, pragmatic and language development. The approach is based on interventions developed for children with developmental language delays<sup>1</sup> and targets core impairments in shared attention, understanding and intentional communication<sup>2</sup>. The rationale for the PACT intervention is based on findings that children with ASD require a style of adapted interaction that is specifically matched to their individual level of social communication.<sup>3</sup>

The intervention was applied with children with core autism in the PACT trial but is designed to be applicable also for young children (aged 2 to 6 years) with autism spectrum disorder and related social communication impairment, at either the pre-verbal or early stages of language development. The programme focuses on changing the interaction of the parent-child dyad in order to enhance child communication. Training is delivered by speech and language therapists, and although clinic based, the goal is to encourage parents to use the adapted interaction during play and other activities with their child in the home.

## 2. BACKGROUND

### *Communication impairments in Autism Spectrum Disorder and impact on parent-child communication*

Autism spectrum disorder (ASD) is a severe neuro-developmental disability<sup>4</sup> in which core impairments in language, communication and reciprocal social interaction have a profound influence on children's social development into adulthood.<sup>5</sup> Impairments in social communication are amongst the first symptoms to arouse parental concern, usually before the age of 24 months<sup>6,7</sup> and include deficits and delays in non-verbal communication, communicative intentionality, joint attention and orientating to social signals.<sup>8-11</sup> Such difficulties are pervasive, persistent, highly predictive of future social and educational outcomes and strongly associated with severity of behavioural symptoms.

The impact of these impairments on parent-child interaction is significant and can result in parental perplexity and reduced interactional 'meshing'.<sup>12</sup> The child's communicative signals may be 'weak', infrequent or poorly timed and thereby increase adult initiations and strategies to re-direct the child's focus of attention.<sup>13</sup> The resultant 'asynchronous' communication can lead to a reduction in language learning opportunities.<sup>14</sup> There is a risk of an increasingly didactic style of parental discourse and a decrease in reciprocal communication.<sup>15</sup> While a more directive parental style is not incompatible with sensitivity<sup>16</sup>, supportive, contingent and sensitive parental responses appear to be central to the development of joint attention, and later language development is accelerated when the adult follows child-initiated and child-focussed topics for joint attention.<sup>16-18</sup> This may be particularly important in children whose developmental impairments lead to difficulties in accommodating demands to shift focus and to regulate several competing demands on attention.<sup>19-21</sup>

### *Communication interventions for children with ASD*

The earliest language intervention programmes for children with ASD developed from behavioural principles and involved the direct teaching of comprehension and expressive vocabulary using prompting, shaping and reinforcement techniques. Although individualised, behaviourally based communication and language interventions<sup>22,23</sup> have been shown to be effective for some children, not all children respond to behavioural programmes of this kind.<sup>24</sup> Moreover, such interventions do not adequately address the underlying social pragmatic difficulties, rote language learning and problems in comprehending and using discourse and conversational skills that are characteristic of ASD.<sup>25</sup>

Pragmatic theory, which first emerged in the 1970s<sup>26</sup>, has influenced therapies that focus on child motivations, naturalistic interactions<sup>27</sup> and social use of language. By considering learning opportunities that occur outside the specific treatment programme<sup>28</sup> such interventions have raised awareness of the importance of maintenance and generalisation of communication skills in natural settings.<sup>29</sup> More recently, too, therapeutic approaches have shifted emphasis from child directed interventions to include parental participation. Therapies focusing on joint attention, synchrony and reciprocity in the parent-child relationship have been found to be associated with significant increases in children's expressive language.<sup>12,18,30-34</sup> Parent training programmes, including Early Bird<sup>35</sup> and Families and Communication Training and Support (FACTS)<sup>36</sup> have also been reported to have

positive effects on parent-child interactions and child communication.<sup>37,38</sup> Pragmatic intervention models, too, have been found effective in enhancing meaningful language and communication in children with ASD.<sup>3,33,39</sup> Systematic reviews<sup>40-43</sup> and the National Research Council<sup>29</sup> stress the need for functional, communication focused interventions:

*“Building spontaneous functional communication skills is a core aspect of effective treatment/ education for children with autism at all ages and all levels of disability. Opportunities for using and increasing communication should occur throughout the day”<sup>42</sup> ..... “Therapy services need to develop effective early intervention with coherent intervention plans to develop functional skills matched to the child’s current developmental level delivered at a high frequency throughout the day and across multiple settings”.*<sup>29</sup>

### 3. DEVELOPMENT OF PACT

The PACT programme aims to facilitate the development of the pre-linguistic and communication skills that underpin the emergence of meaningful language based on research in typically developing children and children with language and communication impairment. Recognition of the need for a pragmatics based approach to language development led to the initial development of the social communication approach to ASD intervention called ‘Child’s Talk’.<sup>12,30,44</sup> “Child’s Talk” also incorporates approaches common to other communication focussed, parent-mediated and video-aided therapies for young children with various disorders.<sup>45</sup>

Initial exploratory studies compared the parent-child interaction of children with specific language impairment, ASD and normally developing young infants and supported the use of the dyadic communication approach that is central to the PACT intervention. The maternal characteristics of synchrony and responsivity, identified as important in interactions with typically developing pre-linguistic infants, were found also to facilitate enhanced communication and interaction in children with autism.<sup>46</sup> However, children with autism required a heightened degree of sensitivity and an increased response level from parents.<sup>3,39</sup> The PACT model also incorporates other language facilitation techniques including semantic contingency<sup>47,48</sup>, adapted language input<sup>49</sup>, language mapping<sup>50</sup> and modelling.<sup>51</sup> Aldred and colleagues<sup>30</sup> demonstrated the potential effectiveness of this intervention in a pilot randomised control trial with 28 children with core autism (14 in each trial arm) against treatment as usual.

