
Conversational responsiveness in specific language impairment: Evidence of disproportionate pragmatic difficulties in a subset of children

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Abstract

Eighteen children with specific language impairment (SLI), from 6 to 8 years of age, were compared with 9 control children matched on age and nonverbal ability (CA controls) and with 9 younger control children of comparable language level (LA controls). Half of the SLI group were rated on a teacher checklist as having pragmatic difficulties: these were referred to as the pragmatic language impairment (PLI) group; the remainder were the typical (SLI-T) group. Children's responses to adult soliciting utterances were compared. All children usually responded to conversational solicitations, but children in the PLI group were more likely than control children to give no response, and they also made very little use of nonverbal responses, such as nodding. Nonverbal responding was closely related to the quality of children's responses. Children who failed to use nonverbal responses also had a relatively high level of pragmatically inappropriate responses that were not readily accounted for in terms of limited grammar or vocabulary. This study lends support to the notion that there is a subset of the language-impaired population who have broader communicative impairments, extending beyond basic difficulties in mastering language form, reflecting difficulty in responding to and expressing communicative intents. The analytic methods developed for this project have promise for the study of pragmatic difficulties in other clinical groups.

Traditional accounts of specific language impairment (SLI) have emphasized the particular difficulties that many children have with the structural aspects of language form (i.e., phonology and syntax). It is often assumed that the content and use of language are rela-

tively normal, or that, insofar as deficits are seen in these domains, these are simply secondary impairments. For instance, Miller (1991) stated,

Children with language disorders evidence strengths in conversation skills. They are purposeful and responsive; however communication is limited by their mastery of grammatical form. (p. 6)

In a similar vein, Hadley and Rice (1991) suggested that lack of responsiveness in conversation seen in some children with SLI may be influenced by limited comprehension, problems in formulating intelligible utterances, or a growing awareness of the inability to communicate effectively.

Others have, however, challenged this as a *general* conceptualization of SLI and argued

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instead that for a subset of children there are pragmatic difficulties which cannot be accounted for as secondary consequences of more basic limitations in grammar, phonology, or vocabulary. Descriptions of such children can be found in the research literature going back over the past 2 decades (Blank, Gessner, & Esposito, 1979; McTear, 1985; Conti-Ramsden & Gunn, 1986; Fujiki & Brinton, 1991; Willcox & Mogford-Bevan, 1995), but there has been little in the way of objective documentation of the problems: most accounts have relied on clinical description. Both Rapin and Allen (1983) and Bishop and Rosenbloom (1987) advanced classification schemes for language-impaired children which included a subtype in which language content and use pose more of a problem than language form—so-called “semantic-pragmatic disorder,” more recently renamed “pragmatic language impairment” (PLI; Bishop, 2000). The kinds of problems that have been described include tangential answers to questions, problems in comprehending discourse despite adequate understanding at the sentence level, lack of semantic specificity, and a tendency to dominate a conversation with apparent disregard for the partner’s needs. To date, however, we have lacked instruments for quantifying such behaviors: most available language tests are concerned with vocabulary, grammar, phonology, or auditory-verbal memory and do not address the issue of language use. In a recent large-scale survey of 7-year-olds attending special language classes in the United Kingdom, Conti-Ramsden, Crutchley, and Botting (1997) reported that 10% of children had a profile of impairment corresponding to PLI, but scores on language tests were not very effective in differentiating these children from other cases of more typical SLI, although they were identified on a teacher interview.

We need better methods for documenting pragmatic difficulties in children, in order to address questions such as the following: (a) To what extent can pragmatic difficulties in SLI be accounted for as secondary consequences of structural language limitations? (b) Is PLI on a continuum with autistic disorder? and (c) What are the similarities and differ-

ences between the pragmatic difficulties seen in children with developmental language disorders and those that are part of the behavioral phenotype of various organic syndromes? (Udwin & Dennis, 1995). In this paper, we describe the development of a method for quantifying and characterizing pragmatic difficulties in conversation, and we report data using this method to address the first of these questions and suggest that this approach may be useful for addressing Questions (b) and (c) in the future.

We compared a group of language-impaired children with both age-matched peers and with a younger control group matched on expressive and receptive language level, in terms of their verbal and nonverbal responsiveness in a conversational setting. The children with SLI were subdivided on the basis of a teacher checklist into those who displayed features of PLI and those who did not. We predicted that children with typical SLI would resemble younger language-matched controls in their conversational responsiveness and that any pragmatic impairments that they displayed would be a consequence of their limited language skills. In contrast, it was predicted that evidence of disproportionate pragmatic difficulties, not attributable to more basic structural language limitations, would be seen in children who were identified by teachers as having PLI.

On the face of it, this might seem to be a singularly uninteresting prediction: we select children who are thought to have PLI and anticipate they will show pragmatic difficulties! However, this is not as trivial as it might seem, for two reasons. First, at present, we have no good methods for identifying pragmatic difficulties, other than clinical opinion, which is notoriously subjective. As argued above, this severely limits research in this area, and allows debates to rumble on about the validity of PLI and its relationship to autistic disorder. If we can quantify the pragmatic difficulties at a microscopic level, by analyzing the child’s conversational utterances rather than relying on macroscopic, global impression, this is a first step in a research program that compares and contrasts pragmatic difficulties in different develop-

mental disorders. We cannot assume a priori that macroscopic and microscopic levels of analysis will yield comparable findings: although the microscopic approach is much more detailed, it is based on a relatively brief period of conversation that may not be adequate to solicit significant instances of pragmatic difficulty. Second, although we are selecting for study children who are regarded as having pragmatic difficulties, the exact nature of those difficulties remains unclear. It is possible, for instance, we would find that, contrary to our prediction, these children's conversational difficulties, that when scrutinized in detail, are qualitatively similar to those of children with more typical SLI, differing only in frequency. Alternatively, we might see quite distinctive problems, perhaps similar to those described in autistic disorder, and extending beyond spoken language to encompass nonverbal communication. Such findings will provide an indication of which areas of pragmatic behavior will be the most useful to pursue in future comparative studies and which might be useful for differential diagnosis.

Our analysis focused on children's responses to adult solicitations in a semistructured conversational setting. Three aspects of conversational responsiveness were considered:

1. *The likelihood that a soliciting utterance by an adult would be responded to.* Insofar as nonresponsiveness is a consequence of limited language skills, language-impaired children are expected to resemble younger language-matched controls (cf. Hadley & Rice, 1991).
2. *The use of nonverbal responses.* Preliminary observations suggest that 4- to 5-year-olds tend to make heavier use of nonverbal responses than do older children (Adams & Bishop, 1989), and it seems plausible that the same will be seen for children with limited language competence. However, such comparisons are complicated by the fact that use of nonverbal responses is affected by the type of adult soliciting utterance. Bishop, Chan, Hartley, and Weir (1998)

showed that normally developing 7- to 8-year-old children give a lower proportion of nonverbal responses to yes-no questions soliciting information (questions such as "Did you go on holiday?") versus utterances soliciting acknowledgment, where there is no doubt about the polarity of the answer and where the utterance serves more of a social function (e.g., "That's nice, isn't it?"). Insofar as children with PLI have broader social difficulties resembling those of autistic children, we might expect that they will show low levels of nonverbal responding, especially when the utterance serves a social function rather than being concerned with information exchange.

3. *The quality of the response (i.e., how far it meets or goes beyond the expectations set up by the question).* Problematic utterances were subdivided into *inadequate* responses, which appeared to reflect limited language ability (e.g., poor comprehension of vocabulary, word-finding difficulties, or problems formulating sentences), and *pragmatically inappropriate* responses, which reflected more fundamental pragmatic difficulties (e.g., in using context to interpret the speaker's intention). This distinction had some similarities with the contrast drawn by Eales (1993) between impairment of execution of an adequate communicative intention and impairment of communicative intention.

