

Research Report

Exploring the effects of communication intervention for developmental pragmatic language impairments: a signal-generation study

Catherine Adams, Julian Lloyd, Catherine Aldred and Janet Baxendale

University of Manchester, Manchester, UK

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Abstract

Background: The remediation of pragmatic problems forms a significant part of the caseload for professionals working with children with communication problems. There is little systematic evidence that demonstrates the benefits of speech and language therapy for children whose difficulties lie primarily within the pragmatic domain or which indicates whether changes in pragmatic behaviours, which are a result of a specific intervention, can be measured over time.

Aims: To generate a signal of change in pragmatic and other language behaviours for children with pragmatic language impairments; to gauge the magnitude and nature of the signal and to make recommendations for future studies.

Methods and Procedures: A case series of six children with pragmatic language impairments without diagnosis of autism received 8 weeks of individual intensive speech and language therapy supported in a mainstream educational setting in the UK. Measures of pragmatic behaviours in conversation were made at seven data points before and after therapy using Bishop's ALICC procedure. Conversation coders were blind to the point of assessment. Inferential comprehension, narrative, sentence formulation and sentence recall skills were also tested before and after therapy. The opinions of teachers and parents were sought regarding any change in communication and social abilities of the children over time.

Outcomes and Results: All children showed change in communication behaviour on some conversational measures, even if the child functioned at the ceiling on

Address correspondence to: Catherine Adams, Human Communication and Deafness Group, University of Manchester, Oxford Road, Manchester M13 9PL, UK. e-mail: catherine.adams@manchester.ac.uk

standardized language testing. Some conversation measures had more utility as outcome measures than others. Most children showed substantial change on standardized language measures, but there are limitations on the use of these due to heterogeneity within the group. Overall, the intervention produced a signal for change in pragmatics and/or language behaviour in all children. Parent/teacher opinion reported demonstrable change in communication behaviour and engagement in the curriculum.

Conclusions: There is a strong signal that change in pragmatic language behaviour can be measured in well-controlled intervention studies but this signal is complex. Outcome measures should take into account changes in language processing skills that are significantly impaired in many children with PLI. For those children within the PLI group who function at ceiling on language tests, conversational measures may have the potential to signal change, but this finding has not been subjected to group study or to testing in generalized settings. Qualitative data regarding behaviour, classroom engagement and generalization of language gains will be an essential supplement to measuring progress in a diverse population.

Keywords: pragmatic language impairment, intervention, language disorder, single case series.

Introduction

Children with pragmatic language impairment (PLI) have difficulty with the interpersonal use of language in social contexts. They are typically verbose, have poor turn-taking skills, have difficulty staying on topic, have problems in comprehending discourse and have difficulty in developing conversational skills (Bishop 2000a, Leinonen *et al.* 2000). They may find it difficult to interpret subtle language meanings or to gauge the listeners' needs for information. These features often, but not always, occur in the presence of normal phonological skills with a history of late development of language and echolalia. Additional problems of social cognition have been reported (Shields *et al.* 1996) and much research attention has been paid to the close relationship between PLI and autism (Lister Brook and Bowler 1992, Bishop and Norbury 2002, Botting and Conti-Ramsden 2003).

Understanding of the nature and diagnosis of PLI has now reached a stage at which researchers are ready to address how to promote well-being in these children and their families by facilitating social communication and language processing skills. A significant proportion of services in educational speech and language therapy are directed to the amelioration of pragmatic difficulties. The opportunities for these children to socialize with peers is restricted by poor communication skills (Botting and Conti-Ramsden 1999), leading to decreasing social participation, exclusion from social groups in later life and a higher risk of mental health problems (Goodyer 2000). These difficulties pervade the children's social interactions and require facilitation of communication so as to enable them to participate in educational activities and to improve social participation and inclusion into society.

Despite the dedication of therapy and educational services, there is little existing high-quality evidence that would stand rigorous methodological scrutiny that pragmatic and language processing ability in children with PLI can be enhanced at all. Practitioners are confident that the results of interventions are positive, but this has not been demonstrated robustly and explicitly enough to argue confidently

for resources. A recent systematic review of the evidence reveals very limited high-quality research to support the effectiveness of the whole spectrum of developmental communication interventions (Law *et al.* 2003). Some evidence regarding intervention with pragmatic language skills exists in the form of quasi-experimental and case studies of children with learning disability and developmental delay (Conant *et al.* 1984, Dollaghan and Katson 1986, Bedrosian and Willis 1987, Camarata and Nelson 1992, Giramolletto 1988, Richardson and Klecan Aker 2000) and children with autism (Gray 1998). These valuable studies have demonstrated positive effects of interventions for conversation, topic management, requests for clarification and responsiveness. They are, however, small-scale studies of different populations that share few of the persistent characteristics of children with PLI.

Speech and language practitioners recognize that their role with children who have PLI is based both on remediation of impairments (a direct approach) and support for learning and personal development by adaptation of the context (an indirect approach). The extent to which either or both of these strategies are effective (that is, produce the desired effect given the resources offered) is unknown as a well-defined group of children with PLI has not been subject to controlled treatment studies. Studies of individual children with PLI have shown that intervention produces gains in conversational and other language skills. Brinton and Fujiki (1995) found this for children with SLI. Willcox and Mogford-Bevan (1995) used formal conversational analysis techniques to provide the basis for a conversational skills intervention focusing on initiations, social routines, repairs and cohesion. Progress was reported as detailed inspection and qualitative reflections on the observed follow-up behaviours. Adams's (2001) case study showed that at the level of the individual, intensive speech and language intervention on pragmatic skills was effective when measured with a conversational analysis and measurement technique. Letts and Reid (1994) used the analysis of pragmatic 'errors' in conversational data in the case of a 7-year-old boy receiving speech and language therapy. They concluded that this approach may have some value in evaluating therapy for pragmatic impairments but may have limitations in group studies because of reliability problems. Olswang *et al.*'s (2001) remediation of a child with social communication problems focused on the role-play of social stories. This child showed improvement in communicative behaviours but generalization to other contexts was limited. There are indications from such studies, therefore, that remediation of pragmatics in children with PLI will be successful, but the magnitude, variation and nature of therapeutic effects remain uncertain.

