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Children's Communication Checklist (CCC) scores in 11 year old children with  
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Abstract

**Background:** The pragmatic skills of children with communication disorders and their assessment are currently an issue for speech and language therapy and educational placement. **Aims:** To explore whether different subgroups of children with communication disorders score differently on the Children's Communication Checklist (CCC; Bishop, 1998) and how they compare to published normative data. **Methods and procedures:** A sample of 161 eleven year old children with a history of communication disorders were assessed using the CCC. The main use of this questionnaire is to establish whether pragmatic impairments are part of a child's communication difficulty. Although the checklist was originally designed for research purposes, Bishop & Baird (2001) have recently published normative data for this scale as well as group data from a number of different clinical groups. Whilst our CCC data has been previously reported descriptively for a wider sample (Conti-Ramsden et al, 2001), it has not been examined in terms of subgroups or compared directly to normative information and similarly diagnosed individuals from other studies. **Outcomes and Results:** Of the children assessed 52 (33%) scored in the normal range (within 1sd) on the pragmatic scale, 40 (26%) fell between 1 and 2 sd below the normative mean and 64 (41%) scored below 2sd the mean of typically developing children (aged 6-16yrs) who were reported by Bishop and Baird (2001). Thus the majority (67%) scored out of the normal range for pragmatic skill at 11 years of age. The cohort was separated into 4 diagnostic sub-categories: Those with a definite diagnosis of Autistic Spectrum Disorder (ASD; n=13); those with typical specific language impairment (SLI; n=29); generally impaired (LILowIQ; n=30);

those with a clinical history of primary Pragmatic Language Impairment (PLI; independent of CCC score, n= 27).

**Conclusions:** Findings show that those with SLI and LilowIQ were less impaired than the other groups on the CCC pragmatic scale. There was a significant trend for those with autistic spectrum disorders (ASD) to score lowest through PLI, LilowIQ to SLI. It is argued that a cut off of 140 may prove to be more useful at this age than the 132 level previously published for 8 year olds. Results suggest that the CCC can be used as a clinical tool, but in conjunction with other reliable measures.

**Key words:** Children's Communication Checklist (CCC); Specific Language Impairment (SLI); Pragmatic Language Impairment (PLI); Autistic Spectrum Disorder (ASD).

## Introduction

The measurement of pragmatic skill in children known to have communication impairments has become recognised as a difficult task. This is for a number of reasons including a general lack of knowledge about normative development, varying contexts and the subtle and rarely occurring forms of pragmatic difficulty. Even in children well known to have problems in conversation (such as poor turn taking, over literalness, poor referencing, an inability to give appropriate amounts of information or to remain cohesive and coherent with the topic), tasks designed to tap these have failed to do so adequately (e.g., Bishop and Adams, 1989, 1992) until very recently (see Adams, 2002 for a review of pragmatic assessment).

One response to this lack of measures was a checklist of communication behaviours developed by Bishop (1998) so that professionals who know children well could identify regular difficulties experienced by them. This measure, the Children's Communication Checklist (CCC) has been shown to have adequate inter-rater reliability and to show good validity in identifying children thought clinically to have primary pragmatic language impairment (PLI; Bishop, 1998; Conti-Ramsden et al, 1997; Botting and Conti-Ramsden, 1999). The CCC is a tool consisting of 9 subscales of communicative ability: Speech, Syntax, Initiation, Coherence, Conversation, Context, Rapport, Social Behaviour, & Restricted interests. Teachers or Speech and Language Therapists (SLTs) who know the child well are asked to answer a number of items in each section to build an overall picture of the child's use of language. The scales of Initiation, Coherence, Conversation, Context and Rapport are then summed to form a pragmatic composite. In the course of this article, these particular communication skills or impairments are what are referred to as "pragmatic". Items include both skills and weaknesses (such as "people can understand virtually

everything he says”) and are then scored accordingly. The checklist was developed following disappointing attempts to develop observational measures of the more subtle aspects of communication (see Bishop and Adams, 1992) and the realisation that the clinician was in the best position to describe the interactive behaviour of the child and analyse this in terms of communication skill. The measure was designed for research purposes, but recently Bishop has commented on its clinical use and also developed a version for parents to complete (Bishop and Baird, 2001). Whilst checklists have their own problems such as reporter bias and different interpretations of behaviour, they do offer an insight into rare and subtle characteristics of communication which might otherwise not be observed. In this sense they provide a systematic way in which to get information that clinicians might refer to as “clinical history”.