### 4. GENERAL PRINCIPLES

*Developmental orientation.* The PACT intervention follows a developmental hierarchy of graded social and communication skills related to reciprocal social, pre-linguistic, pragmatic and linguistic development, all of which are impaired in ASD. The aim of the intervention is to guide parents to provide a timely, highly adapted interaction context in which communication responses and language are matched to the child’s communication competence. Parents learn to identify windows of opportunity to enhance emerging communication, elicit child intentionality and facilitate joint interactions, thereby aiming to ameliorate abnormal developmental pathways.

*Focus on naturalistic interactions.* PACT focuses on naturalistic dyadic interactions between parent and child. The therapist initially observes and makes suggestions on how shared attention can be extended as a means of developing social openings for child communication initiation. Communication opportunities are established by examining, in detail, the interactional styles of parent and child and analysing the contribution of each partner to the dyad. Therapy assists parents to recognise and respond to the child’s contextual, non-verbal and verbal signals and how to interpret the child’s intentions. The intervention aims to equalise the balance between adult and child initiations, with the parent learning to modulate his or her level of support and thereby creating equal opportunities for the child to ‘take the floor’ and signal intentions. Parents are taught to monitor the levels of support they need to give and how to adapt the intensity and timing of their responses. The aim is for this to lead to an increase in child initiations and an enhancement of parent-child reciprocity and positive repertoires of dyadic interaction.

*Parent directed.* The intervention proceeds on a partnership basis, building on the parents’ skills and promoting parents’ individual resourcefulness. Parental independence, decision making, and self belief is emphasised throughout the programme. PACT aims to work collaboratively with parents by combining therapist responsiveness, which promotes therapeutic alliance, with the structured, goal-focused, treatment

delivery programme. The parent's own expertise and identification of appropriate communication goals within the framework of the staged manual are reinforced. Specific interaction and communication goals are set at each treatment session with the pace and style of intervention determined by child and parent characteristics. The targets of therapy are determined primarily by a hierarchy of child developmental skills and by the individual pace of child and parent progress. The therapist endeavours to recognise and extend parents' existing skills through guided, focused observation in order to facilitate enhancements and change in parents' communication responses. Therapists are trained to evaluate parents' experience and skills, and to reflect these back to the parents whilst providing observations of the child's experience and inferred intent in the context of the play interaction. At the same time, parents' own individual priorities, experiences, perceptions, needs and style are recognised in the individualised intervention programme.

*Video-aided.* In accordance with research on adult learning and effective teaching, the treatment programme also utilises video feedback and a reflective style of therapy. All parent-child play sessions are video recorded and followed by a feedback session in which parents are encouraged to identify successful episodes of reciprocal interaction and to reflect on their positive contribution to these. Feedback sessions allow discussion of the interaction between parents and child and exploration of how the child's signals of initiation are determined by contextual cues, non-verbal and verbal behaviour. Parents are also helped to alter their focus from what the child is *saying* to how the child is *communicating* e.g. helping the parent notice the child's vocalisation or action as meaningful communication.

Finally, video feedback enables the parent and therapist to set specific and highly individual targeted goals at each session. The agreed goals are written by the therapist and provided to the parent immediately after the session, or sent by email.

*Adapted to parental style.* Therapy delivery is moderated and matched to parental style in order to optimise effectiveness. Parents were asked how they think they learn best, and encouraged to identify learning situations or strategies that worked well for them. They were encouraged to reflect on a recently acquired skill (e.g. learning to swim, follow a new recipe) and how they achieved their learning goal. Learning style may vary depending on the stage of the programme. Thus, initially, parents may need greater emphasis on direct coaching to support their experience and observation of positive interaction. Subsequently, parents may adopt a more reflective style once they have gained greater awareness and understanding of their own contribution to successful repertoires of interaction. The intervention uses broad questions and comments together with more specific probes to guide observation and discussion around the focus of each stage of the programme. The questions aim to help parents to:

- identify a specific behaviour during the play and facilitate understanding of how this supports child communication opportunities and/or
- identify the child's response and an understanding of why this response occurred.

## 5. SPECIFIC AIMS

The PACT programme targets core impairments in shared attention, communication, intentionality and pragmatics that are thought to underlie the abnormal developmental and language pathways of children with ASD.

*Shared Attention* – Shared attention refers to the ability to share a common focus, object or action with another person. Shared attention is a pre-cursor to developing referential understanding, i.e. understanding that gestures and words refer to objects and events. This is a key factor in vocabulary growth and in the emergence of communication competence in both normally developing children and children with ASD.<sup>37</sup>

Lack of *shared attention* in children with ASD is associated with delay and abnormal development of language.<sup>52</sup> The PACT programme aims to establish co-ordinated attention between the parent and child and to help them develop a shared awareness of the other person, objects and events. The intervention starts with supporting the parents in achieving a mutual shared focus.<sup>37,52</sup>

*Communication* – Communication is the conveying of information or an intention to another person. Communicative acts, verbal and/or non-verbal, are used to respond, to initiate or achieve a specific effect on another person or to signal a desire. Intentions may be conveyed through non-verbal body posture, gestures, gaze and may not necessarily match the words spoken. Children with ASD show less

frequent, and typically weak (signals which are difficult to recognise) and unusual communication.<sup>33,53,54</sup> The primary goal of PACT is to develop the child's spontaneous communication.