One of the outstanding problems for such intervention research is to define an appropriate group of subjects. PLI, which has previously been known as semantic-pragmatic language disorder, was described by Bishop and Rosenbloom (1987) and Rapin and Allen (1983) in their taxonomies of communication impairments in children. Since then research into the nature of PLI has focused principally on its relation to other developmental disorders, in particular autism and specific language impairment (SLI). It is well known that children with autism have problems of language use (Jarrold *et al.* 1997) and therefore it was likely that comparisons would be drawn. Bishop and Norbury (2002) found overlapping boundaries between the conditions of autism, pervasive developmental disorders and PLI on standardized diagnostic tests of autism. In a study of children with PLI attending UK language units, Botting and Conti-Ramsden (1999) found only some children with PLI had autistic features. It is often not emphasized that although language may seem

superficially normal or even superior to typically developing peers, most children with PLI have language processing difficulties akin to those of the related group of SLI, though they do not present with a consistently recognizable pattern of formal linguistic impairment (Botting and Conti-Ramsden 1999). Their pragmatic problems are, however, disproportionate to their other language limitations (Bishop 2000a, Bishop *et al.* 2000) and not obviously a result of (or secondary to) these limitations (Prutting and Kirchner 1987). Bishop (2000b) referred to these children as PLI-plus and to those children with PLI who have normal formal language skills as PLI-pure. Both types of PLI are typically found within the same special education provision, but they may require different intervention emphases.

The present paper adopts Bishop's dimensional position that PLI is an intermediate condition between autism and SLI; it shares some of the processing limitations of both groups in social, social cognitive and language domains. A truly dimensional continuum implies that it will be difficult to define a coherent group, since we are working precisely inside the fuzzy region of diagnosis. For the purposes of intervention therapy subject selection, we take a position that is closely related to current caseload practice rather than attempting too precise a characterization of a single condition and adopt a single case study series as a means of studying the heterogeneity of the condition in relation to intervention. A dimensional model of PLI is attractive to practitioners since management revolves around actions for individual strengths and weaknesses; it does not emerge from a categorical model. Interventions should be based on the dimensional approach in which language processing and language pragmatics therapy are required for the majority of children with PLI. However, in order to obtain some clarity regarding pragmatic therapy, this study concentrates on pragmatic and social aspects of intervention only and will exclude work on comprehension and formal expression. Due consideration, however, is given to the way in which language processing skills might be affected by pragmatic interventions.

To intervene meaningfully therapists need intervention methodologies that have been subjected to systematic evaluation. The gathering of high-quality evidence and the broad dissemination of that evidence is part of that culture of evidence that now pervades health services in the UK and elsewhere (Muir Gray 2001). Large-scale trials of PLI intervention efficacy are not yet possible as outcome measures cannot be defined until it is known which effects to look for. Without adequate measures and with little information regarding the likely changes in intervention, the way forward is to adopt a serial single case study approach to the evaluation of intervention for PLI children using appropriate measures. Projects designed to indicate the presence/absence and magnitude of a treatment effect are called signal-generation studies. Their importance is evident when effect sizes are difficult to estimate, but they are also necessary to ascertain the optimal methods for measuring effects where there is genuine doubt about the potential for improvement. Signal-generation studies are therefore a useful precursor to substantial intervention studies and inform their planning.

The issues addressed in this study are as follows:

- Is there a signal that targeted speech and language therapy brings about change in language and pragmatic skills of children with PLI?
- How is this signal best detected?
- What is the magnitude of the signal?

- What insights into the condition of PLI does studying intervention permit?
- What are the implications for future studies?

Method

Subjects

Six children were recruited from mainstream school speech and language therapy services in the North West of England with the assistance of NHS specialist practitioners. The principal aim in recruiting children was to find a small group of children diagnosed and being managed as having PLI by speech and language practitioners. As this was an exploratory study, inclusive criteria were drawn up as *guidelines* rather than as a strict admission paradigm. The study aimed as far as possible to recruit children who fulfilled the following criteria:

- Aged between 6;0 and 9;11 at the start of the study.
- Attended mainstream primary schools.
- Speech and language practitioners judged them to have communication difficulties principally in the domain of pragmatics.
- Scored less than 21 (cut-off for autism) Autism Diagnostic Interview — Revised (ADI-R) (Lord *et al.* 1994). ADI-R is an investigator-based parent interview. The reciprocal social, communication and repetitive behaviours and stereotyped patterns domains were scored, with a total cut-off score of 8 for communication, 10 for reciprocal social, and 3 for repetitive behaviours and stereotyped patterns. The speech and language therapist (SLT), who was trained in test administration and reliability coding, administered the ADI-R.
- Pragmatic composite scores less than 132 on the Children's Communication Checklist (Research version) (CCC; Bishop, 1998); one subject did not meet this criteria (see below).
- Not receiving other regular concurrent speech and language therapy and had no therapy specifically directed at pragmatic ability within the previous 3 months.
- Scored at the 25%ile or above on Raven's Coloured Progressive Matrices (Raven 1976), which is a test of non-verbal perceptual/analogical reasoning skills.
- Schools could accommodate and provide liaison with intensive speech and language therapy.
- Exclusive criteria: (1) severe unintelligibility, (2) severe expressive language delay and (3) hearing, visual or physical impairment.

SLTs in two primary care trusts in the North West of England were approached for subject recruitment. Once children's names were put forward, the specialist SLT reviewed the case with the local practitioner and approached the children's parents with information regarding the provision of intensive intervention. Briefings were held with school teachers/special needs coordinators in advance of acceptance of subjects in order to ascertain that they had sufficient understanding of the process of intervention and that the facilities for individual and group therapy would be available. Most subjects had statements of special educational needs but were not currently receiving regular SLT of any kind. Subjects typically received input from an SLT within a consultancy model where the therapist advised the designated learning

assistants once a term on appropriate activities and input. However, their history of management varied greatly. The details of pre-study management are given in table 6.