In both research and practice there are a number of diagnostic categories in use which describe the difficulties of individuals with communication impairments and it is worth noting the various terms here. These include a typical Specific Language Impairment profile where any pragmatic difficulties are directly caused by linguistic impairment and also a Pragmatic Language Impairment group for whom pragmatic impairments are felt to be more overt than one would expect from linguistic difficulties alone. The latter group are the same children previously described as having semantic-pragmatic disorder (Rapin and Allen, 1987; Rapin, 1996; Bishop and Rosenbloom, 1987). However, recent research has suggested that the ‘semantic’ part of this description be dropped because word finding, inferencing and word meaning difficulties are no more apparent than in other children with SLI (Bishop and Adams, 1989; Botting and Conti-Ramsden, 1999; Botting and Adams, submitted). Although these children do not always have superior linguistic skills, they often have high non-verbal IQ scores and present initially as very verbal and highly sociable children. Despite having the poor conversational skills outlined earlier, at least a proportion of these children do not seem

to have the difficulties with obsessive or rigid interests essential for a diagnosis of autism (Bishop and Norbury, 2002) .

At the same time, psychiatric centres use the term Pervasive Developmental Disorder Not Otherwise Specified (PDDNOS) to refer to a similar group of children with obviously wide-ranging communicative impairments but who also do not seem to fall within the group of autistic spectrum disorders (ASD). It is unclear to what extent PLI and PDDNOS overlap and few studies have directly compared these descriptions as given by different professions. A notable exception is that of Bishop and Norbury (2002) which showed that whilst the terms often overlapped, a proportion of children with PLI did not fit into ASD or PDDNOS groups using a multiple standardised assessment approach. The PDDNOS description has been deemed unsatisfactory for some time, but no alternatives are currently in use.

Some researchers believe that children with PLI are simply children with ASD who have been given a different label (e.g., Brook and Bowler, 1992; Gagnon, Mottron and Joannette, 1997), and whilst there may be theoretical (and possibly even genetic) overlap between these groups, recent evidence has built a picture suggesting that these groups do have different clinical needs (Botting and Conti-Ramsden, 1999; Bishop and Norbury, 2002; Bishop, 2000). Thus, further to the difficulty in *measuring* pragmatic skill per se, is the debate over whether children who are identified via speech and language therapy services as having pragmatic difficulties represent a different subgroup of children from those with ASD (see Boucher, 1998; Botting, 1998; Brook and Bowler, 1992).

Recently, Bishop and Baird (2001) examined the use of the CCC in clinical settings, using parents as well as professionals to rate childrens' functional communication skills. They compared the CCC pragmatic scores of children with different clinical descriptions and those with typical development. This created some normative data for the CCC not previously available. It also meant that means and variance information were available for a

number of other groups with communication difficulties. Specifically, the article reported differences between those with specific learning difficulties (SLD, which included children with dyslexia and SLI), autism, and importantly some differences between those with Asperger's Syndrome (AS) and those with PDDNOS. Unlike the Autism group, children with PDDNOS also showed no differences from the SLD group. The publication of the data from typically developing children (who were aged from 6 to 16 years - mean age=9.7; sd 3.5yrs) means that larger groups of children with communication difficulties can be compared to an expected normative threshold. This may inform clinical practice as well as theoretical knowledge.

#### The present study

This article reports on children aged 11 years who took part in a wider Nuffield Foundation Study of children attending language units<sup>1</sup> (Conti-Ramsden et al, 1997; Conti-Ramsden et al, 2001). It attempts to examine the CCC scores of a number of children who, although recruited as SLI, are now described as having additional problems – ASD, general learning difficulties or pragmatic language impairments in comparison to those still fitting the SLI description. The scores and thresholds for these groups were also compared to the control and clinical data from Bishop and Baird (2001).

The paper has three central aims:

- 1) To compare different groups with published normative data.
- 2) To compare groups with each other in order to see if any differences between groups are apparent, and to identify the most useful cut-offs for discriminating between clinical subgroups.

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<sup>1</sup> Language units are small classes with high specialist teacher:child ratio and direct speech-language therapy input, usually based alongside or as part of mainstream schools.

3) To make approximate comparisons from the current clinical groupings to the scores of those participating in the Bishop and Baird (2001) study.

In examining these areas a general aim was to provide further information on the CCC, especially its clinical validity and to examine scores of different clinical groups.