*Communication intention* – This is the ability to initiate and convey meaningful ideas and be aware of the other person acting as an agent (a person who is available to respond to the child's communication). The development of intentionality occurs when the infant realises the effect of his actions/vocalisations on other people. Children with ASD show fewer communication initiations and a relatively limited range of communicative intentions compared to typically developing children.<sup>55</sup> For example a pre-verbal child with ASD may simply cry while staring towards a desired object, making little attempt to solicit the parent's attention. Similarly, a verbal child may name the object he/she wants, but may make no direct attempt to seek or direct the parent's attention to this.<sup>56,57</sup> Intentional actions are facilitated in the PACT programme by encouraging parents to use pauses in their interactions to encourage the child to produce a non-verbal and/or verbal communication response. In this way the child becomes aware of the parent as someone who responds to communication actions and words.

*Pragmatics* – In this study the term pragmatics is used to refer to the form and function of communication. The *form* is the way the child communicates i.e. using glancing, pointing, gestures, posture, vocalisation or words.<sup>58</sup> The *function* is the purpose of the communication e.g. to seek attention, direct another to perform an action, request an object, negate. Pragmatic difficulties in ASD are characterised by a limited range of communicative functions (communication acts). These difficulties continue into later childhood, with dissociation between language form and function persisting even for children who become verbally fluent.<sup>59</sup> The PACT programme aims to elicit a range of pragmatic functions (such as glancing and a gesture to request an activity again, giving an object to seek help, glancing and vocalising to ask for a container to be opened using pause, subtle sabotage and gentle teasing).

## **6. PACT INTERVENTION TRIAL PROCEDURE**

The trial had six treatment therapists, two at each site and 3 lead therapists, one at each site. The lead therapist provided weekly supervision on case management and setting appropriate targets for treatment therapists.

### ***Liaison with local therapists***

The lead therapist at each treatment site contacted local therapy managers, the speech and language therapy department administrators and individual therapists to inform them of the family's participation in the study and their group allocation. Families randomised to the treatment arm were provided with a named therapist and the date of the initial home visit. Specific details of the treatment and its progress were not shared with local services, though families were free to do so. A copy of the initial assessment reports were sent to the families, the lead therapist and referring agent prior to randomisation and final reports sent to the same after the final assessment.

### ***Initial Home Visit***

An initial home visit was made to explore parental beliefs and other factors that might affect therapy or influence engagement with the programme. During the home visit parents were helped to select a suitable time and a quiet, distraction free room or space in which to practise the programme at home. This initial visit also allowed the therapist to explore parental attitudes, priorities, expectations of treatment, and how the child's communication needs are viewed by the parent. The initial exploration of beliefs and expectations helped to clarify parents' underlying aspirations for their child. Parental beliefs of autism including cultural beliefs, stigmatisation, religious beliefs and attributions were elicited and recorded. In addition, parents' priorities and roles (e.g. educating at home), the child's role, discipline, family interaction, and cultural values were explored by the therapist. During the initial home visit parents were also asked to consider their preferred learning style.

### **Clinic Sessions**

#### ***Physical environment***

Each of the clinic settings at the three sites had minimal distractions, any cupboards had lockable door, ideally high shelving, suitable free floor space, a small table and chair, and no mirrors or easily accessible windows. Extra furniture/ objects/equipment were removed. The room was a minimum of 3

metres square but not too large. The environment was planned to create a comfortable space with plenty of opportunity for parent-child interaction. For recording the sessions a floor mounted camera was placed in an unobtrusive corner of the room with chairs for viewing video playback. A computer was required for video feedback and a printer for the written home programmes. All camera equipment and DVDs etc were removed or stored in a lockable cabinet

### ***Choice of materials***

A standard set of specific toys were available. These included large plastic boxes to contain a selection of toys for each individual child session. Therapists planned the intervention programme and use of appropriate play material based initially on the assessment profile of the child and information contained in the initial assessment report and subsequently on the use of materials in the previous sessions.

The therapist ensured that toys were varied to maintain novelty and elicit interaction. A small selection of toys was placed in a clear plastic box in the centre of the floor or on a small table according to the goals of each session. All other toys/ equipment were removed from the room.

If a child developed a particularly strong interest in a specific toy that interfered with interaction, this was removed at the next session and substituted with an alternative toy.

When selecting appropriate toys, the therapist considered the following:

- The developmental level of the child
- The child's interests (toys that may interest the child but not ones that he/she is likely to become obsessed with)
- The stage of the intervention: some stages required specific consideration of the choice of toys.

At the end of the parent-child play session an alternative set of toys was provided. Therapists also asked parents to bring a favourite snack/activity/game that was likely to occupy the child during the feedback session so that parent focus during this time was not interrupted. If the child had difficulty occupying themselves parents were encouraged to bring a helper or family member to play with the child during feedback time. If this was not possible the therapist identified a colleague or someone in the clinic to take on this role.

### ***Session Structure***

The parent(s) and child were invited to attend individual intervention sessions lasting approximately 2 hours, on alternate weeks for six months and then monthly sessions for a further six months. At each session parents were asked to play with the child as they do normally at home and demonstrate how they were implementing the programme. During this time the therapist made a 10 minutes video recording. The parent and therapist then watched the complete video and identified, reviewed and discussed specific clips that demonstrate accomplishment of therapy goals for each stage of the programme. The therapist's role was to guide parents to identify their successful strategies and responses i.e. episodes of engagement and/ or mutual sharing with their child. Parents were helped to reflect on their role in enhancing interaction and to identify new intervention goals. These were then set out in the next written programme for parents to practise in the session and at home. Therapists made notes for each stage of the programme to establish the quality and frequency of applied social, communication and language strategies.