Justification of PLI criteria

There are no clear-cut criteria for the differential diagnosis of PLI from SLI. Previous research has indicated that even within this relatively small group, there is a range of abilities across social, cognitive and linguistic domains (Bishop and Adams 1989, Botting and Conti-Ramsden 1999) and that the boundaries of the condition merge into other diagnoses. Bishop and Norbury (2002) showed that children could be identified as having PLI who did not meet full criteria for autism. However, the range and severity of autistic symptoms within their PLI and autism groups was highly variable suggesting that there are fuzzy boundaries between the two conditions. The likelihood of finding a tightly cohesive group is therefore small. Using criteria for cut-off for PLI (pragmatic composite less than 132) on the CCC, which have been employed in other research, would have precluded the presence of one of our subjects. In the revised version, CCC-2 (Bishop 2003), which was not available at the time of this research, a composite score of CCC subscales, the Social Interaction Deviance Composite, was used to identify children with disproportionate social communication difficulties. Despite this revision, Norbury *et al.* (2004) showed that this general pragmatic composite of the CCC-2 did not have validity in differentiating PLI from SLI. It is the case that the diagnostic division is simply too difficult to delineate as children's language abilities grow more complex and the secondary effects of SLI take their toll on social communication. CCC-2 is the instrument of choice where children with communication disorder function within the normal range on standardized language tests (that is, it *does* detect the presence of communication impairment) but it cannot differentiate PLI from SLI. Therefore, we took the position that the presence of expert clinical opinion on the presence of the chief characteristics of PLI *plus* CCC scores indicating communication impairment *plus* the absence of frank autism as identified by ADI would constitute criteria for inclusion in the PLI case series.

Study design

The design was based on the series single case model with three children participating simultaneously in school term 1 and the remaining three children participating in school term 2. Series case studies have the advantage over single case studies of addressing questions of internal and external validity where group studies are not possible. The serial case study design allowed for adaptations in the design to be made if necessary. A pilot study (Adams and Baxendale, 1997) demonstrated positive measurable effects of therapy in a single multiple baseline design case. Each case proceeded as an ABA reversal design consisting of A1=baseline assessment (no treatment), B=intensive treatment and A2=withdrawal (no treatment). Children returned to their local speech and language therapy provision after A2. In keeping with good practice in case study design multiple observations were made of the

primary outcome measure in phases A1 and A2 (Kazdin 1982). It was not possible to make continuous observations in phase B since the child was receiving intensive attention and time for assessments in this phase was limited. A number of two-shot formal assessments were also included at the start of A1 and the end of A2 so as to measure progress on standardized instruments and formal language skills.

Procedure

Pre-therapy assessment phase (A1)=8 weeks

Each child participated in a pre-therapy assessment battery at the start of this phase with a researcher. All assessments took place in a mainstream school setting in a separate room with just the tester and child present. The first pre-therapy assessment consisted of the following:

- Conversation Assessment Task (CAT) (see below for a detailed description): the primary outcome measure from which a signal is predicted to arise.
- Assessment of Comprehension and Expression (ACE 6–11) (Adams *et al.* 2001):
 - Narrative Subtest (Propositions only) (secondary outcome measure).
 - Inferential Comprehension subtest (secondary outcome measure).
- Clinical Evaluations of Language Fundamentals Test (Semel *et al.* 2000):
 - Sentence Recall subtest (secondary outcome measure).
 - Formulating Sentences subtest (secondary outcome measure).

In addition, two tests were administered to provide more background information about the children's language abilities. These tests were not repeated and did not function as outcome measures:

- Test for Reception of Grammar (Bishop 1983).
- ACE (6–11) Naming subtest (Adams *et al.* 2001).
- British Picture Vocabulary Scale (Dunn *et al.* 1997).

In Phase A1, three additional CAT assessments were carried out at 2-weekly intervals. These assessments provided the baseline observations for the primary outcome measure. The treating therapist carried out CAT assessments in Phase A1. A researcher familiar with the administration of language tests carried out all other assessments.

Individual subject characteristics

Test scores on pre-therapy standardized tests and inclusion assessments are shown for all six subjects in table 1. It provides information regarding the autism diagnostic status of the children and information regarding the severity of the interpersonal communication problems via the CCC. No children fell into the core autism range on the ADI (autism scores at higher than 21 on the ADI algorithm). Subject 6's carers were unable to complete the interview without considerable anxiety. Therefore, the ADOS-G (Autism Diagnostic Observation Schedule; Lord *et al.*

Table 1. Subject characteristics and test scores at the start of the study

Child	Age at start		Ravens centile	ADI-R total	TROG		BPVS		ACE naming	
	of A1	CCC			SS	Percentile	SS	Percentile	SS	Percentile
1	9;9	129	75	13	141	99	117	87	11	63
2	8;4	116	25	12	91	25–50	81	11	5	2
3	8;7	141	25–50	5	91	25–50	104	60	8	25
4	6;5	113	50–75	8	87	25	129	97	13	84
5	8;01	109	25	18	77	5	78	7	5	5
6	5;11	113	95	*	91	90	96	40	10	50

CCC pragmatic composite less than 132 indicative of PLI.

ADOS assessment instead of ADI-R (see the text). ADI-R cut off for autism=less than 21.

TROG, BPVS, mean standard score=100, standard deviation=15.

ACE mean subtest standard score=10, standard deviation=3.

2000), a semi-structured assessment of current communication, reciprocal social skills and stereotyped behaviours, was used to assess this child by means of observation rather than report. This participant fell below the threshold for autism on the diagnostic algorithm of ADOS-G.

Several individual characteristics are worthy of note. One child (subject 3) does not meet the strict guideline for PLI on the CCC (cut-off 132) but nevertheless presented with the typical characteristics of a child with PLI. Subjects 1, 3, 4 and 6 were linguistically able children who would not be deemed language disordered based on available formal language assessments. Subjects 2 and 5 have the lowest scores on BPVS. All children except subject 5 have sentence comprehension within normal limits on the TROG. Subject 5 was the only child with a diagnosis of Asperger's syndrome in addition to his language problems. Subject 3 had significant behavioural problems for which he received additional support at school.

Intervention phase (B)=8 weeks

Children were next seen for the intervention phase by the specialist SLT only. Intervention was designed using a framework of PLI therapy discussed in detail elsewhere (Adams *et al.* in press). This framework emphasizes social interaction, social cognition, language pragmatics and language processing skills as the four principal aspects of intervention for children with PLI. Children's individual profiles (compared with the framework) can therefore indicate priorities for intervention in one or more of the four aspects. In this project, intervention concentrated on the two social aspects and on language pragmatics only. No specific work on language processing at the level of the sentence was carried out, nor was verbal comprehension a target of therapy. Intervention programmes were individually designed to mirror the child's profile within this model. Parent's perceptions of their child and priority areas for intervention were also gained and incorporated into the intervention goals.