Specific Hypotheses

1. Younger normally developing children will be less responsive to adult solicitations than older normally developing children.
2. Children with typical SLI will be less responsive to adult solicitations than age-matched controls, but they will not differ in this respect from younger normally developing children of similar language level. In contrast, it is anticipated that children with PLI might show a lower level of responsiveness, even when compared with younger normally developing children.
3. Children with limited language skills (i.e.,

those with SLI and younger normally developing children) will show a tendency to respond nonverbally. However, for children with PLI we might expect to see a reduced rate of nonverbal responding, especially following acknowledgment-soliciting adult utterances.

4. Younger normally developing children will give fewer adequate responses to adult solicitations than older normally developing children, but they will not produce a high rate of pragmatically inappropriate responses.
5. Children with typical SLI will resemble younger normally developing children in the quality of their responses to adult solicitations; where they fail to give an adequate response, it is anticipated that they will be most likely to produce inadequate rather than pragmatically inappropriate responses. For children with PLI, it is anticipated that a higher rate of pragmatically inappropriate responses will be seen.

Participants

Children with specific language impairments

Children with language impairments between the ages of 6 and 8 years were recruited during 1991, principally from four special schools and units specializing in the education of children with SLI, although two children were recruited from the mainstream schools attended by control children. The special schools have stringent admission criteria and do not admit children who have autistic disorder, major emotional or behavioral difficulties, or whose language difficulties are attributable to mental handicap or deafness. In addition, we excluded from consideration any child who had neurological or physical abnormalities, who spoke English as a second language, who had sensorineural hearing loss, or for whom parental consent was not given. (Across all schools, the rate of parental consent was 80%.)

PLI group. In order to recruit sufficient numbers of children with PLI, a two-stage procedure was adopted. First, teachers and thera-

pists were asked to identify all children in their classroom who were thought to be possible cases of “semantic–pragmatic disorder” (which was the term in current usage at that time). This gave a sample of 11 children. For each of these children, a teacher or therapist who had known the child at least 3 months completed an experimental checklist (see Appendix A) based on accounts of semantic–pragmatic disorder by Rapin and Allen (1983) and Bishop and Rosenbloom (1987). This checklist is a pilot instrument whose reliability and validity have not been established.¹ It is not intended to diagnose language impairment in children but rather to provide qualitative information about the nature of language problems in children who are already identified as having communicative difficulties. It covers both positive features, such as fluent, clearly articulated speech, and negative features, such as tangential answers to questions. Scores on the checklist for these children ranged from 12 to 20, out of a possible total of 24 (see Appendix A). All obtained a nonverbal IQ of 80 or above on baseline screening (see below). One child was excluded from the PLI group because he scored within 1 standard deviation (*SD*) of the mean on both the expressive and receptive language tests, and another had to be excluded because of equipment failure. Thus the final sample consisted of 9 children with checklist scores of 12 or above, all of whom had nonverbal ability in the normal range, but with scores more than 1 *SD* below the mean on at least one of the language measures. (Seven children did this poorly on Clinical Evaluation of Language Fundamentals—Revised [CELF-R] Repeating Sentences, and six on the British Picture Vocabulary Scale [BPVS].) Race was not a selection criteria, but all children were White. The term “pragmatic language impairment” (PLI) will be used in preference to “semantic–pragmatic disorder” to describe this group, because some of these children did *not* have evidence of semantic problems.

1. In later studies, the checklist has gone through several revisions, culminating in the Children’s Communication Checklist (Bishop, 1998), which has acceptable reliability and validity.

Typical SLI group. We recruited an equivalent number of children from the same sources with more typical forms of SLI. Teachers completed checklists for the other children in their classes who met our inclusion criteria. From such cases we selected children who scored 10 or below on the checklist. Potential participants were then screened with the baseline test battery until we had recruited nine children who met IQ and language test criteria (i.e., nonverbal IQ of 80 or above, and a score more than 1 *SD* below the mean on at least one language test). All children were White.

Normally developing control children

Control children were recruited for this study from five primary schools in Lancashire and Yorkshire during 1991. The schools were selected on the basis that their pupils came from average social backgrounds, and we avoided areas that were particularly affluent or socially deprived. All children came from English-speaking homes: race was not a selection criteria, but all children were White. Parental consent was obtained for all children who took part in the study. We recruited to the study 10 children at each year level from 4 to 8 years, selecting at random from the available pupils. Some preliminary analyses of data on the control 7- to 8-year-olds are reported by Bishop et al. (1998). Because of the time-consuming nature of the analyses reported in this paper, we selected two comparison groups of 9 children from this larger pool of control children, according to the following criteria: (a) all control children had to have a nonverbal IQ of 80 and above, and language test scores within 1 *SD* of the standardization mean (seven potential controls were excluded by this criterion); (b) a language-age (LA) matched control group was selected on the grounds that their *raw* scores on the language screening tests were in the same range as the children with SLI; (c) a chronological age (CA) control group was matched to the SLI groups in terms of age and nonverbal ability; and (d) we aimed to keep the sex ratio as similar as possible to that of the language-impaired groups, and so selected a preponderance of boys.

Baseline testing. Children were seen in a quiet room at their school for the baseline tests. All children were given the same set of procedures, which were administered after the conversational sampling (see below), as we wanted to avoid children treating the conversation as part of the assessment.

The measures were selected to ensure that samples were of average nonverbal ability and to enable matching of groups on indices of verbal comprehension and expression. There were limits on the amount of time available to see each child, which constrained the choice of measures.

Raven's Coloured Matrices (Raven, Court, & Raven, 1986) was used as a measure of nonverbal ability. As Raven et al. note, this test has a high *g* loading. It takes about 10–15 min to administer and requires the child to select a shape that completes a pattern from a pictorial array. Test-retest reliability is reported as around .80 and split half-reliability as around .85 for children in this age range. The 1982 standardization was used to derive norms, except for children under 5 years of age, where Raven's extrapolated norms were used.

The long form of the BPVS (Dunn, Dunn, Whetton, & Pintilie, 1982) was used as an index of receptive language. This is a multiple-choice test in which the child must find a picture to match a spoken word from an array of four choices. The test is one of the most comprehensively standardized comprehension tests available in the United Kingdom, with norms based on over 3000 persons from 3 to 18 years of age. Split half reliability ranges from .84 to .95 across the age range studied here.

The Repeating Sentences subtest of the CELF-R (Semel, Wiig, & Secord, 1980) was used as an index of expressive language, because in previous studies it has been shown to provide a particularly sensitive index of specific language impairment across a wide age range (Bishop, 1994). In this test, the child repeats sentences of increasing grammatical complexity. CELF-R is not widely used in the United Kingdom, but we had collected data on this subtest in another study which included a control group of 61 local school-

children from 5 to 8 years of age, who had a mean Raven's IQ of 104.7 ($SD = 13.22$). These children obtained a mean z score on this subtest of -0.2 ($SD = 1.33$), giving confidence that British children score similarly to the U.S. standardization sample. No data on reliability are reported in the test manual. However, a retest of 40 of twin pairs with SLI seen in a study by Bishop, North, and Donlan (1995), 44 months after original test, gave a test-retest correlation of .792. The disadvantage of using this test is that published norms do not extend below 5 years of age, so it was not possible to convert raw scores to standard scores for the youngest control children. However, this was not deemed critical, as the main purpose of using this test was to match younger controls with the SLI groups in terms of their raw scores. Also, the BPVS is standardized on younger children, and so scores on that test could be used to confirm that the youngest control children had age-appropriate language ability.

Scores were converted to scaled scores except for control children below 5 years of age, for whom no norms on CELF-R Repeating Sentences are available. Mean length of utterance (MLU) in words was computed from the conversational sample (see below), after excluding utterances with no topical content (e.g., so-called back channels which merely reinforce what the other has said, exclamations such as "Wow!"), incomplete utterances, and those where more than one-third of the words were not fully intelligible. Mean scores for the four groups are shown in Table 1. These confirm that the LA control group did not differ significantly from either language-impaired group in terms of raw score on the language tests.