At each session, video play back allowed a review of targets set in the previous session. Parents and therapist then planned together how to change and develop the child's communication within the framework of the programme. New targets generated in discussion were noted in a written programme. Parents were asked to spend 30 minutes daily practising the strategies at home. The child's accomplishment of communication and other goals were noted by parents and discussed at the next intervention session

### ***Session format***

#### **Beginning : Review of home progress and setting of agenda**

The start of each session began with an initial welcome and an opportunity for parents to share important events since the last session. Parents were then asked to describe progress with the home practice and to recall the targets set. They were asked how often they were able to practice, if they experienced any problems, and if they have noticed any changes in the child since the previous session

Parents were encouraged to bring their own priorities, goals and communication targets to the session.

Middle (30-60 minutes in total)

The parent and child were then asked to play together for 10 minutes using the toys provided by the therapist. This play session was recorded and therapist and parent watched the video recording together. The therapist recorded the times of specific sections of the DVD to be reviewed in playback and noted points for discussion using a standard form. The therapist and parents watched the DVD excerpts again and discussed progress together. The therapist used succinct probes starting with broad observations and focused questions to elicit parent observation and interpretation. The probes also focused on specific strategies related to the stage of the programme. The video feedback typically took between 30-60 minutes.

The therapist used record sheets to code behaviours noted during the video playback for each stage of the programme and wrote up the case notes. Parents' comments and observations were elicited and the therapist recorded key points and words in the written programme. The therapist also summarised the successful techniques used and provided clear written examples of these (e.g. When you did / said this, he did this).

End (10-15 minutes)

At the end of each session parents were given a written programme summarising the aims and targets of the session, the goals achieved, with examples from video play back, and the agreed new goals for the next week. The therapist also summarised the agreed activities that were used to achieve these targets and checked date and time of the next appointment. The written summary of the session and the homework programme was compiled with the therapist *asking* the parent to help them reflect, rather than *telling* them what to do. The therapist and parent generated aims for the programme using the parent's own words and terminology. For example, the therapist asked "What do you want to include in this programme?" The therapist took into account the developmental stage of the child and stage of the manual to ensure that the parent's self identified targets were appropriate.

***Selecting video clips for feedback***

As far as possible parents were encouraged to select video clips but if they had difficulty in doing so the therapist selected the clip to watch. The therapist selected positive clips where the parent had demonstrated a specific skill e.g. successful modelling and increased confidence in playing with their child.

In early sessions clips were identified by asking parents which aspect of play they enjoyed/ which part they felt the child enjoyed etc. These clips were often the moments where shared engagement was achieved. In later sessions the therapist guided the parent towards selecting the video clip related to the stage specific goals by focusing on different parts of the play before watching the clip i.e. before the video the therapist may have described the focus of the stage.

Decisions on which clips to suggest varied from session to session and often depended on the parent's ability to reflect on the video and his/her understanding and awareness of the significance of particular child communication opportunities. The therapist introduced new concepts or re-framed the parent's observations by:

- selecting particular video clips
- guiding the parent towards a specific excerpt of the video illustrating a communication strategy through focussing on different parts of the play.
- focussing on increasing communication opportunities for the child

The therapist also used concrete analogies, relating to parents' own experiences to help them:

- visualise a concept/ idea;
- relate to their child's experiences
- think about how their child feels/ what he/she is experiencing by relating it to their own knowledge/ experiences.

As parents became more competent observers it was necessary to review only selected clips, not the whole playback. During the feedback session the therapist summarised the goals identified and reflected on the child's developmental stage. Throughout the session the therapist took notes of comments, vocabulary and phrases used by the parent to embed within the feedback session and in the written home programme. In this way the feedback reflected the parent's understanding and personal style of framing the goals of therapy.

### ***Setting the home programme***

The home programmes were an integral part of the intervention process and written following every session. The written programme was short, concise and clear, relating to the individual child goals and summarised the parent's successful strategies and newly acquired skills. For example: "Ben is now sharing his play with you and inviting you to join in with his actions, well done".

The initial home programmes reinforced the need for the 30 minutes individual parent-child time in a quiet room in the home. Later programmes identified essential additions or revisions of the programme (e.g. avoiding moving on too quickly, staying at a particular stage). Later programmes also gave examples of how targets could be generalised into everyday natural routines with greater emphasis on generalisation particularly from Stage 3 onwards.

The written programme were made up of 3 sections:

**Section 1:** Summary of individual parent and child success

This summarised success reported from home practice sessions and observations by therapist and/or parent(s) from the feedback session. Progress was related to the aims of the stage, with behavioural examples from the video play session.

**Section 2:** Definition of specific developmental aims for the child e.g. "Ben needs help with.....). The aims were specific and related to short term goals. Emergent skills were identified (e.g. the aim is to increase duration and frequency of mutual sharing) and 1-2 targets set for the child in each session.

**Section 3:** "Aims for home practice" - Targets were discussed in feedback, and detailed practice ideas and specific activities relating to the targets were described with examples from the play session. Activities were described with clear behavioural examples, using parents' own words and phrases noted by the therapist during the video playback. The written programme summarised the staged goals in bullet points.