## Method

### Participants

Data from children from the Nuffield Foundation Study (Conti-Ramsden et al, 1997;, 2001) were used for this study as well as 5 additional children in the ASD group. Details of the main body of participants is described elsewhere but was a 50% sample of children attending UK language units when recruited at age 7 years. At this time 242 children were enrolled in the study. Follow-up data is used in this report when children were aged 11 years. At the 11 year stage, 200 children from the original cohort took part. However for the purpose of this report, only those with CCC data could be included: a total of 156 children. In addition to these 156, five children with ASD were recruited at 11 years of age to provide enough data to enable statistical analysis among groups. Of this entire cohort of 161 children, 32 (20%) were girls, twenty children (13%) had exposure to languages other than English at home and the average age of these children was 10:11 (sd = 5 months, range 10;1 to 12;6). Again, at the 11 year stage children were re-categorised in terms of current diagnostic status based on measures used in the Nuffield study (Conti-Ramsden et al, 2001). For this study a slightly modified version of group categorisation is used and each is described fully below and in Table 1 which gives short form performance IQ means (based on WISC III Block Design and Picture Completion), as well as expressive and receptive language scores.

[Table 1 about here]

Specific language impairment (SLI, n=82).

Children who still met criteria for SLI (i.e., PIQ above 70 and at least one language test score below -1sd) or who now showed no linguistic difficulties but had a strong history of SLI, and

who were not thought by teachers to have pragmatic difficulties. Mean age = 10;11 girls = 14 (17%).

Low performance IQ and language impairment (LiLowIQ, n=37).

Children whose performance IQ's now fell below 70. All of this group still had concurrent language impairments. Mean age = 10;11 ; girls = 16 (43%).

Autistic spectrum disorders (ASD, n=15).

Ten children from the original cohort plus the 5 additionally recruited children with ASD all now with ASD diagnoses and scoring 30 or more on the Childhood Autism Rating Scale (CARS; Schopler, Reichler, Devellis & Daly, 1980). Mean age = 11;0; girls = 0.

Pragmatic language impairment (PLI, n=27).

To avoid circularity in analysis, a measure other than the CCC was needed to identify a group thought to have primary difficulties in this area. An interview with the child's teachers / SLT at 7 and 8 years of age included an item about the child's particular communication difficulties. In this case the professional was asked to identify whether the child's main difficulties lay in the areas of articulation/phonology, morphology/syntax or semantic-pragmatic (as was the term then in use) difficulties. A positive score for primary semantic and pragmatic difficulties *in both consecutive years* has proved a useful indicator of risk in this area. Thus children in this group were those with a strong positive history of pragmatic difficulties as defined in this way (both with and without concurrent linguistic impairment). No children in this group met criteria for ASD or LiLowIQ groups. Mean age = 10; 11 ; girls = 2 (7%).

### A note regarding the normative group

Thresholds for normative scoring were taken from Bishop and Baird's (2001) study. The mean age of the comparison children was slightly younger than the current clinical groups (mean age=9.7) but they ranged from 6 to 16 years (sd 3.5yrs). According to Bishop and Baird, they were recruited as controls for other studies and had been screened to exclude any children with low verbal or non-verbal abilities, or with developmental disorders. As the raw data for this group were not directly available to the author, the normative thresholds reported in their paper were used, as with any other standardised task.

### Measures

The Children's Communication Checklist aims to tap into communication difficulties of children using 9 subscales of communication and behaviour:

- speech (output, intelligibility, fluency, e.g., people can understand virtually everything he or she says)
- syntax, (complexity of spoken grammar, e.g., speech is mostly two to three word phrases such as "me got ball" or "give dolly")
- inappropriate initiation\* (e.g., talks to anyone and everyone; talks too much)
- coherence\* (making sense in conversation, e.g., uses terms like "he" and "it" without making it clear what he or she is talking about)
- stereotyped conversation\* (using learned chunks or favourite topics of language, e.g., has favourite phrases, sentences or longer sequences which he or she will use a great deal, sometimes in inappropriate situations)
- context\* (use of context in understanding conversation, e.g., takes in just one or two words in a sentence and so often misinterprets what has been said)

- rapport\* (use of conversational cues, e.g., poor at using facial expressions or gestures to convey his or her feelings; may look blank when angry or smile when anxious)
- social (relationships, e.g., is popular with other children; may hurt or upset other children unintentionally)
- interests (restricted interests, e.g., has one or more overriding specific interests and will prefer doing activities involving this to anything else).