Conversational sampling. Conversations were gathered using the semistructured method devised by Adams and Bishop (1989). Two women, neither of whom was previously familiar with the children, were video- and audiotaped while chatting to the child in a quiet room or an area screened off from the classroom. The video apparatus was set up and then left to run, to avoid the child being distracted by an operator behind the camera.

Black and white photographs of familiar events were used as prompts to initiate particular topics, such as a trip to the seaside, a birthday party, or a visit by the doctor. The aim was for the adult to use the photograph to engage the child in conversation about the content of the photograph but then to move on to discuss the child's own similar experiences. We aimed to avoid the kind of interaction where the adult asks questions to which the answers are already known. In general, three photographs were used with each child, and this usually gave between 150 to 220 conversational turns, lasting around 7–12 min. (A conversational turn begins when one speaker starts to speak, and includes everything the current speaker says until another speaker takes over. Nonverbal actions which have an communicative function are also considered to be turns; for example, nodding and pointing may be nonverbal turns, when they have communicative intent.) The conversation was transcribed by investigators who had been trained in using the specific transcription conventions adopted for this project, using a transcribing machine. Particular attention was given to timing of intervals between turns, as these affected later coding. When there was a gap between utterances, this was timed with a stopwatch, rounded down to the nearest half second, and shown on the transcript in numerals. Transcripts were then supplemented by information from the video; nonverbal communicative gestures such as head nods or shakes were recorded, as were events and objects from the environmental context that were relevant to the conversation.

Coding of adult solicitations. We draw a distinction between adult utterances that solicited *information* and those that solicited *acknowledgment*. For the former kind of utterance, the speaker has some uncertainty about a state of affairs, which is reduced when an appropriate response is provided. An example would be a question such as "Where did you go on holiday?" or "Do you like chocolate?" Adequate responses to utterances soliciting information will contribute to topic development, either by providing new information or by backtracking to clear up something that had been left un-

Table 1. *Sample characteristics*

	LA Control	CA Control	SLI-T	PLI
Boy + girl	7 + 2	7 + 2	8 + 1	8 + 1
Age (months)				
Mean (<i>SD</i>)	62.9 _a (7.56)	88.1 _b (9.01)	89.7 _b (12.47)	90.2 _b (10.72)
Range	53–75	73–100	73–107	73–103
Raven IQ				
Mean (<i>SD</i>)	107.3 (13.33)	93.4 (10.81)	100.3 (10.28)	105.8 (16.93)
Range	85–125	80–115	84–115	86–130
Repeating sentences, raw				
Mean (<i>SD</i>)	42.3 _a (15.76)	62.2 _b (7.71)	28.3 _a (10.77)	38.1 _a (15.92)
Range	12–56	49–73	10–40	13–67
Repeating sentences, scaled ^a				
Mean (<i>SD</i>)	11.2 (1.30)	12.6 _a (1.99)	4.4 _b (1.87)	5.6 _b (3.54)
Range	10–13	9–15	3–8	3–14
BPVS, raw				
Mean (<i>SD</i>)	46.6 _a (9.42)	76.4 _b (11.52)	48.3 _a (11.75)	47.1 _a (9.27)
Range	30–58	54–89	27–70	27–56
BPVS, scaled				
Mean (<i>SD</i>)	98.4 _a (9.39)	108.9 _a (9.74)	75.8 _b (9.88)	76.6 _b (8.05)
Range	82–111	95–122	61–96	65–90
<i>N</i> Conversational turns				
Mean (<i>SD</i>)	189.4 (20.3)	185.0 (22.7)	194.0 (16.17)	176.2 (15.5)
Range	141–200	133–200	151–200	155–200
<i>N</i> Child utterances				
Mean (<i>SD</i>)	78.9 (16.96)	98.2 (20.37)	80.8 (17.13)	88.2 (30.04)
Range	47–99	64–131	58–116	53–144
MLU in words				
Mean (<i>SD</i>)	4.23 (1.17)	5.14 _a (1.12)	2.94 _b (0.53)	4.12 (1.68)
Range	2.30–6.36	3.44–6.60	1.85–3.56	1.63–6.26

Note: Means in the same row that have different subscripts are significantly different at $p < .05$ by Scheffé test. MLU, mean length of utterance.

^aRepeating sentences, scaled, mean based on five children aged 5 years and over; norms do not extend below this age.

clear (where the adult has requested clarification). Many utterances that solicit a “yes” or “no” answer do not, however, solicit information; the polarity of the response is entirely predictable, to the extent that there would be a definite sense of contradiction if the child gave an unexpected response. Although there is no one-to-one correspondence between grammatical form and pragmatic function, it is common to see utterances with the form of tag questions or declaratives with questioning intonation used to solicit acknowledgment (Bishop et al., 1998). Furthermore, requests for information and requests for acknowledgment tend to have different prosodic characteristics. However, the main way of identifying that a questioning utterance is not a genuine request for information is by awareness that the speaker already has the relevant

knowledge. Thus, for instance, in the following exchange the final utterance could be a request for information by a speaker, who is seeking confirmation of something she is uncertain about. However, if we have the prior knowledge that Blackpool Tower is a famous landmark that most British adults would have heard of, then we are likely to treat this utterance as a request for acknowledgment.

- A where did you go on holiday
 C to blackpool
 A there s a really big tower there, is nt there

One may wonder why a speaker should bother to solicit acknowledgment when the response is in effect a foregone conclusion, but such utterances are very common in conversational

contexts. They seem to serve a social function, providing a speaker with a means of monitoring the addressee's engagement in the conversation and providing the addressee a way of indicating interest in a minimally demanding way. Failure to produce a response to such acknowledgment-soliciting utterances is far less disruptive to the conversation than failure to respond to an information-soliciting utterance. However, they are usually responded to by children (Bishop et al., 1998).

In our coding system, we distinguished between requests for information and requests for acknowledgment at the transcription stage. The terminating symbol of a question mark (?) was used where the coder judged that the speaker had finished speaking and was directing another speaker to take a turn which would provide information. A wavy line (~) was used to terminate utterances where it was judged that the turn was passed to the interlocutor with the expectation that he or she would provide acknowledgment. There were inevitably cases where the decision to code "~" or "?" was not clear cut, partly because the distinction is really a matter of degree rather than a sharp distinction, and also because it was not always possible to judge the speaker's knowledge (i.e., whether there was genuine uncertainty about the response). Effort was expended in training transcribers to treat turn-handling marks as different from punctuation marks. After training, agreement between raters in judging whether the utterance terminated in "?", "~", or another turn-handling mark was 87.5% (Cohen's [1960] $\kappa = .73$) for two conversations totalling 344 utterances.

All transcripts and videos were identified solely by a code number, and information that might identify the status of the child (e.g., age, name, school) was encrypted in the transcript. The person coding the transcript was unaware of the group identity of the child. These steps were taken to avoid unwitting bias when coding adequacy of responses.

Analysis 1: Coding the type of response to soliciting utterances. Children's responses following the adult soliciting responses were classified as follows.

No response. Two points need stressing when explaining coding of this category. First, we define "response" in a more rigorous way than many other conversational analyses. Thus just because a child's utterance occurs immediately after an adult's utterance, this does not mean it is a response. To be counted as a response, it has to match some features of the prior soliciting utterance. A response to an acknowledgment-soliciting utterance will always be an acknowledgment. A response to an information-soliciting utterance must be an answer (i.e., it provides information on the requested topic, or on one closely related to it). Second, we have to consider the child's *opportunity* to respond. Sometimes an adult would, for instance, ask one question immediately followed by another. If the adult continued with the turn leaving less than a 1-s pause between utterances, then the first adult utterance was excluded from analysis.

"No response" could thus be coded in two situations. The first was if the child took up the turn after the adult's solicitation but did not respond to the adult's contribution (e.g., by making an unrelated comment or continuing to give a narrative account that ignored an intervening question). Thus, Utterance 1.1 in Example 1 would be coded as having no response, because the utterance at 2.1 is coded as a statement rather than an answer.