### ***Home Practice***

Parents were advised to find a room at home providing a distraction free setting, where there was no TV, video, computer, phone or radio (or, if not removed, turned off). It was equally important to avoid distraction during the practice play sessions at home as it was during the clinic sessions. The therapist helped parents identify a suitable room and any necessary adaptations to this, and to decide on the best time when they could be alone with the child (e.g. after tea or after bath time). Parents were advised to prepare for the 30 minute home practice sessions by selecting a small set of toys and removing other toys or distractions from the room during these times.

### ***Generalisation***

In the first six months of the intervention, an integral aim of the intervention was to facilitate the generalisation of new skills into other contexts. In the second six months period, each monthly session was part of the consolidation stage of the programme which focused on generalising the social-communication skills learned during the sessions into every day routines- for example mealtimes, dressing, washing, and bedtimes, and to establish spontaneous and independent use by the child.

## **7. ADDITIONAL CLINICAL CONSIDERATIONS**

### ***Training and fidelity***

The research therapists had prior experience of a range of children with ASD of differing developmental levels, an understanding of developmental theories of autism and experience in implementing autism specific intervention strategies (i.e. reducing visual distractions, forewarning of change, monitoring arousal levels, environmental adaptations e.g. removing toys that the child becomes focused on). In addition, therapists had basic skills in observation and working with parents of children with ASD. The research therapists attended a training course lead by Catherine Aldred, who was a principal investigator in the study and had led the pilot study. The training manual included detailed procedures for each stage of the programme, record sheets and proformas for recording notes from the initial home visit, stage specific observations and writing the home programme. To complete training therapists were required to achieve 80% fidelity on two DVDs taken from five practice parent-child interaction sessions. The therapists accomplished the required level prior to commencing the trial. Standard operating procedures were developed to address issues (e.g. management of cancelled appointments) relating to the delivery of the treatment in the context of a randomised control trial across 3 sites.



Research therapists received weekly supervision from the lead therapist at each site to discuss individual case management, issues arising from treatment families, criteria for moving on to the next stage, advice relating to accessing other services, liaison or problem solving. Therapists selected one or two treatment DVDs of parent/ child interaction and the feedback session for discussion of treatment aims, parental learning style and adapting the treatment process to each individual case. Issues, risks and actions were recorded and shared with the therapists at other treatment sites. Therapists completed individual research case notes for each intervention session. These case notes included recording attendance, parental compliance and parental fidelity to the intervention programme and home practice. The number of sessions taken to complete each stage of the intervention manual, exceptional circumstances including family events which compromised compliance to the intervention were recorded. The individual pace of the child's development and factors influencing points of rapid progress were also recorded.

Following the initial training, an exercise was undertaken through the trial to assess ongoing fidelity to the model during the trial treatment period. All clinic sessions in the PACT trial were videotaped. 44 of these clinic sessions (from 37 participants), were selected by stratified randomisation to balance therapist and whether session was early or late in the treatment. These were double-coded for therapist fidelity by three independent raters against items in a Fidelity Rating Scale (see appendix) modified for the study from the modified Cognitive Therapy Quality Rating Scale.<sup>64 65</sup> The number of items/session (out of a possible total of 14) meeting criteria for fidelity was calculated, with a target of maintaining 80% item fidelity. Coding on one item in the scale (Item 9) was only available in 32/44 (72%) sessions due to missing data and was examined separately from this main fidelity analysis; available data on this item showed inter-rater agreement of 31/32 (97%) and coding that met fidelity criteria in 31/32 (97%) of sessions. Further details of the fidelity coding procedure and analysis are available from the corresponding author.

#### ***Families involved in other intervention programmes***

The PACT trial protocol recognised that families in the treatment arm may have been accessing several interventions simultaneously. The research therapists therefore obtained information about any other interventions from the parents. Occasionally parents raised a question about some aspect of the PACT programme that appeared to conflict with advice from other professionals. In such cases the research therapist discussed the specific targets in the PACT intervention and assisted the parent to recognise ways in which different forms of intervention could be compatible. If necessary the lead therapist contacted a local professional to discuss and reconcile the advice given.

#### ***Demands on families***

Individual and family circumstances including culture, priorities and health beliefs were important considerations that were accommodated within the flexibility of the PACT programme where possible. Problems related to parents who presented with specific concerns, such as depression or anxiety which influenced access to the intervention were discussed with the relevant supervisor/line manager. Clinical risk was evaluated and managed in accordance with national and local policy and procedures.

#### ***Feedback to parents.***

Ensuring that the child was occupied during feedback sessions so that parents and therapists could focus on the video play back did sometimes present problems. The therapist asked parents to bring a favourite toy/ activity /snack for use during the feedback session or needed to include a helper (either another family member, or another therapist/work colleague). The therapist encouraged the child to settle with the toys by giving him/her extra time to explore the room or asking the parents how they usually help settle their child

#### ***Adapting the programme for verbally fluent children***

The study had children ranging from those with no verbal communication to others with emerging language skills. Some parents had difficulty in focussing on the early stages of the programme due to greater language expectations of their child. In spite of this the therapists began at Stage 1 with all children because parent strategies in the later stages relies on understanding and implementing concepts and strategies acquired in the earlier stages. The rationale for the early strategies was explained to parents in terms of establishing the pre-requisite skills for the later stages of the intervention.