Practical guidelines for PLI interventions from expert practitioners are widely available (Paul 1992, Anderson-Wood and Smith 1997, Firth and Venkatesh 1999, Rinaldi 2001). The range of therapeutic techniques used within this client group is well documented within the literature, reflecting what clinicians are doing in

their working practice (Leinonen *et al.* 2000). Conversational interventions developed with children who have SLI have been extended for use for children with PLI (Brinton and Fujiki 1995, Naremore *et al.* 2001). Social language interventions for children with high-functioning autism (Gray 1998) can also be employed with PLI and strongly influenced the interventions employed in this study. Appropriate pragmatic intervention techniques such as modelling, positive and negative practice, inadequate messages, scripting, role play and a meta-pragmatic or mediation approach have all been described and are in current use (Naremore *et al.* 1995).

Intervention protocol

Each child received an individual session of specialist speech and language therapy, three times a week for 8 weeks. Each session lasted approximately 1 hour with teacher/teacher assistants liaison time added to this. Overall, children therefore received an average of approximately 24 hours of specialist contact time plus practitioner time for training and administration. The permitted management protocol was as follows:

- Targets for intervention were drawn up with reference to pre-therapy assessments and were stated before therapy commenced and distributed to relevant professionals within the child's environment and to parents.
- Intervention was planned on an individual basis and reflected current practice in pragmatics, i.e. building on strengths in communication through exercises and games in interpersonal communication and by developing strategies to promote more effective communication with others in the child's environment.
- Advice and training in environmental strategies to support social communication for co-workers/parents was considered an essential part of the intervention; Classroom assistants were trained to implement the individual intervention strategies and support generalization into the classroom.
- Published and novel materials for SLT support were permitted.
- In order to set boundaries for the intervention under study, areas of therapy were specified as permitted to be included in the intervention.
- Therapy was permitted in the areas of:
 - pragmatic rules in discourse and conversation;
 - turn-taking;
 - meta-pragmatics;
 - social understanding and social role-playing;
 - formulation of conversation and narrative;
 - inferential understanding.
- Therapy was not permitted in the areas of:
 - sentence comprehension;
 - syntactic exercises;
 - word-finding practice;
 - phonological work;
 - semantic work.

- In addition to child intervention the SLT actively engaged with the caregivers, classroom teacher and special needs coordinator for each child, providing assessment result and intervention aims.
- At the end of therapy a detailed progress report was drawn up and distributed to parents and professionals for each case.

An example of intervention goals and practical activities for one case are detailed in appendix A.

Target setting and expectations of change

Therapy targets were set in consultation with teachers and parents using the intervention protocol. Some targets were common across children and others were individualized to the child's specific linguistic profile. Targets were set up during the pre-therapy phase by the specialist SLT according to the protocol above. At this stage, it was possible to make predictions regarding potential changes in individual conversational profiles at the post-therapy stage. Changes in conversational behaviour (provided they met certain criteria; see below) which matched predictions would therefore suggest a positive effect of therapy. Absence of changes or negative effects would suggest that this aspect of therapy was not effective for that individual. As a signal-generation exercise, it was felt to be important to include this level of prediction, since the effects of complex interventions can be diluted when outcome measures are applied too broadly.

Post-therapy assessment phase (A2)=8 weeks

The primary outcome measure (CAT) was carried out at 2-week intervals starting 2 weeks after the end of therapy. The assessor was an SLT unknown to the child, since familiarity with the treating SLT may have skewed results unnecessarily. All CATs for all children were recorded on high quality DVD disk and assigned a random number from a sequence derived for all recordings. Recordings were transcribed by trained assistants and passed to the coder with a number identity only. Coding commenced after the last CAT assessment for children had finished. Thus, the coder was blind to the point of CAT being analysed.

In addition, 2 weeks after the end of therapy, secondary outcome measures (ACE and CELF subtests) were repeated once by the same researcher as in Phase A1. Thus, the secondary outcome measures are not scored blind to stage of the assessment.

A parent and teacher interview regarding the outcomes of therapy and the experiences of carers and teachers of that period (qualitative outcome measure) was also administered. The interview protocol is given in appendix B.

Conversation Assessment Task (CAT) and analysis

The Conversation Assessment Task was based on previous assessments used by the first author and derived from Bishop's Assessment of Language Impaired Children's Conversation (ALICC). In this task, the child converses with the assessor about a series of individual pictures. The aim of the task is to promote a dyadic exchange

rather than a question–answer interview or a monologue. Prompts are provided for the assessor to use to encourage the child to talk about events similar to those in the pictures. Each conversation lasted for approximately ten minutes. Research has shown that similar conversational patterns unique to that child tend to occur despite changes of interlocutor or materials, thus rendering it a suitable means of assessment for repeated measures (Bishop *et al.* 1994). In this study, the assessor had access to three different sets of pictures depending on the stage of assessment and the recency of exposure to that set of pictures. Training in the technique was provided for the three assessors (all SLTs) involved in this study.

The recorded conversations were then transcribed onto an Excel file ready for coding. Conversations were transcribed in orthographic script without marking for stress or voice quality except where these are essential to the understanding of the discourse. Turn transition points were transcribed for intonation in order to identify points at which responses or acknowledgements are expected. For further detail on transcription techniques, see Bishop *et al.* (2000). Transcription and coding time for ten minutes of conversation is approximately 2 hours for a skilled coder.

Child and adult utterances were then categorized by the coder for first/second part and communicative function (e.g. statement of information, request for clarification, question). Once this basic coding at the level of utterance was completed, indices of conversation were computed across the number of turns in that conversation, discounting session introductions. The method for deriving the conversational indices used in this study has been described in detail elsewhere (Bishop *et al.* 2000, Adams *et al.* 2002, Adams and Lloyd 2005). The following indices of conversational behaviour were derived from coding communicative functions and responses to adult solicitations:

- Discourse participation: the ratio of child utterances to assessor utterances. A ratio greater than 1.0 suggests the child has dominated the conversation.
- Conversational dominance: the degree to which the child dominates the conversation by repeatedly requesting information or by providing unsolicited information. Conversational dominance = $\text{child} [\text{first parts} + \text{statements}] / \text{adult} + \text{child} [\text{first parts} + \text{statements}]$.
- Loquacity: tendency for the child to produce multiple utterances per turn, thus indicating whether a child tends to produce monologue-type turns. Loquacity = $\text{child multiple turn parts} / \text{total child turns}$.
- Assertiveness: child's tendency to initiate conversational exchanges. Assertiveness = $\text{child first parts} / \text{total child utterance}$.
- Verbosity: tendency to engage in extended unsolicited talk in a single turn. Verbosity = $\text{number of child turns which contain four or more statements in sequence} / \text{total number of turns in conversation}$.
- Verbal responsiveness: number of child responses to tester utterances ending in a soliciting or neutral intonation. (In this analysis, no video data were available so nods and shakes of the head were not accounted for at any stage of assessment.)