A composite "pragmatic impairment score" can be derived from the middle 5 scales marked\* above. Teachers or speech and language therapists complete the checklist about a child based on good knowledge of the individual of at least 3 months. Each scale consists of a number of behavioural items such as the examples given for each subscale above. Professionals were asked to say whether the item did not apply, applied somewhat or definitely applied. They were asked to complete the checklist independently of others who knew the child. Interrater reliability for the checklist has recently been shown to be 0.80 overall (range of scales = 0.62 to 0.83; Bishop, 1998) and clinical validity of this scale has shown to be good using a threshold of 132 or below to indicate pragmatic language impairment (Bishop, 1998).

## Results

### 1) Comparison of scores relative to normative data

According to the normative data set used in Bishop and Baird (2001), which showed a mean of 153.7 and sd of 6.5, a high proportion of the entire clinical cohort (groups pooled) scored below 1 sd – a score of 147 (104/156) and below 2sd – a score of 140 (64/156). See Fig. 1.

However, when the groups were considered separately, different patterns emerged. The mean score of children with SLI was 144.1 (sd=11.2) and for the LiLowIQ was 141.4 (sd=11.2) – both of these means falling between 1sd and 2sd below the normative mean, but well above the published CCC pragmatic threshold. However, as expected the PLI group had a mean score that fell below 2sd (135.7, sd=11.0) although this was not below 132. The ASD group mean was considerably lower than all other groups at 122.1 (sd=12.3).

[Fig. 1 about here]

### 2) Comparison of scores across clinical groups

Fig.2 highlights the differences in CCC score by group described above, even though the clinical definition of each group was independent of CCC rating ( $F(3)=17.7$ ,  $p<0.001$ ). Post hoc Sheff ■ tests revealed that those with SLI and LiLowIQ did not differ significantly ( $p=0.7$ ). The group with PLI were significantly different from the first of these groups ( $p=0.01$ ) but showed scores that were significantly more positive than the scores of those with ASD ( $p=0.004$ ). None of the three non-autistic groups had mean scores that fell below the 132 clinical threshold suggested for 8 year olds with SLI by Bishop (1998). In contrast,

the ASD group showed extremely low scores, which were significantly poorer than those in all other groups (SLI:  $p < 0.001$ , LiLowIQ:  $p < 0.001$  and PLI:  $p = 0.004$ ).

[Fig. 2 about here]

An accuracy analysis was carried out using the original 132 threshold (based on 8 year old children with communication difficulties, Bishop, 1998) and using a threshold of 140, which represented  $-2sd$  (from norm mean). Table 2 shows the percentage of each group who fell above and below both thresholds. Using the 132 threshold, a number of children with ASD and the majority of children with PLI are not identified as having pragmatic difficulties. Using the 140 cut-off, only one child of the 15 in the ASD group (7%), scored above this cut-off compared to 11/27 (40%) in the PLI group, 23/37 (62%) of the LiLowIQ group and the majority of the SLI group (58/84; 71%). These differences in distribution across groups for both thresholds were statistically significant ( $\chi^2(3) = 14$ ,  $p = 0.003$  and  $\chi^2(3) = 25.2$ ,  $p < 0.001$  respectively). When SLI + LiLowIQ and ASD + PLI were combined a Kappa statistic could be calculated to compare goodness of fit for those expected to have primary pragmatic difficulties. These were  $k = 0.28$ ,  $p = 0.001$  and  $k = 0.33$ ,  $p < 0.001$  respectively suggesting that 140 may be a more efficient cut-off for determining subgroups at 11 years of age.

[Table 2 about here]

### 3) Comparison of clinical groups with those used in Bishop and Baird (2001)

Table 3 shows the mean scores found per group in the Bishop and Baird study alongside the groups in the present investigation. As can be seen, the SLI group was higher in this study than the scores of the SLD group in the Bishop and Baird study, but fell within

1sd of this score. Similarly, the present ASD group mean was also between the Asperger's and Autism groups from the Bishop and Baird (2001) study, falling within 1sd of both these group scores. PLI group scores fell outside of 1sd of the ASD group but within 1sd of the Asperger and PDDNOS groups, and was remarkably similar to the SLD group used in the Bishop and Baird study. Thus, overall clinical groups showed similar degrees of pragmatic impairment across studies.

[Table 3 about here]

Relationship to IQ differed between the two studies. For the *entire sample* in this investigation, Pearson correlations between IQ and CCC scores were  $r(156)=0.14$  for VIQ and  $r(155)=0.01$  for PIQ (both non-significant). This was unlike the equivalent correlation values of 0.35 and 0.42 reported by Bishop and Baird. This lack of relationship to either type of IQ was also true for the SLI, Low IQ and PLI groups analysed separately. For ASD in the current study however, a significant negative correlation was seen with VIQ ( $r(15) = -0.68$ ).