Example 1

- 1.1 A what do you think is wrong with that 'boy?
2.1 C i m having my birthday party tomorrow.

The second kind of situation where this category was coded was when the adult paused for at least a second, waiting for a response which was not forthcoming, and then continued. During the interval, the child might be silent, or indicate a desire to hold the turn while preparing a response (e.g., by uttering "er"). Utterance 1.1 in Example 2 is coded as having no response because the adult waits for more than 1 s before continuing with a supplementary question. (Timed intervals are represented as digits in the transcript.) If, however, the adult paused for longer than a

second but the child *did* then give a response, this was coded as a response (e.g., Utterance 2.1 in Example 2).

Example 2

- 1.1 A did you have a party 'this year? 2.5
1.2 when you were 'eight? 2.0
2.1 C yeah.

Nonverbal response. This is coded when the child responds nonverbally (e.g., nod, head shake, shrug, pointing to a referent) with no accompanying words.

Example 3

- 1.1 A so you went to 'school today, did you~
2.1 C (nods)

If a nonverbal response accompanied a verbal response, then this was coded as a verbal response, in one of the categories below.

Prosodic response. This code was used for nonlexical verbal responses, such as “mmh,” “uhuh,” and so forth, as illustrated in Example 4.

Example 4

- 1.1 A did you have some specially nice things to 'eat at your party?
2.1 C mmm.

Minimal verbal response. This was coded if the child responded “yes,” “no,” or “don’t know” to a soliciting utterance with the form of a yes–no question, or provided just the requested information with no elaboration in response to a “wh” question (as in Example 5).

Example 5

- 1.1 A where does your 'sister go to school?
2.1 C huddersfield.

Extended verbal response. This was coded when the child gave a relevant response that went beyond the minimal requested information or acknowledgment. Usually, this code was used for utterances that requested information (as in Example 6), but it could be used after a request for acknowledgment if the child followed on with a closely related statement (as in the Sequence 3.1–4.1 in Example 7).

Example 6

- 1.1 A are you going on 'holiday this year?
2.1 C yes, to 'spain.

Example 7

- 1.1 A where did you go on holiday?
2.1 C south of 'france.
3.1 A it s 'hot there, is nt it~
4.1 C and windy.

Other. This residual category was used when no other coding applied, as, for instance, when the child responded to a question by challenging its presuppositions. Such cases were rare and were excluded from further analysis. In addition, cases where a solicitation or its response was unintelligible, incomplete, or in overlap with the other speaker were excluded from consideration.

Agreement between two independent raters applying this classification to 163 responses from six conversations was 94% (Cohen’s [1960] $\kappa = .89$).

Clearly, the grammatical form of a soliciting utterance will determine the types of response that can occur. Nonverbal and prosodic responses are particularly implausible following “wh” questions or alternative questions. If we wish to compare how responses vary in relation to the communicative function of an adult solicitation, it makes sense to concentrate on those adult utterances that anticipate a reply of “yes” or “no.” In our analysis, we therefore drew a threefold distinction between responses to

1. acknowledgment-soliciting utterances, transcribed terminating in “~,” which invariably had a grammatical form that anticipated a “yes” or “no” reply;
2. yes–no information-soliciting utterances, transcribed terminating in “?,” with the grammatical form of auxiliary inversion questions, tag questions, and declarative (intonational) questions;
3. other question types, predominantly “wh” questions and alternative questions, where “yes” or “no” and their nonverbal and prosodic analogues are not plausible as a reply.

Results

Frequency and nature of responses to acknowledgment-soliciting utterances

Proportions of different response types to acknowledgment-soliciting utterances are shown

Table 2. Descriptive statistics for responses to acknowledgment-soliciting utterances (all anticipating a yes–no response)

	Mean	SD	Min	Max	$N > 0^a$
Total N solicitations					
LA control	16.22	6.22	9	29	
CA control	12.89	5.35	3	19	
SLI-T	11.89	5.44	6	21	
PLI	10.44	4.45	6	20	
Proportion of response types					
No response					
LA control	.112	.104	0	.286	7
CA control	.078	.113	0	.333	4
SLI-T	.195	.139	0	.375	8
PLI	.231	.223	0	.556	7
Nonverbal					
LA control	.475	.337	0	.909	8
CA control	.255	.226	0	.722	8
SLI-T	.262	.296	0	.889	6
PLI	.113	.255	0	.778	4
Prosodic					
LA control	.080	.162	0	.474	4
CA control	.036	.072	0	.182	3
SLI-T	.064	.100	0	.250	6
PLI	.040	.087	0	.250	6
Minimal verbal					
LA control	.280	.154	.091	.571	9
CA control	.570	.198	.278	.875	9
SLI-T	.422	.276	.056	.714	9
PLI	.562	.253	.111	.875	9
Extended verbal					
LA control	.052	.073	0	.182	4
CA control	.061	.074	0	.167	4
SLI-T	.057	.094	0	.250	3
PLI	.053	.069	0	.167	4

^aThe number of children, out of nine, who gave at least one instance of this category of response.

in Table 2. These data were used to test Hypotheses 1–3, which, respectively, predicted that (a) younger (LA) controls will show higher rates of “no response” than older controls; (b) the SLI-T group will resemble LA controls, whereas the PLI group might show even higher rates of “no response”; and (c) nonverbal responses will be especially common among children with immature language skills (i.e., LA controls and the SLI-T group). Proportions were converted to empirical log odds and analyzed as detailed in Appendix B. Contrary to the prediction from Hypothesis 1, the two control groups did not differ significantly in the proportion of “no response” observed ($z = 1.37$). In agreement

with predictions from Hypothesis 2, for the SLI-T group, only the comparison with CA controls reached significance ($z = 2.77$). Also in line with predictions from Hypothesis 2, children in the PLI group, were *less* likely than controls to respond to these utterances; the difference was significant at the .05 level both for the comparison with CA controls ($z = 3.37$) and for the comparison with LA controls ($z = 2.37$).

To test Hypothesis 3, we considered what proportion of responses to acknowledgment-soliciting utterances were nonverbal (after excluding cases of “no response”). An unexpected finding was the high rate of nonverbal responses in the younger LA control group,

who differed significantly from older CA controls ($z = 2.71$). The SLI-T group did not differ significantly from either control group in the proportion of responses that were nonverbal. However, in line with prediction, the PLI group was noteworthy for having a very low rate of nonverbal response, significantly less than that of all three other groups (PLI vs. LA controls, $z = 4.82$, vs. CA controls, $z = 2.66$, vs. SLI-T, $z = 3.31$).

Frequency and nature of responses to “yes–no” information-soliciting utterances

Similar analyses were next conducted for responses to information-soliciting utterances for which “yes” or “no” were expected responses (Table 3). Proportions of “no response” were very low in all groups. Nevertheless, in line with predictions from Hypothesis 1, “no response” was more common for younger controls than for CA controls. Rates of “no response” in the SLI-T group were not significantly different from LA or CA controls. The highest rate of “no response” was seen in the PLI group. They differed significantly from the CA control ($z = 3.64$) and SLI-T ($z = 2.52$) groups, but the difference from LA controls just fell short of significance ($z = 1.99$).

To test Hypothesis 3, the proportion of all responses that were nonverbal was next computed. It is evident from inspection that the frequency of nonverbal responses is lower than for acknowledgment-soliciting utterances in all four groups, but the overall pattern of difference between groups is maintained. Thus, the younger LA-matched control children made heavier use of nonverbal responses than any other group. (All comparisons with other groups were statistically significant at the .05 level, with z scores ranging from 4.55 [vs. SLI-T] through 4.81 [vs. CA controls] to 6.41 [vs. PLI].) A relatively low rate of nonverbal responses in the PLI group was again apparent, with the difference being significant relative all other groups (vs. CA control, $z = 2.19$, vs. SLI-T, $z = 2.28$).