### ***Adapting the programme for children who use delayed echolalia***

When working with the children the therapist encouraged the parent to think about the function of the delayed echolalia, and the subsequent interaction. Typically the child's use of delayed echolalia triggered a highly repetitive predictable pattern of interaction. This could lead to further difficulties in engaging the child in meaningful interaction directly related to the play context. The therapist helped the parent to:

- Ignore delayed echolalia that did not have a communicative function.
- Watch the child's actions- these may give the parent clues about the child's intended meaning
- If the utterance was judged to have a communicative function the parent could model appropriate phrases: i.e. encouraging the parent to respond back with a more appropriate phrase that the child could use instead.
- Relate the delayed echolalia to objects/actions within the environment

### ***Home or clinic based training***

Although generally the intervention was conducted within a clinic setting, in certain circumstances home intervention was more appropriate. This was the case, for example, for children who were highly anxious in unfamiliar settings or had difficulty settling in the clinic environment. Considerations for establishing a minimally distracting room, the location of the specific PACT therapy toys and camera were discussed with parents. The room at home needed prior preparation, with other toys and distractions being removed. Parents were asked to consider how they wished to ensure the child could be occupied to ensure minimal interruptions during the feedback session.

### ***Bilingualism***

The PACT intervention places demands on parents' processing and expression of language, both in the parent-child play session and when implementing the written programme. Bilingual parents were asked to identify the principal language used at home and when addressing their child.

### ***Working with two parents***

Before therapy started therapists discussed with parents their preferences and availability to attend the intervention sessions. The parent most consistently available to attend the sessions and complete the home practice was identified. The other parent or family member/ helper was welcome to observe the session to support home practice. When parents expressed a desire to have equal involvement in the sessions, both at home and in the clinic, arrangements were made to include both parents in the feedback and home practice.

## **8. PACT STAGES**

The programme has 6 stages that follow a developmental hierarchy. These are summarised below.

***Stage 1. Establishing Shared attention*** The initial focus helps the parent and child to establish episodes of shared attention.

Aim:

- For the parent and child to experience episodes of mutual shared attention.
- To provide the context for communication through shared attention.

This is achieved by:

- The parent sensitively observes the child's focus, verbal and non-verbal signals.
- The parent recognising and responding to opportunities for shared attention during play with the child.

### ***Stage 2. Synchronicity and sensitivity***

Parents identify and use responses aimed at facilitating the child's social and communication responsiveness, thereby reducing asynchronous communication (mistimed responses that place a demand on the child) and increasing parent synchronous communication (adapted to the child's pace/ timing, commenting on and complementing the child's topic of interest). Directive responses and demands are replaced with synchronous responses such as commenting and acknowledging child intentions.

Aim:

For the child to:

- experience reduced demands in play.
- process the parent's language more easily.
- experience synchronous responses to communication.
- experience a balance between the child's and parent's communication initiation.

This is achieved by:

- The parent adapting the type of language she/he uses (comments, questions, instructions) to support the child's processing.
- Helping the parent to respond sensitively, appropriately and contingently to the child.
- Helping the parent to respond to the child's signals as meaningful communication.

### ***Stage 3. Focusing on language input***

The parent selects and models language that accurately matches the child's language competencies. Parent language and non-verbal gestures are carefully monitored and modified to be contingent with child comprehension. The parent is explicitly trained to respond to the child's communication and to model complementary verbal responses that express the child's inferred communication intent.

Aim:

- For the child to develop his/her understanding and use of spoken language.

This is achieved by:

- The parent mapping and modelling language that is appropriate to the child's developmental level.
- The parent using language that matches the child's focus of interest and communicative intent.

### ***Stage 4. Establishing routines and anticipation***

This is a consolidation phase that supports the child's verbal understanding, anticipation and participation using repetitive rhymes, routine familiar phrases and familiar interactive play.

Aim:

For the child to:

- learn to anticipate with enjoyment through familiar routines.
- initiate communication within predictable routines.
- develop intentional communication and generalise these skills into daily life.

This is achieved by:

- The parent learning to use consistent, predictable and rehearsed interactive play.
- The parent using repetitive familiar language.

### ***Stage 5. Increasing communication functions***

Communication acts are elicited by the use of communication "teasers" to provide opportunities for child initiation. For example, by the parent using pause and gaps within familiar predictable play situations which the child fills with non-verbal and verbal responses. These are gradually extended to pose deliberate problems and "sabotage" in situations where the parent makes obvious mistakes. A range of pragmatic communication acts are elicited including requesting, negating, directing and commenting.

Aim:

For the child to:

- become an active and intentional communicator.
- initiate spontaneous communication and use language for a variety of functions.
- develop an awareness of the parent's responses to the child's communication.

This is achieved by:

- The parent learning to use a range of strategies to create opportunities for the child to initiate communication and use language for a range of functions.

### ***Stage 6. Expanding language and conversations***

The final phase involves the parents elaborating and expanding on the child's own play, communication and language repertoire.

Aim:

For the child to:

- extend semantics and vocabulary.
- develop syntactic and narrative language skills.
- take part in reciprocal conversational exchanges.

This is achieved by:

- The parent repeating back the child's language in play and adding syntactic and semantic expansions that complement and match the child's topic.
- The parent making complementary comments in play to elicit conversational reciprocity and elaborate on the child's topic of conversation by adding new ideas.

### ***Background to the stages***

Each stage has a specific aim and strategies that the therapist targets with the parent(s). It should be noted that at each stage the therapist may not need to target *all* of the strategies, but one or two may be key in affecting the parent/ child dyad. For each stage the treatment manual provided a section entitled "Ways to help elicit observations from parents" with examples of probes and comments that could be used. Individualised prompts aimed to facilitate parental observation and understanding.

### ***Sequence of intervention stages***

The intervention always started at Stage 1 of the treatment with at least 2-3 sessions focussing on this stage. Subsequent progression was determined by the child's developmental readiness and the pace of the parent in working through the goals.