The final two indices from the CAT task were derived from a consideration of what Bishop *et al.* (2000) referred to as 'meshing', or the quality of fit between adult solicitations and child responses. Four categories of meshing have been defined (for a more detailed description of these categories, see Bishop *et al.* 2000):

- Adequate: response is judged to be a good fit with the first soliciting part (A: 'Where are you going on Saturday?'; C: 'To the zoo').
- Inadequate: child produces a less than optimal response because of some linguistic limitation, comprehension failure, or lack of general knowledge. When using this code no allowance is made for age (e.g. A: 'Where's Tenby?'; C: 'Long way away').
- Pragmatically inappropriate: response does not fit the social and/or communicative context of the soliciting part. This may be because the child has failed to take into account previously given information, ignores an adult solicitation, produces a tangential response, an over-literal response that does not appreciate the speaker's intention, or uses 'don't know' uncooperatively (e.g. A: 'Have you ever been to the doctor?'; C: 'I had an apple a day'; A: 'Where did your dad take you last Saturday?' C: 'All of a sudden we went to the shops').
- No response: child is given an opportunity to respond but does not do so.

Thus, the final two indices were derived:

- Response problems=child (inadequate responses+pragmatically inappropriate responses+no responses)/total child responses.
- Pragmatic problems=pragmatically inappropriate responses/total child responses.

Results

Variation in conversational indices

Indices were derived for each child from all data points. Information from individual data points were then averaged across pre-therapy (four points) and post-therapy (three points). For subjects 4–6, one datum point was missing due to non-attendance at school in the time frame for that data point. Data from post-therapy for these children are therefore derived from two data points only. Multiple data points were averaged in order to provide for variation in complex behaviours which are subject to many influences (Todman and Dugard 2001). In the case of this assessment, the child's willingness to participate in conversation can vary according to mood and level of boredom with repeated tasks. Indices inevitably tended to vary across phases for each child and average scores allowed inspection of trends in phases rather than for isolated assessment points. The first four data points constituted the baseline measures for the non-intervention period.

In order to inspect data for meaningful changes it was necessary to estimate what variation there was in typical data that could be accounted for by performance and contextual variation factors in a typical sample of children with PLI. Previous work had carried out a pilot study with just such an aim (Adams and Lloyd 2005). In that study 15 children (ten boys and five girls, mean age=9;5 years; SD=2;5 years; range=7;3–11;6 years) identified as having PLI by their SLTs and by the CCC (Bishop 1998) took part in conversational coding on two occasions with the same interlocutors. An age/sex-matched control group with a mean age of 9;8 years

(SD=1;3 years; range=7;3–11;0 years) also took part. Variation in the indices used in the pilot study is shown in table 2. The same indices are reported in this study. For the purposes of visual inspection, a meaningful change in index across conditions will henceforth be defined as differences between pre- and post-therapy averaged indices that exceed the estimated permissible variation in index (either greater or lower). It is recognized that this is only an estimate and that further work should incorporate power calculations to allow for the inclusion of inferential statistical treatment of conversational data.

Reliability

All conversational coding techniques were subjected to reliability checking. Eight randomly selected CAT transcripts (approximately 20% of the total) were subjected to recoding for first/second parts, communicative function type and response quality/type by the principal investigator who has extensive experience of conversational analysis. Across 1936 recodings, inter-rater agreement between first and second coders reached 90.9% agreement ($\kappa=0.023$, $p=0.021$).

Primary outcome measure: conversational data

Results of the primary outcome measure are shown in table 3. Post-therapy indices that differ by more than the estimated degree of variation from pre-therapy indices are highlighted for each child. The results in table 3 should be interpreted in the light of individual treatment aims. The predicted direction of change in specific indices differed according to aims of individual intervention plans. For instance, some talkative children participated in therapy aimed at improving turn taking and appreciation of listener's needs. It might be anticipated that these children would show a *decrease* in loquacity, which would reflect the aims of the therapy. Other children, whilst still verbal, were more reticent and conscious of communicative failure. Therapy that aimed to improve narrative skills and participation in discourse would be shown to be successful in its aim by an *increase* in the loquacity index. Thus, it is possible to interpret certain changes only with reference to the individual and to the specific aims of therapy.

In general, mean discourse participation indices were lower post-therapy compared with pre-therapy, suggesting a more equal sharing of the conversational

Table 2. Variation in conversational indices across assessment times for children with PLI and those with typical language development ($n=15$)

	PLI	CON
Conversational dominance	-0.03	0.01
Loquacity	0.03	0.03
Assertiveness	0.01	0
Verbosity	-0.01	-0.01
Responsiveness	-0.02	-0.02
Response problems	0.06	0.04
Pragmatic problems	0.02	0.01

Metric shows a difference between indices across assessment times (maximum=1.0, minimum=0).

Table 3. Mean pre- and post-therapy conversational behaviour indices scores by subject

Indices	Variation	Subjects											
		1		2		3		4		5		6	
		Pre-	Post-	Pre-	Post-	Pre-	Post-	Pre-	Post-	Pre-	Post-	Pre-	Post-
Discourse participation	0.03*	1.10	0.99	1.15	0.98	0.92	0.87	0.84	0.56	1.02	0.74	0.65	0.53
Conversational dominance	0.03	0.54	0.41	0.44	0.42	0.28	0.33	0.32	0.28	0.45	0.56	0.22	0.21
Loquacity	0.03	0.49	0.38	0.39	0.40	0.26	0.32	0.34	0.34	0.46	0.64	0.26	0.30
Verbosity	0.01	0.04	0.02	0.01	0.01	0.00	0.01	0.01	0.01	0.02	0.03	0.00	0.00
Assertiveness	0.01	0.02	0.01	0.01	0.01	0.01	0.02	0.03	0.02	0.02	0.01	0.00	0.02
Verbal responsiveness	0.02	0.76	0.69	0.75	0.59	0.83	0.79	0.78	0.69	0.67	0.57	0.58	0.58
Response problems	0.06	0.11	0.11	0.29	0.25	0.04	0.11	0.11	0.12	0.35	0.31	0.41	0.29
Pragmatic problems	0.02	0.07	0.09	0.19	0.19	0.01	0.08	0.06	0.10	0.26	0.29	0.31	0.18

Changes in post-therapy indices for individuals outside the estimated variation range are in bold.