Although the group differences are statistically significant, there was nevertheless quite marked individual variation, especially within the language-impaired groups. All nine chil-

dren in the CA control group and eight of the nine children in the LA control group produced a higher rate of nonverbal responses in response to acknowledgment-soliciting utterances (Table 2) than in information-soliciting yes–no utterances (Table 3). There were five children in the SLI-T group and only three in the PLI group who showed this pattern. All control children produced some nonverbal responses, but two children in the SLI-T group and three in the PLI group produced no nonverbal responses in either condition.

Frequency and nature of responses to “wh” information-soliciting utterances

The third type of adult solicitation to be considered were information-soliciting utterances with the format of “wh” questions (Table 4). Although there was a trend for low responsiveness in the PLI group, there were no statistically significant differences between groups on this measure, and responsiveness was overall very high. It was not appropriate to conduct an analysis of nonverbal responses for this solicitation type, because there are few contexts where a nonverbal response can be given to a “wh” question.

Overview of group differences

Overall, we may summarize this part of the analysis by saying that the analysis reveals, first, differences in pattern of responding between the younger LA matched controls and older CA matched controls. Contrary to prediction, the most marked difference between these groups was not in rate of “no response” (which was low at all ages, especially for information-soliciting utterances) but rather in use of nonverbal responses. At all ages, children were more likely to use nonverbal responses for acknowledgment-soliciting utterances than information-soliciting utterances, but the younger children made heavier use of nonverbal responses overall.

In line with prediction from Hypothesis 2, the children in the SLI-T group did not differ significantly from LA controls in rates of “no response,” whereas the PLI group did. However, predictions from Hypothesis 3 were only

Table 3. Descriptive statistics for responses to information-soliciting utterances anticipating a yes–no response

	Mean	SD	Min	Max	<i>N</i> > 0 ^a
Total <i>N</i> solicitations					
LA control	38.22	11.04	30	58	
CA control	32.00	9.27	20	50	
SLI-T	36.78	8.35	27	53	
PLI	30.33	8.72	13	44	
Proportion of response types					
No response					
LA control	.032	.046	0	.200	6
CA control	.033	.037	0	.100	2
SLI-T	.009	.017	0	.043	6
PLI	.026	.022	0	.061	5
Nonverbal					
LA control	.135	.156	0	.559	9
CA control	.275	.195	.026	.559	8
SLI-T	.120	.093	0	.250	5
PLI	.098	.144	0	.424	7
Prosodic					
LA control	.032	.046	0	.182	3
CA control	.014	.023	0	.065	5
SLI-T	.031	.032	0	.080	8
PLI	.052	.060	0	.182	5
Minimal verbal					
LA control	.577	.166	.200	.870	9
CA control	.441	.157	.200	.692	9
SLI-T	.530	.115	.323	.704	9
PLI	.681	.159	.273	.767	9
Extended verbal					
LA control	.224	.107	0	.433	9
CA control	.238	.088	.088	.367	9
SLI-T	.311	.075	.222	.433	9
PLI	.143	.053	.038	.216	8

^aThe number of children, out of nine, who gave at least one instance of this category of response.

partly confirmed: unlike younger normally developing children of similar language level, language-impaired children did not compensate for verbal limitations by using nonverbal responding; indeed, the PLI group was characterized by an exceptionally low rate of nonverbal responses.

Analysis 2: Coding meshing of soliciting utterances and their responses. Responses to information-soliciting utterances were coded in terms of how well they meshed with the expectations of the solicitation. An *adequate* response was one where the requested information was either provided or where the child stated that it could not be provided, with a

response such as “don’t know,” in a context where even an adult might be unable to answer (e.g., in response to “Where are you going on holiday next year?”). This category included instances where the requested information was not explicitly stated but was readily inferred, as, for instance, in the following exchange, where we can infer that the family does not have a car:

Example 8

- 1.1 A has your dad got a 'car?
2.1 C got a 'van.

Those responses that were not regarded as adequate were further subdivided into two cate-

Table 4. Descriptive statistics for responses to “wh” question information-soliciting utterances

	Mean	SD	Min	Max	$N > 0^a$
Total N Solicitations					
LA control	21.56	9.22	13	44	
CA control	18.33	5.24	11	28	
SLI-T	24.89	6.53	15	34	
PLI	20.00	8.80	13	38	
Proportion of response types					
No response					
LA control	.070	.070	0	.182	6
CA control	.037	.072	0	.211	3
SLI-T	.077	.090	0	.250	5
PLI	.085	.059	0	.154	7
Nonverbal					
LA control	.031	.051	0	.143	5
CA control	.018	.029	0	.067	7
SLI-T	.015	.025	0	.067	5
PLI	.007	.015	0	.038	4
Prosodic					
LA control	0	0	0	0	4
CA control	0	0	0	0	2
SLI-T	.004	.013	0	.040	5
PLI	0	0	0	0	5
Minimal verbal					
LA control	.770	.065	.692	.875	9
CA control	.825	.080	.684	.938	9
SLI-T	.823	.076	.708	.971	9
PLI	.828	.083	.763	1.000	9
Extended verbal					
LA control	.129	.100	0	.304	7
CA control	.120	.057	.062	.250	9
SLI-T	.081	.073	.029	.222	9
PLI	.080	.051	0	.154	8

^aThe number of children, out of nine, who gave at least one instance of this category of response.

gories: those that were *inadequate* (i.e., vague, underspecified, or apparently reflecting poor understanding of the words in a question) and those that were *pragmatically inappropriate* and which were less easy to explain as consequences of weak vocabulary or grammar. This latter category, which drew some of its notions from earlier work by Bishop and Adams (1989), was composed of a rather wide range of response types but generally included those that gave an impression of oddity rather than immaturity, because the child either took little notice of what had been said, or gave an over-literal response that indicated misinterpretation of the intended meaning, or produced an utterance that contained tangential or irrele-

vant material, or whose prosody seemed exaggerated and inappropriate to the context. Examples are given in Appendix C. Agreement by two coders over this three-fold categorization was 89.9% (Cohen's $\kappa = .526$) for a total of 545 solicitations whose responses were coded independently.

Comparing groups in terms of response adequacy

Mean proportions of responses in each category are shown in Table 5. These data were used to evaluate the remaining hypotheses:

4. Younger LA controls will produce more

Table 5. *Meshing of responses to information-soliciting utterances*

	Mean	SD	Min	Max	$N > 0^a$
Total N information-soliciting utterances					
LA control	59.78	14.00	43	82	
CA control	50.33	11.91	35	71	
SLI-T	62.11	12.40	49	87	
PLI	50.44	12.18	26	64	
Proportion adequate responses					
LA control	.844	.073	.705	.933	9
CA control	.934	.054	.809	1.000	9
SLI-T	.742	.156	.444	.947	9
PLI	.722	.089	.615	.887	9
Proportion inadequate responses					
LA control	.118	.066	.050	.256	9
CA control	.052	.040	0	.128	8
SLI-T	.135	.078	.040	.259	9
PLI	.148	.092	.065	.308	9
Proportion pragmatically inappropriate responses					
LA control	.038	.017	.013	.064	9
CA control	.014	.023	0	.064	3
SLI-T	.123	.106	.013	.296	9
PLI	.130	.096	.047	.298	9

^aThe number of children, out of nine, who gave at least one instance of this category of response.

“inadequate” responses than older CA controls but will not differ in the frequency of “pragmatically inappropriate” responses.

5. The pattern of performance for children in the SLI-T group will resemble that of CA controls, whereas the PLI group will show a high rate of “pragmatically inappropriate” responses.

Comparing first the four groups in terms of the proportion of adequate responses, the CA control group differed significantly from all other groups on this index (vs. LA controls, $z = 3.99$; vs. SLI-T, $z = 7.32$; vs. PLI, $z = 7.36$). In addition, both language-impaired groups had a lower rate of adequate responses than the LA control group (SLI-T vs. LA control, $z = 4.07$; PLI vs. LA control, $z = 4.14$). The two language-impaired groups did not, however, differ significantly from one another on this measure.