### ***Moving Through the Stages of the PACT intervention***

The intervention has measurable criteria for moving from one stage to the next in the PACT programme. These criteria enabled the therapist to judge if the parent and child had accomplished an level of skill at that particular stage. At the end of each stage in the full manual to be published for use in training courses there is a section entitled "Moving to stage...". The therapist rated the latest play session using the criteria for moving on to the next stage. The criteria varied through the stages but commonly included

- Direct measurements/ counts of behaviours within the 10 minute play session
- Observations made within the 10 minute play sessions
- Parental reports of behaviours/strategies carried out at home.

Once the therapist judged that the child and parent were ready to progress she/he checked that the essential criteria had been measured and achieved (e.g. 'parent following child's focus for 50 % of the time'). There were also some optional targets for moving on to the next stage.

The pace of the intervention was judged by the parent's and child's readiness to move on. Some children needed to remain at one stage for a longer period of time compared with other children. Finally not all children accomplished the higher stages 5 or 6.

### ***Flexibility in moving through the stages***

While the stages were designed to be carried out sequentially, there was flexibility in the way therapists moved through the stages. Equally, it was necessary to continue with a stage even when both parent and child had accomplished the stage specific goals if the therapist judged this to be beneficial in consolidating or further developing existing skills.

- *Going back to earlier stages.* Therapists re-visited earlier stages of the intervention if the parent needed to reinforce these skills to help accomplish the later stage. Therapists also revisited an earlier stage in the intervention to consolidate or reinforce earlier skills e.g. to ensure synchrony when moving onto a later stage.
- *Variable rate of progression through the stages.* Some children (e.g. those who are more verbal) progressed onto the next stage after 1 or 2 sessions. Other children needed a greater number of sessions, particularly at Stages 4 and 5. The progression was judged on the basis of the combination of individual parent and child readiness.

### ***Maintenance Sessions***

Once the 12 regular fortnightly treatment sessions were completed, families progressed to 6 once a month maintenance sessions. The monthly sessions aimed to review previous targets/ stages and to progress through the stages of the intervention manual. Maintenance sessions continued with video feedback and revisited earlier targets whilst working towards higher goals e.g. language mapping and higher levels of consistency. Sometimes parents slipped back to using aspects of their previous interaction style, as progress in their child's language and communication initiation lead them to take a more didactic style. Maintaining higher thresholds of synchronicity was emphasised. Once consistency was achieved, maintenance sessions progressed through the next stages of the intervention manual. Some children only progressed to Stage 3; others became verbally fluent and attained Stage 6. The treatment programme addressed conversational initiation, reciprocity, topic maintenance, language

contingency and language expansions/ extensions for verbally fluent children. Record keeping was continued using the standard proformas (see full manual to be published).

### **Future training/ dissemination**

Further training will be available in Manchester and other approved training sites. It will involve role-play of clinical scenarios, analysis of DVD clips and case presentations with an accompanying intervention procedural manual. Details of training can be obtained from Dr Catherine Aldred, [craldred@tiscali.co.uk](mailto:craldred@tiscali.co.uk).

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## Appendix

### Treatment Fidelity Rating Scale

#### A. General Therapeutic Procedures

##### 1. *Agenda Setting*

- 0 The therapist did not review achievement of communication goals or either did not set an agenda *or* set one that was vague, incomplete, or unilaterally determined.
- 1 The therapist worked with the parent to set a mutually acceptable agenda that included specific communication targets.

##### 2. *Viewing Video Excerpts*

- 0 The therapist did not show appropriate excerpts or comment on the parent-child communication interaction or selected excerpts or made comments on the parent-child communication that were vague or not related to the communication targets set.
- 1 The therapist showed appropriate video excerpts highlighting parental achievement of the communication targets set and elicited positive parental comments on change communication style.

##### 3. *Eliciting Parent Feedback*

- 0 Little or no attempt by the therapist to elicit feedback to determine if the parent had understood the strategies and techniques being utilised in the session. Did not ask enough questions to be sure the parent understood the communication goals or to ascertain the parent's reactions to the session.
- 1 The therapist elicited feedback from the parent to determine the parent's observation and understanding of communication goals after the video play back session.

##### 4. *Response to Parents Focus*

- 0 No attempt to recognise or respond to parent's focus.
- 1 Recognised and responded appropriately to parent's focus throughout the session.

##### 5. *Structuring the Session*

- 0 Little or no structure to the therapy time *or* pacing too slow or too fast, or was inflexible or not adapted to the task in hand.
- 1 The therapist and parent paced the session well, so there was a clear beginning, middle and closing of the session. Peripheral and unproductive digressions were either very uncommon, or handled well by the therapist and/or parent.

##### 6. *Pacing*

- 0 The therapist pacing and timing was not appropriate to parents.
- 1 The therapist pacing and timing was appropriate to parents.

## B. Interpersonal Effectiveness

### 7. *Sensitivity Skills*

- 0 The therapist failed to reflect or rephrase what the parent explicitly said or showed problems responding to implicit or subtle communication.
- 1 The therapist generally seemed to grasp the parent's meaning as reflected by both what the parent explicitly said and what the parent communicated more subtly.

### 8. *Validation and Positive Feedback*

- 0 The therapist missed opportunities to praise parental achievements.
- 1 The therapist recognised and appropriately praised parental achievements

## C. Specific Communication Therapy Techniques

(Rate item 9a-f according to the relevant treatment stage of session)

### 9a. *Focus on parent shared attention (PACT stage 1)*

The emphasis of this stage is on the parent sensitively waiting and observing the child, sharing of a common focus which leads to episodes of mutual interpersonal sharing.