*Not included in the pilot study but estimated in line with other similar indices.

floor time in the post-therapy conversations. Mean conversational dominance indices for subjects 1, 3 and 5 were lower post-therapy compared with pre-therapy, suggesting that these children were taking a less dominant role in the post-therapy conversations. Subjects 2 and 6 showed similar conversational dominance across assessment periods. Four children increased in loquacity across intervention and two remained the same. Assertiveness and verbosity were generally very small indices, produced from infrequent behaviours, rendering their potential to show change limited. Mean verbal responsiveness indices for five out of six children were lower post-therapy compared with pre-therapy. This suggests that each child displayed a *higher* degree of verbal responsiveness in the post-therapy conversations — that is if they responded, more responses were verbal as opposed to inferred non-verbal than in pre-therapy conversations. The proportion of pragmatically inappropriate responses for Subjects 1 and 2 was higher in post-therapy conversations but this may accompany their tendency to engage more. Mean verbal response problems indices for Subjects 1 and 3 were lower post-therapy compared with pre-therapy, suggesting that these children made more adequate responses to adult solicitations in the post-therapy conversations.

The two indices which it was anticipated would show consistent directionality were response problems and pragmatic problems, since any therapy would aim to alleviate these problems as part of a pragmatic intervention package. It was hypothesized that these measures would show decrease in the value of the index if therapy was successful in lessening communication problems. In order to test this, data from the two indices were subject to non-parametric testing. There was no significant difference between stages of treatment on response problems: Wilcoxon signed ranks test, $Z = -0.677$, $p = 0.498$; or on pragmatic problems, Wilcoxon signed ranks test, $Z = -0.674$, $p = 0.5$.

Expected and actual outcomes for individual cases

Conversational data can only be viewed as a positive sign of progress (or a sign of no progress) if the individual profiles are compared with individual management programmes. Since children with the PLI population are known to show heterogeneous pragmatic profiles, it follows that individual programmes with specific aims will aspire to different directions of change in the conversational indices. For example, say to increase conversational participation for the quiet child might be an aim of therapy, but for the talkative child we may wish to help him to improve his ability to share the conversational floor. Therefore, the direction of change in a conversational index can only be interpreted as a positive sign if it is congruent with the individual aim of intervention. In order to address the issue of the number of positive outcomes which could function as positive signals related to intervention, the numbers of changes in primary outcome indices, which are predicted from therapy targeting, were tabulated (table 4). Profiles of change at the level of the case were compared with targets of intervention. The table shows that for all children some predictions were met and some predictions confounded. Importantly subject 1, who functioned at ceiling on standardized tests, did show predicted changes in some indices. Most children did not show change for indices that rely on infrequent behaviours, i.e. response and pragmatic problems. In addition, some unexpected results occurred, either in the form of a change that had

Table 4. Expected effects of intervention on conversational indices and standardized test scores

Indices	Subjects					
	1	2	3	4	5	6
Discourse participation	↓	↓	↑ pre- > post-	↓	↓	↑ pre- > post-
Conversational dominance	↓	↓	↑	↓	pre- > post-	↑ NC
Loquacity	↓	∅	↑	↓ NC	∅	↑
Verbosity	↓	∅	↑	↓ NC	∅	∅
Assertiveness	↓	∅	↑	∅	pre- > post-	↑
Verbal responsiveness	∅ pre- > post-	↓	↓	↓	↓	↓ NC
Response problems	↓ NC	↓ NC	↓ pre- > post-	↓ NC	↓ NC	↓
Pragmatic problems	↓ NC	↓ NC	↓ pre- > post-	↓ pre- > post-	↓ pre- > post-	↓

↓, Index predicted to decrease; ↑, index predicted to increase; ∅, no prediction made; NC, no change; shaded box, prediction confirmed; unshaded box, prediction not confirmed.

not been predicted or as a non-predicted (negative) result. In summary, when individual indices are inspected at this level of detailed prediction, mixed outcomes are obtained, but important implications arise from this level of analysis, which will be discussed further.

Standardized language tests: secondary outcomes

The results of pre- and post-therapy secondary outcomes measures are shown in table 5. Inspection of the table reveals that all children showed changes in standard scores on one or more subtests though some subjects scored at ceiling on ACE and CELF subtests. In many cases the change in scores is considerable given the period between testing and suggests substantial changes in language processing skills. Three out of five subjects showed improved scores on the ACE (6–11) Inferential

Table 5. Pre- and post-therapy ACE and CELF subtest standard scores/centiles

Assessment		Subjects											
		1		2		3		4		5		6	
		Pre-	Post-	Pre-	Post-	Pre-	Post-	Pre-	Post-	Pre-	Post-	Pre-	Post-
ACE Inferential	SS	17	17	5	4	11	16	14	13	3	5	5	7
Comprehension	Percentile	99	99	2	2	63	98	91	84	1	5	5	16
ACE Narrative	SS	13	16	8	10	14	10	12	9	6	7	5	10
Propositions	Percentile	84	98	25	50	91	50	75	37	9	16	5	50
CELF Sentence	SS	17	17	3	5	4	12	9	17	3	8	4	9
Recall	Percentile	99	99	1	5	2	75	37	98	1	25	2	37
CELF Form	SS	17	17	3	13	7	15	16	17	8	16	5	13
Sentences	Percentile	99	99	1	84	16	95	98	98	25	98	5	84

*Propositions score only.

Comprehension subtest; two showed reluctance to cooperate with repeated narrative testing. When treated as a small group for statistical purposes, changes on neither ACE Inferential Comprehension ($Z=-1.225$, $p=0.22$) nor ACE Narrative ($Z=-0.738$, $p=0.46$) are significant using Wilcoxon's signed ranks test. However, improvement post therapy on the Sentence Recall subtest of the CELF was significant ($Z=-2.041$, $p=0.04$) with only one child at ceiling. Performance on Formulated Sentences also showed significant improvement ($Z=-2.06$, $p=0.039$).

Parent and teacher perceptions

In all cases, education staff felt actively involved in the experimental intervention and gained skills by discussing therapy plans and strategies and watching individual sessions on a regular basis. The parents reported satisfactory involvement with the therapy and had visited the therapist in school on a regular basis. Three parents felt they gained better understanding of their child's needs and the underlying difficulties and how to adopt communication strategies at home. Four parents spent more individual time at home practising conversational skills, and using simplified language input. Another parent felt she reduced the pressures on her child and gave him more space and less direct control.