Next, we considered only those responses that were *not* judged adequate and compared the proportion of pragmatically inappropriate responses for the four groups (i.e., pragmatically inappropriate / [inadequate + pragmatically

inappropriate]). The two control groups did not differ from one another on this index, nor did the two language-impaired groups. However, both language-impaired groups differed significantly from the LA control group, with a higher proportion of pragmatically inappropriate responses (SLI-T vs. LA control, $z = 3.06$; PLI vs. LA control, $z = 3.27$). There was a similar trend for comparisons with the CA control group, but this did not reach statistical significance; estimates of proportions were very unstable in this group because only a small minority of responses were not judged adequate.

These findings are in line with predictions from Hypothesis 4, in showing that it is “inadequate” rather than “pragmatically inappropriate” responses that differentiate younger from older control children. However, they are discrepant with Hypothesis 5, which predicted a different pattern of performance in the SLI-T and PLI groups; we had anticipated that the SLI-T group would resemble the LA control group. This finding is open to a range of explanations. It could be that a relatively high rate of pragmatically inappropriate responses

Table 6. Classification of responses for sample recoded according to number of nonverbal responses

Group	N Nonverbal Response	Original Group Status	Mesh Code Proportions		
			Adequate	Inadequate	Pragmatically Inappropriate
Low	0–2	1 CA control, 5 SLI-T, 6 PLI	.711	.126	.163
Medium	3–9	4 LA control, 5 CA control, 1 SLI-T, 2 PLI	.883	.088	.029
High	10–34	5 LA control, 3 CA control, 3 SLI-T, 1 PLI	.837	.127	.036

is characteristic of all children with SLI, regardless of clinical subtype. Although this view seems contrary to clinical experience, it could be the case that pragmatically odd responses are simply more likely to be overlooked in a child with limited expressive ability (i.e., the majority of those in the SLI-T group) than in a child who can produce longer and more clearly articulated utterances. An alternative view is that there is a genuine difference between those children whose language is simply immature and those who have disproportionate pragmatic difficulties, but the checklist that we used to subclassify children failed to make this distinction very well.

Reclassification of children in terms of nonverbal responsiveness

This latter explanation seemed supported by a final analysis in which children were recoded into three equal-sized groups, not according to the checklist but rather in terms of the number of nonverbal responses they gave. This new classification is shown in Table 6.

The low nonverbal group differed significantly from both other groups in the proportion of adequate responses (for Low vs. Medium, $z = 6.72$; for Low vs. High, $z = 4.70$). Considering next just those responses that were not coded as adequate, the proportion coded as pragmatically inappropriate was significantly greater for the Low Nonverbal group (Low vs. Medium, $z = 4.11$; Low vs. High, $z = 5.65$). This final analysis suggested that there is a subset of language-impaired children who make a disproportionately high proportion of pragmatically inappropriate responses, and these children are also character-

ized by their low level of nonverbal responding in a conversational setting.

Discussion

Insights into normal development of conversational skills

In the development of pragmatic abilities, several components are involved: some strictly linguistic and others more clearly social or interactive (Ninio & Snow, 1996). To participate in a conversation, the child must have the ability both to understand what others are saying and to formulate an appropriate response. However, while language ability is necessary for conversational competence, it is not sufficient. The importance of social cognition in conversational development has been stressed by many authors. The child must be able to understand not only what has been said by a partner but also the speaker's communicative intent. In a review of work in this area, Bishop (1997) noted that, in normal development, children appear to use contextual and nonverbal cues to decode communicative intents even when they do not fully understand the spoken language.

The data obtained here lend weight to the notion that the young child is already highly sensitive to the social aspects of conversation by 4 years of age. We had anticipated that younger normally developing (LA control) children would be less responsive than older (CA control) children to conversational solicitations. However, this was not the case: in general, the LA control children showed a uniformly high response rate, not significantly different from that of CA controls; the

younger children responded to 88% of acknowledgment-soliciting utterances and around 95% of information-soliciting utterances. Where the two groups *did* differ was in their use of nonverbal responses: the younger children were much more likely than older children to nod rather than say "yes." What changes with age is not the likelihood of responding but the form that a response takes. This finding is consistent with observations by Adams and Bishop (1989) and Doherty-Sneddon and Kent (1996), who noted high rates of nonverbal responses for small children interacting with adults. This finding emphasizes the importance of using video as well as audio recordings when studying communicative interaction in young children.

The qualitative analysis of meshing between adult solicitations and child responses (Analysis 2) gave further evidence that it is primarily the linguistic demands of conversation that limit the young child's conversational skills rather than difficulty in expressing or interpreting communicative intentions. The younger control children were more likely than older children to fail to give an adequate response to an adult solicitation, but when they did so their responses tended to fall into the category of "inadequate" responses rather than "pragmatically odd"; that is, they showed characteristics that, on a priori grounds, were judged to arise from limitations of structural language skills.

Differences between SLI and control children

As noted in the Introduction, it is usually assumed that for children with SLI limited structural language skills are the reason behind any pragmatic limitations that are observed, but the data reported here question that assumption and suggest that, at least for some of these children, conversational difficulties may reflect more fundamental problems in understanding or expressing communicative intentions.

On average, children with SLI were less responsive to adult solicitations than CA control children. Previous research has been somewhat inconsistent on this issue: Willemssen-Swinkels, Buitelaar, and van Engeland

(1997) found normal conversational responsiveness in a group of language-impaired children, but Hadley and Rice (1991) reported that rates of "no response" were higher for language-impaired children than for normally developing peers. The inconsistencies may reflect the wide individual variation within language-impaired groups. Also, the size of effect is not large: in our study, although there was a significant group difference, language-impaired children did respond to the majority of adult solicitations.

Hadley and Rice (1991) suggested that the relative lack of responsiveness in some language-impaired children may be caused by problems in comprehension or utterance formulation. However, our study suggests limited utterance formulation is not a factor, because lack of responsiveness was seen even for acknowledgment-soliciting utterances, which require only that the child nod agreement.

The pattern of responsiveness was related to qualitative aspects of language impairment. For those classified as having pragmatic impairments, the rate of nonresponding was higher even than for LA control children. Variation in responsiveness does not, therefore, seem to be simply a consequence of limited mastery of language structure.²

Language-impaired children, especially those with pragmatic impairments, tended to have a very low rate of nonverbal response, with several of them never using this response mode. Thus, in situations where the child has an option of speaking or using a head movement to reply to a yes-no question, children with pragmatic impairments seldom give a

2. Data from Craig and Evans (1993) are difficult to compare directly with our study because they defined "no response" when the child did not produce an utterance within 2 s of an adult utterance; thus they would have excluded from this category the kinds of noncontingent sequence shown in Example 1. It is likely that their "no response" would have included nonverbal turns by the child, which we coded separately. If one sums Craig and Evans's "no response" and "noncontingent" categories so that their category more closely resembles ours, then the group difference is significant at the .05 level, $F(3, 16) = 4.17$, $p < .05$, although a high rate of no response relative to age-matched controls is seen only in the receptive SLI group.

nonverbal response. In this respect, they are quite unlike younger, normally developing children.

This aspect of our results is at odds with the conventional view of a language-impaired child as one who uses the nonverbal channel in preference to verbal responding, a view endorsed by Rosinski-McClendon and Newhoff's (1987) study of younger language-impaired children; they concluded that "when questioned, the language-impaired children remain silent *or respond nonverbally* more often than do normal language children." However, they did not present data on the frequency of nonverbal responding in either group, and they may have missed some nonverbal responses because they relied on audio recording supplemented with notes taken during the test session, rather than on video recording. Furthermore, there are numerous methodological differences between our study and theirs. The children studied by Rosinski-McClendon and Newhoff were younger than ours, and those with major comprehension difficulties were screened out. They gathered data in a free-play setting where the presence of toys may have facilitated the use of nonverbal pointing responses. Also, they based their conclusion on responses given to five probe questions that were selected to be syntactically simple and pertaining to the topic under discussion or the focus of attention. The deficit that we observed in nonverbal responding for language-impaired versus younger children was most noticeable in contexts where the nonverbal response served a social rather than informing function; it is unlikely that Rosinski-McClendon and Newhoff used probes that solicited such responses.