- 0 There was no specific use of techniques to gain parent observation of sharing attention or following child's focus or the focus of the questions was vague or irrelevant.
- 1 There was adequate focus on the parent's observations of specific episodes of parental shared attention and the resultant change in child responses.

### 9b. *Focus on parent synchronous communication style (PACT stage 2)*

The focus of stage 2 is to decrease parents' intrusive demands made on the child and replace these with comments aimed at facilitating and sustaining the child's communication responses. The parent's non-verbal responses and language become synchronous with the actions and intentions of the child.

- 0 There was not an adequate attempt to elicit parent's observation of the impact of their communication style on their child's responses. There was not adequate use of techniques such as inductive questioning or focus of the questions was vague or irrelevant.
- 1 There was an appropriate focus on parent's observation of the impact of their communication style on their child's responses. Helping parents to identify synchronous communications which elicited increased responses in the child.

### 9c. *Application of communication techniques (PACT stage 3)*

Stage 3 focuses on the parent using simplified, repetitive language and using words that directly relate to the ongoing events and experiences of the child

- 0 Lack of adequate identification of language mapping opportunities. Therapist directly advises parent rather than facilitating. Therapist must encourage the parent to watch the child's play and attach appropriate vocabulary and complexity to what is seen.
- 1 Identifies with the parent language use that accurately matches the child's language competence. Correctly identifies opportunities for language mapping and elicits parental understanding of the appropriate level of language complexity. (Language mapping means episodes of applying language accurately to the observed world). Identifies episodes of spontaneous mapping by parent and label this and reinforce it. Rather than

directly advising the parent, the therapist should be encouraged to identify these episodes for themselves.

9d. *Application of predictable routines (PACT stage 4)*

Stage 4 focuses on the parent using high consistent repetitive familiar language scripts and social routines commensurate with the child's level of language understanding. This is a phase of consolidation of all the preceding stages and the use of repetition in play, interaction, language (e.g. repetitive rhymes, play themes, interactive routines)

- 0 Lack of adequate feedback on the parent's use of consist language scripts, routines and play. Lack of feedback on the use of repetition to facilitate child verbal understanding.
- 1 Therapist identifies with the parent appropriate use of repetitive scripts, familiar routine and play. The therapists identifies opportunities for consolidation and elicits parental understanding of the way repetition facilitates child comprehension and processing.

9e. *Application of Communication initiation techniques (PACT stage 5)*

Stage 5 focuses on the parent eliciting child intentional communication acts. The parent purposely uses pause and openings for the child to fill with a non-verbal or verbal response and subtle teasing. This stage extends to the therapist facilitating the parent in eliciting child initiation for a range of communication functions, seeking/ directing adult attention, requesting, negating, acknowledging.

- 0 No or very limited repertoire of techniques, *or* attempts to facilitate parent to elicit child communication initiation. Therapists attempts to identify opportunities for child communication initiation was incomplete or inadequate.
- 1 Therapist encourages parent to reflect on opportunities to create child communication initiation. Use of questioning style continues. An adequate variety of child communication initiation opportunities were identified with the parent. The therapist facilitated the parent to reflect on the type and function of the child's communication responses and initiations and mutually identified further opportunities to extend these.

9f. *Language extensions and elaboration techniques (PACT stage 6)*

Stage 6 focuses on the therapist assisting the parent to elaborate on and expand the child's repertoire i.e. finding opportunities to expand their utterances with semantically contingent information. The therapist should be using language referring to strategies such as Language extension, Re-casts, Syntactic expansions, semantic expansions and elaborations (i.e. adding another idea). The aim of this stage is to develop and extend child semantics and syntax. The therapist should also facilitate the parent in reciprocating in verbal interactions to develop mini-conversations that constitute at least 4 element conversational turns.

- 0 The therapists uses no or very limited feedback on parents use of extension and elaboration techniques. The therapist rarely attempts to facilitate parent to observe and identify opportunities to provide a reciprocal verbal responses which adds to the child's language and continues along the same meaning (contingency). The Therapist attempts to identify opportunities for verbal reciprocal interchanges between parent and child was incomplete or inadequate.
- 1 Therapist encourages parent to reflect on opportunities for the parent to extend and elaborate the child's language. The therapists encourages the parent to identify the child's awareness of the parents semantically contingent responses and reciprocal interchanges. The therapist use of probes facilitates parental awareness and understanding. An adequate variety of child language extension techniques and opportunities for verbal reciprocal conversations were identified with the parent.

10. *Setting of Homework (PACT all stages)*

- 0 There was no setting of homework.
- 1 There was setting of homework that arose directly from the session and was jointly agreed.

11. *Review of Homework (PACT all stages)*

- 0 No review of homework was utilised or no review of previous homework, or the homework agreed at the end of the session was assigned without collaboration.
- 1 Previous homework was reviewed.

12. *Deviation from Manual*

Were there any significant unusual factors in this session that you feel justified the therapist's departure from the standard approach measured by this scale?

YES (Please explain below)/NO

Details:

**D. Overall Ratings and Comments**

13. *Appropriate Use of Materials*

- 0 The therapist's selection of materials did not facilitate interaction.
- 1 The therapist's selection of materials did facilitate interaction.

14. *Room Environment*

Did the room setting meet the requirements set out in the Standard Operating Procedures?

YES/NO

15. *Quality Time*

Was there adequate opportunity for parent/therapist discussion?

YES/NO