Both the teachers and parents were of the opinion that they had changed their approach to the child's communication by having the opportunity to talk through specific problems with the therapist. All teachers and parents found it easier to access therapy in school as this increased generalization of skill. Five teachers reported the quantity of therapy to be appropriate to his needs of the child; one teacher felt the intervention was too intense.

Follow up care

Management of the children's post-experimental intervention is shown in table 6. Outcome for further management was mixed, with two children being discharged as no longer requiring speech and language therapy; one child moved away from the area; one child lost contact with SLT services despite parental concerns over the lack of support for social needs at school; and two children continued to receive speech and language therapy programmes of advice in school.

Discussion

This study provides a signal of positive change in the communication behaviours of children with PLI given intensive specialist intervention. All individuals in the case series showed change, some substantial change, in one or both of the two quantitative outcome instruments (conversation analysis, standardized language tests) and all on the parent/teacher perceptions questionnaire. However, the outcomes of therapy are not uniform across individuals. Some children show clear change signals — others are less convincing. We suggest that this reflects the complex nature and breadth of the communication impairments and associated developmental profiles in the PLI group.

Table 6. Pre- and post-study management obtained from the case notes

Subject	Pre-study management	Post-study management
1	Parent reluctant to have SLT assessment. Liaison with school staff by SLT and advice on interactional skills given	Despite parental concerns, no statement of special needs; contact lost with SLT services
2	At 3;6 regular therapy for listening and attention skills. At 5;0 regular therapy for comprehension and wh- questions/ pronouns. Discharged at 6;5. Reopened at 6;8: assessment and school liaison/ advice once per term	Parent requests more therapy
3	4;0–4;6: regular phonology therapy; 4;9–5;3 regular therapy for comprehension and phonology; 5;4–6;0 word-finding and comprehension therapy; 6;6–8;4 thirteen sessions in total on syntax and semantics	Liaison with parents and school. Narrative group therapy for two sessions. Further assessment and discharge
4	Programme of SLT advice once per term for expressive narrative skills	Programme of SLT advice once per term for pragmatic and social skills
5	Once per week for a 6-week block regular SLT in school for listening skills development	Once per term SLT advice in school for verbal comprehension and pragmatic skills development
6	Waiting list for therapy; screening SLT assessment only	Reviewed and discharged

Primary outcome measure

The primary outcome measure, quantitative analysis of conversation (ALICC), proved to have mixed utility in demonstrating change. Importantly, it could clearly demonstrate changes in pragmatic skills for children who were at ceiling on language tests. At present, there is no other established method of doing this. The magnitude of the effect in pragmatic analysis measures (where there was a clear change) was relatively small, but sufficient to exceed an estimate of natural variation and to be clear on visual inspection.

In particular, indices calculated from frequent conversational behaviours such as conversational dominance and loquacity proved to be of use in demonstrating changes which were of clinical significance. Measures of response and pragmatic problems, however, proved to be of little use in showing changes that were reported by parents and teachers. We suggest that the relatively small frequencies of these behaviours (which have always courted controversy) may render these unsuitable as outcome measures. Nevertheless, these behaviours are significant in terms of intervention planning and should be assessed in a qualitative mode for planning therapy.

The outcome signals arising purely from conversational analysis are not sufficiently clear across the group to show universal application as a pragmatic outcome measure. For some children there was insufficient change in response indices to show change beyond natural variation and some children showed increases in problems post-therapy. This means that either ALICC fails to identify change, that there was no change to measure or that a longer baseline period of assessment is required. Given that we have stated that ALICC does show up targeted changes for some children, it cannot be assumed to be entirely without sensitivity. It follows therefore that for *some* children who have PLI it may not be

possible to change the profile of pragmatic ability with short focused periods of intervention. This may be because the therapy is not sufficiently well targeted or has failed to engage the child and his/her environmental support in the process of pragmatic learning; or it may be because the communication skills underlying pragmatics are resistant to change in some children.

Secondary and tertiary outcome measures

Standardized tests of language proved to be essential as secondary outcome measures and for most children showed strong signals of change. Some children (e.g. subject 6) showed substantial gains in language processing skills as measured by the ACE (6–11) and CELF-R subtests. The most unexpected findings were in Sentence Recall and Formulating Sentences, which were never directly addressed in intervention. However, results from language tests are, again, not universal across the group. Here, some children (1 and to some extent 4) are functioning at or near the ceiling on some tests so they cannot demonstrate improvement. Two children (2 and 3) showed changes in some language subtest scores, and one child (5) showed modest improvements in language test scores. Thus, language tests have an important function as outcome measures but only for a subgroup of children with PLI — those who share the language processing characteristics of SLI.

Change in language processing skills is perhaps an unexpected finding given the social nature of the intervention which did not aim to address language-processing skills directly. Improvement signals across language tests could be interpreted as a heightened engagement of the child in the language learning process through intervention. This generalized effect of treatment (for children who had language-processing impairments) suggested that basic language processing skills such as auditory memory may be being trained in some way, simply by the intensity of focusing on language in individual sessions. Two-shot standardized assessments are not ideal as outcome measures in case studies due to the effects of individual's fluctuations in behaviour and attention. An alternative explanation is that a 'practice' effect has operated to some degree in these measures — that the children simply got better at doing tests. This cannot be entirely ruled out, but it is unlikely that the magnitude of effects demonstrated could be due entirely to such an effect. We cannot rule out the potential of increased confidence and motivation in language skills as contributing to these results. Such striking changes suggest that these children with PLI may be withdrawing from language learning over time as a source of failure and that consequently communication problems which are potentially remediable are exacerbated as the child gets older.