## Discussion

The purpose of this study was to examine the differences between clinical subgroups on the CCC measure and to draw together two independent sources of information on this tool, which appears to be increasingly used in language units and practitioner research (see Nathan, 2002; Adams 2002). It aimed to examine scores in relation to normative data from Bishop and Baird (2001), to examine scores across clinical groups especially in relation to clinical thresholds, and finally to compare clinical scores with those diagnostic groups reported in the cited paper.

Firstly, two thirds of this clinical sample scored outside the normal range (1sd) reported from a typically developing group of children. Although this group covered a wide age range (6-16yrs), little is known about typical pragmatic development, with fairly young children showing highly proficient communicative behaviour. Overall this group had a lower mean of 9.8 years – which should lend itself to conservative results (i.e., actual differences between atypical and typical development might have been missed). Nevertheless, the difference in scores is not surprising and adds weight to the use of the CCC as a clinical tool to identify communication impairments. When examined by group, the SLI and LowIQ group means were not as far from the normal range as the PLI and ASD group means, which were both below 2sd. It is particularly interesting, that in this sample, the children with SLI were not significantly different in their pragmatic use of language compared to a group with low IQ scores, despite markedly different vocabulary scores. The fact that lower overall ability did not directly lead to low CCC scores may lend support to suggestions that SLI discrepancy criteria (low language scores and normal IQ scores) may not be as useful as once thought (e.g., Tomblin et al 1997; Fey et al, 1994) since these two groups of children appear to have similar functional communicational ability and perhaps, therefore, similar clinical



needs. In addition, both these groups were relatively proficient in their pragmatic language skills compared to reported norm information and showed mean scores substantially above those in Bishop and Baird's SLD group. This latter point may reflect a more uniformly selected participant sample or may reflect reliability of the tool and those completing it.

Secondly, there was a significant trend for pragmatic skill to be worst in those with ASD, followed by those with PLI, LilowIQ and finally those with SLI. Although not all groups were significantly different from all other groups, this study has yielded evidence supporting Bishop and Baird's finding that the CCC pragmatic scale can discriminate between groups with differing communication impairments. As expected, the children with ASD in this study were indeed the lowest scorers overall. Importantly, they were significantly lower scorers than peers with PLI despite very similar referral pathways (through SLT services for the majority). This lends further support to the argument that some children with PLI are clinically different from peers with autism. It must be noted, however, that the PIQ scores of these groups differed significantly with the PLI group scoring significantly better than the ASD sample. The data from this study does not therefore rule out the possibility that children with PLI and ASD differ only on their level of functioning.

Some authors have described pragmatic language deficits as being a primary association of impaired speech, language or of lower cognitive abilities (for an overview see Bishop, 2000). However, if this were true for the present group, the two LI groups might have been expected to have much lower CCC pragmatic scores. This data shows at least that low linguistic and cognitive ability does not necessarily lead to poor CCC scores. A recent study by Nathan (2002) also supports this interpretation in part, showing children with speech difficulties scored well within the normal CCC range (mean = 149.9) indicating that speech impairment alone is not sufficient to cause pragmatic difficulties. Furthermore, social skills and the ability to make friends or avoid being bullied are also sometimes thought to be related

directly to level of linguistic skill, but studies reporting these social/friendship difficulties within SLI (e.g., Redmond and Rice, 1998; Botting & Conti-Ramsden, 2000) or linking pragmatic and linguistic skills (e.g., Craig and Evans, 1993) do not clearly point to linguistic ability as the central factor. Conti-Ramsden & Botting's (in press) recent follow up of social-behavioural outcomes in language unit attendees shows a clearer link between CCC score and social /behavioural factors at 11 years, rather than with language scores directly. It discusses the possibility that many children with SLI have *concurrent* difficulties with language and social skills – an issue which has previously been under-recognized.

Theoretically it is interesting that the LilowIQ group scored substantially higher in pragmatic language than the ASD group, despite the fact that the former were significantly poorer cognitively than those with ASD and were no different to the ASD group on formal language measures. Thus, these findings suggest that pragmatic language impairments are more than the sum of cognitive and linguistic difficulties. Instead, they imply that other skills are also necessary, and these might plausibly include a well-developed theory of mind or intact social schemas.