Our analysis of meshing was concerned with the *quality* of responses given to information-soliciting utterances (i.e., how far they matched the expectations set up by the question). Our initial analysis showed that SLI children in general had a lower rate of adequate responses than either control group, regardless of the subtype of language disorder. Broadly speaking, these results are compatible with those obtained by Rosinski-McClendon and Newhoff (1987), who noted that language-impaired children seldom remained si-

lent in response to a probe question but tended to give responses that were incorrect or unresponsive to the context, doing more poorly than younger children of similar MLU.

Our study also endorses suggestions by Johnston (1985) and Eales (1993) that research on children's pragmatic difficulties should contrast those aspects of discourse ability where formal knowledge of language does and does not seem critical. We found that many of the responses by language-impaired children that were coded as "not adequate" were pragmatically inappropriate (i.e., they could not readily be explained in terms of poor comprehension or limited verbal formulation skills). A subsidiary analysis showed a striking relationship between the tendency to produce pragmatically inappropriate responses and a low level of nonverbal responses. When children were classified in terms of the frequency with which they produced nonverbal responses, we found that pragmatically inappropriate responses characterized those who seldom or never produced nonverbal responses but were rarely seen in other children.

Methodological considerations

In interpreting these findings, it is important to bear in mind some methodological limitations of the study. First, the sample size is relatively small, with just nine children in each of the SLI groups. Although this order of sample size is not unusual in studies that involve labor-intensive microlevel analysis of interaction, it does lead to relatively large error of measurement associated with group means. However, by doing such intensive studies of small groups of children, we can identify behaviors which it would be worth focusing on in larger scale studies. For instance, having found that the child's use of a nonverbal response mode is a critical variable distinguishing children with pragmatic problems, we could conduct future studies focusing just on nonverbal responsiveness: by reducing the amount of microanalysis on a conversation in this way, large-scale studies would become more tractable.

In addition, we need to do further studies

evaluating the role of other variables that might influence the conversational indices that we studied. For instance, although we ensured that the groups studied here were all average in terms of their nonverbal abilities, we did not record the social and family background of the children who participated in this study, and it is possible that variables such as maternal education, socioeconomic status, family size, and birth order might influence communicative style. Further research is needed to investigate the role of such factors on the variables under study. It is also important to consider how far the conversational behaviors described here are stable across different settings and contexts, and how far they may be influenced by variables such as familiarity and identity of the conversational partner (cf. Bishop, Hartley, & Weir, 1994).

To address the question of whether there are continuities between SLI and pervasive developmental disorders, we need studies that explicitly compare different diagnostic groups using standard diagnostic criteria. A weakness of the present study is that we relied on the school selection criteria to exclude children with autistic disorder. Most of the children in our study would have been evaluated for special educational provision in the mid- to late 1980s, when formal diagnostic algorithms for autistic disorder were not available, so diagnosis relied more heavily on clinical judgment and tended to place more emphasis on current status than early history: Rutter's (1978) diagnostic guidelines were widely adopted in the United Kingdom at this time. Nowadays, the early history assumes more importance, and standardized methods are available for eliciting

information and making a diagnosis. There are parallels between the communicative behaviors observed in PLI and those described in children with high-functioning autism, and we need studies that compare both conversational behavior and autistic symptomatology in children with SLI and those with autistic disorder. The analytic approach devised for this study provides a promising method for such future studies.

Conclusions

Overall, these findings support the view that conversational skills are not invariably a strength of children with SLI. Although many language-impaired children do seem to be simply immature in their conversational behavior, there is a subgroup who have broader communicative impairments. These children are characterized by a preference for verbal rather than nonverbal responding and by a tendency to give pragmatically inappropriate responses that are not readily explained as due to poor comprehension of literal meaning or difficulties in formulating sentences. For clinicians, it is important to be aware that many children who meet psychometric criteria for SLI may have communicative difficulties that extend beyond verbal communication. There is a tendency to assume that any conversational difficulties they have can be attributed to problems in comprehension or in formulating utterances, but it is important to be aware that some children might benefit from more direct intervention focusing on use of nonverbal communication and on aspects of social cognition.

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Appendix A: Experimental Checklist for Identifying Children with Pragmatic Language Impairment: Items, Scoring, and Item Means for Two Language-Impaired Groups

In the absence of reliable diagnostic criteria for pragmatic language impairment, this checklist was devised to formalize impressions of teachers and speech–language therapists. The checklist was completed by someone who had known the child for at least 3 months. Readers should note that the

psychometric characteristics of this checklist are not established; those interested in using a checklist should contact the first author for details of a more up-to-date version of the checklist with better evidence of reliability and validity.

The person completing the checklist was given

the following instructions: "For each area of functioning, five statements have been provided. Please circle the statement which you think describes this child most accurately. If you think that two adjacent statements apply, please circle both. Please give a response to all items; we cannot use the checklist if items are not completed. If no statement is entirely accurate, circle the one you think comes closest, and add an explanatory comment."

The checklist items were presented in multiple-choice format. Each response was awarded 0, 1, or 2 points, reflecting how well it matched clinical accounts of "semantic pragmatic disorder." The score is stated after the response option; however, in the version of the checklist used in this study, these scores were not shown.

1. *Articulation/expressive phonology:*

- normal (2)
- minor immaturities only (e.g., th→f; r→w) (2)
- consistent errors on two or three speech sounds (0)
- many errors: inconsistent and/or unusual substitutions (0)
- mostly unintelligible out of context (0)
- mean for PLI group = 1.89; for SLI-T group = 0.89.*

2. *Sentence construction:*

- mostly 2–3 word phrases (0)
- 4–5 word utterances: single clauses only (0)
- uses coordination not subordination (0)
- some use of subordination (1)
- produces many multiclausal utterances (2)
- mean for PLI group = 0.56 ; for SLI-T group = 0.22.*

3. *Grammatical morphology (e.g., plural endings, pronoun case/gender, verb endings):*

- never uses inflections (0)
- uses -ing and plural -s but usually omits other inflections (0)
- more often correct than incorrect, but still makes many mistakes (1)
- occasional error only (2)
- no problems (2)
- mean for PLI group = 1.33; for SLI-T group = 0.33.*

4. *Vocabulary:*

- uses very limited range of words (0)
- reasonable everyday vocabulary but does not know more unusual terms (0)
- tends to grope for certain words and may make semantic or phonemic confusions (1)

good range of vocabulary used appropriately (1)

unusually adult vocabulary (2)

mean for PLI group = 0.61; for SLI-T group = 0.28.

5. *Talkativeness:*

- needs considerable coaxing to talk at all (0)
- responds when spoken to but does not initiate conversation (0)
- will sometimes take the lead in conversation, especially with other children (0)
- talkative but not abnormally so (1)
- verbose: talks incessantly (2)
- mean for PLI group = 1.11; for SLI-T group = 0.78.*

6. *Fluency:*

- utterances very slow and labored (0)
- frequently hesitates when groping for a word (0)
- unremarkable (1)
- many false starts: repeats fragments of an utterance (1)
- extremely fast speech rate (2)
- mean for PLI group = 1.11; for SLI-T group = 0.78.*

7. *Intonation:*

- speaks on monotone (2)
- poor use of intonation to convey meaning or emotion (2)
- normal range of intonation (0)
- marked variation in intonation, used appropriately (0)
- distinctive intonational contour used in stereotyped fashion (2)
- mean for PLI group = 1.78; for SLI-T group = 0.22.*

8. *Sentence comprehension:*

- no understanding of spoken language (0)
- grasps only two or three content words in an utterance (0)
- understands simple everyday language but gets confused by complex constructions (1)
- virtually normal: makes the occasional mistake (2)
- appears to have normal age-appropriate understanding (2)
- mean for PLI group = 1.06 for SLI-T group = 1.06.*

9. *Ability to use context to decode meaning:*

- frequent overliteral interpretation of utterances, without taking the speaker or situation into account (2)

occasionally overliteral (1)
 poor at bringing general knowledge to bear,
 e.g., when reading a story (1)
 no problems observed (0)
 makes excellent use of context to deduce mean-
 ing (0)
mean for PLI group = 1.56; for SLI-T group =
0.44.