Preliminary evidence from interviews with parents and teachers indicated that the gains made in therapy were evident primarily in conversational skills, in social flexibility and in attention in the classroom. Importantly they perceived that intervention effects were generalizing. Parents were keen to be involved and to learn strategies for more effective communication at home, even though some of these children had received speech and language therapy for many years. The practitioner has a clear role in supporting both the education staff and the parent in such cases. This feedback indicates that outcome measures for generalization of pragmatic

gains, parent reports of social behaviour in conjunction with language therapy and social/behavioural function in the classroom should be employed in addition to standard language and pragmatic assessments. They form an essential part of the outcome process for children with PLI. Given the pervasive nature of the condition, it would be important to examine peer relations (Botting and Conti-Ramsden 1999), access to the curriculum and to social opportunities, provided the intervention was substantive enough to anticipate broad changes. Children with PLI, given their typically articulate nature, should be given an opportunity to talk about the intervention process and how it has affected their participation and understanding of communication.¹

Methodological issues

It is worth re-emphasizing at this point that this is not an efficacy study. Limitations of design and subject numbers mean that the only valid evidence-based practice conclusion that can be reached is that there is a signal of treatment change for PLI. Neither did this study attempt to find out whether a specific type of intervention is appropriate to these children's needs. Although we attempted to control the intervention protocol, it is evident that the process of therapy cannot really or fully differentiate pragmatic therapies from, say, semantic therapies, since the two are so intimately related. Future studies may wish to refine the definition of communication intervention. In measuring change, the study concentrated on changes within the child's communication profile based on adult-child interactions. Future studies may wish to investigate carer-child and/or peer interactions to gain more ecologically valid data. The ALICC analysis remains a largely subjective measure that is too lengthy for the practitioner. To gain accuracy for research studies, further work on natural variation in the CAT indices is required since we only relied on two samples in this study. Evidence suggesting that children with PLI and children with autism share restricted non-verbal communication (Bishop *et al.* 2000) indicates that future studies should include parallel observation of verbal and non-verbal pragmatic skills. Further work also needs to include appropriate control conditions such as a non-treatment group and non-language treatment measures that have the potential to differentiate between language-specific change (as a result of intervention) and overall maturation. Factors within the child, such as resistant social cognition limitations, may account for the inability to change. No measures of social cognition were made in this study. Future research should investigate whether there are correlations between specific pragmatic/social cognitive characteristics and the results of intervention.

Implications for practice

In evidence-based practice, strictly speaking, no clinical implications should be derived from a signal-generation study. However, the study does present significant practice issues that require immediate consideration. The intervention studied here had the potential to show changes in language processing and pragmatics skills. It is evident that children with PLI therefore have much in common linguistically with

children with SLI and that therapies applicable to SLI are highly applicable to children with PLI. The implication is that there is no simple formula that suggests children with SLI should receive language therapy and children with PLI should receive social skills therapy. Detailed investigation of individual profiles should dictate approach. It may be time therefore to move on from the current concentration on differential diagnosis and move to a more intervention outcome-focused approach to PLI research.

Project children at the start of this study had the assistance of support workers with occasional reviews from speech/language therapists but were not progressing in language/pragmatic skills. As a result of intensive intervention, significant progress in communication and classroom participation was made. The inescapable conclusion is that current management strategy was not meeting these children's needs. Practitioners and researchers should be giving urgent attention to the benefits of similar intervention regimes in the light of current concerns regarding the consultancy models so prevalent in the UK (Law *et al.* 2002). This therapy may not be the right model — there are many other methods that could be explored — and it may be expensive, but we are not in a position to reject or accept any model until evidence is available. To reject interventions precipitously on the basis of unrealistic cost goes against the principles of good evidence-based practice.

We are not stating that intensive is best, but drawing attention to the lack of provision for children who are failing socially and academically and the overwhelming lack of evidence to support choices of intervention. Neither are we advocating impairment-based 'pragmatic skills training' therapies as an intervention panacea. The study indicates that there may be limitations to the extent of change it is possible to effect by direct intervention with pragmatics and suggests that environmental adjustments and adaptations may be of considerable importance, or in fact of priority, for some children. This is congruent with the theoretical position of major authorities on the intractable nature of social cognition in children from the autistic continuum (Baron Cohen 1995). It is not necessary to choose between direct (impairment-based) and indirect (adaptive) models of intervention and they should be seen as complementary and applied flexibly to suit individual needs.

Recommendations

This study has demonstrated that there is potential to demonstrate that children with complex problems of social, cognitive and linguistic functioning benefit from communication interventions. For future communication intervention research for children with PLI, the following are recommended:

- Efficacy of intervention for a larger cohort of children with PLI is investigated using a controlled trial.
- Statistical power is substantial enough to allow clinically significant changes to become apparent. This indicates that future empirical studies need to be based regionally or nationally in order to obtain sufficient power.
- Combination of pragmatic and other language measures (i.e. composite rather than single outcome measures) is used to account for the complex number of changes in behaviour.
- Parent and teacher opinions regarding the child's personal and social responses to therapy and the impact on curricular progress are essential.

- Measurement of some pragmatic skills is essential in children who present with normal language processing skills on standardized tests.
- Therapy protocol is very tightly controlled for examination of effectiveness.

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Note

1. National Framework for Children, Young People and Maternity Services, Department of Health 2004 (<http://www.dh.gov.uk>).

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Appendix A: Intervention goals and therapy record

Intervention targets and sample methods for Case 6

1. Increase appropriate use of language by reducing his tangential topics:
 - a. Allow set time for the use of obsessional topics at end of session.
 - b. Carryover to classroom activities.
2. To develop listening skills. Explicit good listening rules established and practised in initial activities to be carried over by classroom assistant.
3. Improve conversational skills by practising turn taking, introducing a topic, maintaining topics and ending a topic in conversational exchanges:
 - a. Metapragmatic rules established and identified watching puppet stories and sabotage techniques.
 - b. Alternating speaker and listener roles in conversations and stories.
 - c. Using symbols to represent listening and conversational rules.
4. To improve narrative formulation skills by modelling and constructing narrative sequences:
 - a. Sequences created from junk.
 - b. Identifying elements of stories and sequences.
 - c. Puppets used to re-enact stories with errors.
5. To develop understanding of social inference and social intentions and to encourage the ability to empathise and read other people's emotions:

1. Social stories created and expanded using puppets and role reversal.
2. Activities which practise attributing emotions to facial expressions.

Appendix B: Parent/teacher telephone interview protocol

Before therapy:

1. Describe x's language and communication at school/home.
2. What did you expect therapy to be like?
3. How did you think x might change at home/school?

During therapy:

1. What did x tell you about therapy?
2. Did you tell anyone about therapy? If so what did you say?
3. How were you involved?

After therapy:

1. Describe x's communication at home now. What is the same? What is different?
2. Describe how easy it is to have a conversation/chit chat with x
3. How easy is it for x to tell you about events or stories?
4. Describe x's spontaneous communication and how he volunteers information or asks questions.
5. Describe how x participates in group discussions/activities.
6. Describe how x interacts with you. Has this changed in any way?
7. Describe how appropriate x's communication is. Has this changed in any way?
8. Are you doing anything different now?
9. In retrospect how did you feel about therapy?
10. What would you change about it?
11. How did you feel about being involved in research?
12. How did you feel about the intensity of the research?
13. How did you feel about the therapy being based in school?