An accuracy analysis based on individual categorisation using the original 132 threshold and a cut-off of 140 (which was the  $-2sd$  threshold for the normally developing group in Bishop and Baird, 2001) showed potentially improved discrimination results for the latter when applied to 11 year olds. A higher threshold than the 132 published for 8 year olds (Bishop, 1998) may be clinically useful with older children, since by this age individuals are expected to have a highly competent pragmatic style. However, results did not reveal perfect subgrouping within communication disorders even using this higher threshold and this again supports previous acknowledgements that this measure needs to be used in combination with other tools. Furthermore, Bishop and Baird's control group had a much wider age range than the children reported here, with a younger mean age (9.75). Although this should produce

highly conservative results (i.e., an even higher threshold might be more appropriate), normative data for other age-groups is needed.

The final aim, to examine group results in relation to those reported in Bishop and Baird, suggested that the present SLI group was less impaired pragmatically than the corresponding SLD group. It also revealed similarities between the PLI group reported here and both the Asperger and PDDNOS groups in the Bishop and Baird (2001) paper, although the children with PLI were more pragmatically skilled. This middle position occupied by PLI may be due to the existence of two groups of PLI reported elsewhere (Bishop, 1998; Botting and Conti-Ramsden, 2003), whereby one group (PLI plus) more closely resemble peers with Asperger syndrome than those with PLI pure. In contrast to these similarities, there were clear differences between this PLI group and the autism group in Bishop and Baird.

#### Concluding remarks

This article adds weight to the use of the CCC pragmatic scale scores and its usefulness in a clinical setting. It shows that the majority of children with communication impairments at 11 yrs score below norms from a younger peer group without communication impairments. The CCC also seems able to identify group differences, although these are not thought to be reliable enough to use alone at an individual case level, and should be used clinically as a descriptive tool in conjunction with other measures. In agreement with other recent studies, children with PLI scored significantly better than those with ASD despite similar clinical histories and referral pathways. A higher threshold for older children, such as 140 might also be more accurate, but this needs further investigation and more normative data from differing ages. Finally, this study largely confirms the findings of Bishop and Baird (2001) regarding subgroup performance, albeit using slightly different clinical groupings. The use of the CCC in research and clinical practice may with further standardisation enable

more accurate theoretical and clinical understanding of children with a wide range of different communication impairments.

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Table 1: Descriptive characteristics of different groups – means (sd)

	PIQ+	BPVS	EVT	TROG
SLI	95 (17.5)a,	85.8 (11.9)d	75.8 (15.6)f	33.3 (30.6)
LilowIQ	58 (7.3)a,b,	77.6 (10.2)d,e	64.3 (11.9)f,g	18.2 (26.9)
PLI	99.9 (20.0)b,c	88.0 (15.5)e	77.3 (15.7)g	32.9 (31.9)
ASD	76.7 (17.6)a,c	80.3 (10.1)	64.4 (18.9)	28.4 (31.3)

PIQ – WISC III short form performance IQ (Wechsler, 1993) – standard score /IQ points

BPVS – British Picture Vocabulary Scale II (Dunn et al, 1998) centile score for age

EVT – Expressive Vocabulary Scale (Williams, 1997) centile score for age

TROG – Test for Reception of Grammar (Bishop, 1982) mid-point of centile score range for age

NB: matching letters represent groups with significantly different scores ( $p < 0.05$ ), for example the two group scores marked 'a' (from LiLowIQ and ASD) were significantly different on that measure (PIQ).

Table 2: Percentage of each group falling above and below each CCC threshold

	SLI	LilowIQ	PLI	ASD
132 threshold	85% above 15% on or below	78% above 22% on or below	63% above 37% on or below	40% above 60% on or below
140 threshold	71% above 29% on or below	62% above 38% on or below	40% above 60% on or below	7% above 93% on or below

NB: A score on or below suggests clinically significant pragmatic impairment

Table 3: Comparison of mean (sd) CCC scores between present study and that of Bishop & Baird (2001)

Present study	Bishop and Baird (2001)
SLI - 144.1 (11.2)	133.1(14.0) - SLD
LilowIQ – 141.4 (11.2)	
PLI - 135.7 (11.0)	125.8 (13.0) - PDDNOS
ASD - 122.1 (12.3).	125.1 (13.0) - Asperger
	114.7 (7.4) - Autism

Fig.1: Proportion of sample scoring in different categories compared to normative data

Fig.2: Mean (95% Confidence Interval) CCC score by clinical subgroup