10. *Imitation:*

frequently echoes another's utterances (2)
 past history of echolalia but now seldom ob-
 served (2)
 good at imitating speech but only does so on
 request (0)
 poor at imitating speech, e.g., limited digit span
 (0)
 major difficulty in imitating even a single word
 (0)
mean for PLI group = 1.67; for SLI-T group =
0.22.

11. *Content of spontaneous utterances:*

keeps trying to turn conversation to own fa-
 vored topics (2)

often gives tangential responses (2)
 minimal content: needs prompting to supply in-
 formation (1)
 content of conversation seems age appropriate
 (0)
 can discuss a wide range of topics with great
 sophistication (0)
mean for PLI group = 1.56; for SLI-T group =
0.89.

12. *Nonverbal communication:*

relies largely on signed language to communi-
 cate (0)
 makes heavy use of facial and bodily gestures
 to supplement speech (0)
 combines verbal and nonverbal communication
 in a normal way (0)
 limited use of facial or bodily gesture (1)
 marked lack of eye contact; and/or little use of
 gesture (2)
mean for PLI group = 1.17; for SLI-T group =
0.33.

Appendix B: Statistical Methods

Comparisons of proportions are problematic when proportions are based on different numbers of responses for different subjects, and when floor and ceiling effects occur. Use of the weighted empirical logit transform makes allowance for the fact that proportions based on a large number of observations are likely to be more accurate than those based on only a small number of observations (Cox & Snell, 1989). For each subject, where n is the number of responses and r is the number of responses in a particular category, we compute the empirical log odds score, $L = \log [(r + .5)/(n - r + .5)]$; its associated variance, $U = [(n + 1)(n + 2)]/[n(r + 1)(n - r + 1)]$; and a weighting term, W , which is equivalent to $1/U$. For testing paired comparisons between condition i and j , we compute a difference score, $d = L_i - L_j$, and a combined weight, $w = 1/(U_i + U_j)$. We can then test the significance of $z = \sum wd/\sqrt{\sum w}$.

For between subjects comparisons between independent groups 1 and 2, we compute

$$z = \left[\left(\sum w_{1j} L_{1j} / \sum w_{1j} \right) - \left(\sum w_{2j} L_{2j} / \sum w_{2j} \right) \right] \\ \div \sqrt{\left(1 / \sum w_{1j} \right) + \left(1 / \sum w_{2j} \right)},$$

where responses can be categorized into mutually exclusive categories, proportions of different cate-

gories are not independent. For instance, if the number of cases of "no response" is high, then the number of other response types must be low. To avoid spuriously inflating the number of significant results, one can test only independent proportions by testing one response category and then removing that category from consideration before testing the next. For example, if a child had a total of 25 coded responses, of which 5 were "no response" and 10 were "nonverbal," we would first do tests on the "no response" category, computing the log odds score based on the proportion $5/25 = .20$ (i.e., as a proportion of *all* responses). We would then remove the "no response" category, so that tests of "nonverbal" responses would be based on the remaining categories, giving the proportion $10/20 = .5$. A final consideration is the need to adjust significance values to take into account the fact that multiple comparisons are conducted. For each set of within- or between-subject comparisons for a given response category, we adopted Holm's test, in which differences between groups are ranked by size, and the number of comparisons is NC. Where the significance level, α , is set at .05, the largest comparison is tested using α/NC , the next largest using $\alpha/(NC - 1)$, the next with $\alpha/(NC - 2)$ and so on (see Howell, 1995).

Appendix C: Guidelines for Coding Response Quality

Please note that punctuation marks have specific meanings in our transcription system (see Bishop et al., 1998).

Inadequate

The child's age is *not* taken into account when making these ratings. It is expected that normal young children will give responses that fall in this category because of limited language skills or world experience.

Response that is vague, overgeneral, semantically underspecified.

- 1.1 A what did you use as a 'bat?
2.1 C we had one of 'these things that goes up and down 'there, (gestures) and then it goes 'round like 'that.

- 1.1 C in the summer holidays i m going to 'manton.
 2.1 A where s 'that?
3.1 C long way 'away.

Semantic selection error: Related word substituted.

- 1.1 A what s the doctor 'doing
2.1 C testing the boy with a 'telescope.
 (referring to stethoscope)

Response to only part of an alternative question, leaving meaning unclear.

- 1.1 A and could he 'walk then, or did you have to 'carry him?
2.1 C no.

Ignoring part of a complex question.

- 1.1 A what is your favorite thing to drink at a party?
2.1 C toffees.

Failure of literal comprehension. The response is appropriate to a related question.

- 1.1 A where did you 'go on holiday?
 2.1 C in 'september.

"Don't know" or equivalent where an adult would be expected to give an answer. The problem may reflect immaturity, poor memory, not knowing a word, or inability to think imaginatively.

- 1.1 A are you going to the same place next year?
 2.1 C yes.

- 3.1 A what s it 'called?

- 4.1 C ca nt remember.**

"No response" to information-soliciting utterance: Child silent or hesitant. These are cases where "no response" was coded, because of a failure of the child to say anything, or because the child attempted unsuccessfully to produce an answer.

- 1.1 A did you have a party 'this year? 2.5
(no response by C)
 1.2 when you were 'eight?
 2.1 C yeah.
 1.1 A where did you go on holiday?
2.1 C erm, 2.0
2.2 i er,
2.3 er, 5.0

- 3.1 A not sure~
 4.1 C no.

Pragmatically inappropriate

Over-literal response that does not appreciate speaker's intention.

- 1.1 A can you tell me what sort of 'car your dad s got?
2.1 C yes. 2.0

Specific referent introduced without explanation.

- 1.1 A who went with you on your 'holiday?
2.1 C paul.
 3.1 A who s 'paul?

Scope of question misunderstood: Different type of information supplied. This contrasts with inadequate responses, where the information provided is of the right kind but is too vague, general, or underspecified.

- 1.1 A so your dad drives to work every day.
 1.2 what sort of 'car has he got?
2.1 C brown one.

Hyperbolic or unbelievable response.

- 1.1 A (looking at photo of sick child)
 1.2 ^what d you thinks 'wrong with him?
2.1 C he has a 'heart attack.

Failure to take prior conversation into account.

- 1.1 A did you go to blackpool in your 'car?
 2.1 C yes.

- 3.1 A what about when you went to 'scarborough?
4.1 C it was 'hot.

Failure to use social context. These are often but not invariably impolite. The child's response does not take the social status of the partner into account.

- (child with unfamiliar adult)
1.1 A who s you best friend?
2.1 C you are.

Unexplained self-contradiction.

- 1.1 A have you ever been to the 'seaside?
2.1 C no.
3.1 A so if you have nt been to the 'seaside, where do you go on 'holiday?
4.1 C to the 'seaside.

Apparently uncooperative use of "don't know." Child says "don't know" in a context where even a young child should have no difficulty in answering the question.

- 1.1 A what s your brothers name?
2.1 C do nt know.

Tangential response. The minimal response can be inferred, but only with some difficulty.

- 1.1 A have you ever been to the 'doctor?
2.1 C i had a 'apple a day.
(infer no)

Extended response that contains additional detail that is irrelevant, repetitive or bizarre.

- 1.1 A what do you think is wrong with that 'boy?
2.1 C i think he might have fallen into the water, on january the sixth.

"No response" where child ignores adult and continues speaking.

- 1.1 A what do you think is wrong with that 'boy?
2.1 C i m having my birthday party tomorrow.

Inappropriately exaggerated prosody.

- 1.1 A did you have a party this year?
2.1 C o:h no:!.
(intonation suggests this is a comment on a major disaster: would be appropriate, for instance, if he had just spilled coffee on his trousers!)