Children with cerebral palsy, spina bifida and pragmatic language impairment: Differences and similarities in pragmatic ability

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ARTICLE INFO

ABSTRACT

Pragmatically related abilities were studied in three clinical groups of children from 5 to 11 years of age; children with cerebral palsy (CP; $n = 10$), children with spina bifida and hydrocephalus (SBH; $n = 10$) and children with pragmatic language impairment (PLI; $n = 10$), in order to explore pragmatic abilities within each group. A range of pragmatic, linguistic and cognitive assessments were performed, and comparisons between the groups were made. In addition, connections between variables were studied. The most salient result was the many similarities and the lack of clear boundaries between the groups. The only significant differences found concerned short-term memory and inference ability, where all three groups experienced problems but to varying extent. Different patterns of variance were found in the groups, indicating that different underlying abilities such as reception of grammar, inferential comprehension and lexical comprehension seem to affect pragmatic ability in somewhat different ways. The results suggest that the children with CP and SBH in this study shared a number of pragmatically related traits, being more similar than would be expected according to earlier research. Finally, it is suggested that pragmatic assessment is further subdivided into a socially versus a linguistically related assessment.

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1. Introduction

Pragmatic impairment is a complex and elusive concept that encompasses several scientific areas. It is a concept hard to pin down, without clear defining features and sufficiently constrained inclusion criteria (Leinonen, Letts, & Smith, 2000). Although the existence of instruments as, e.g. The Children's Communication Checklist (CCC; Bishop, 1998) could be helpful, according to Letts and Leinonen (2001) clear criteria for diagnosing pragmatic impairment are not available. The process still involves a heavy dependence on clinical judgement and good knowledge of the specific child (Conti-Ramsden, Crutchley, & Botting, 1997). The assessment of pragmatic ability is further complicated by the variability in performance of children with pragmatic problems, due to context dependency. Children with pragmatic impairment normally find it easier to perform in a structured situation guided by an adult, e.g. a formal assessment situation, than in an unstructured situation such as a spontaneous conversation (Bishop, 1998). In addition, there is a general lack of norms in different subskills (Adams & Lloyd, 2005; Letts & Leinonen, 2001), making pragmatic impairment difficult to establish unambiguously. One contributing factor to the lack of norms is the context dependency and the fact that pragmatic ability changes over time.

Two of the most common early-onset physical impairments in children are cerebral palsy (CP) and spina bifida (SB). Both conditions are reported to be associated with problems related to communication, however with different manifestations. Although there is an extensive body of research on issues related to speech and language in both conditions, descriptions of pragmatic ability are more scarce (Bara, Bosco, & Bucciarelli, 1999), especially when it comes to cerebral palsy. In this condition, the communication problems often occur as motor speech and interactional problems, whereas in the case of spina bifida (in this study spina bifida with hydrocephalus) speech and language often appear to be well functioning on the surface.

Although language related abilities often have been considered to be a strength in children with SB and hydrocephalus (SBH), SBH was one of the first conditions associated with pragmatic problems, at the time labelled as "cocktail party syndrome" (Hadenius, Hagberg, Hyttnes-Bensch, & Sjögren, 1962; Rapin & Allen, 1983; Tew, 1979). More recently, e.g. Fletcher, Barnes, and Dennis (2002) stated that most children with SBH experience difficulties in the construction of meaning and pragmatic comprehension. SBH leads to a range of cognitive and motor difficulties, including language. Examples of such problems in the SB-group are learning difficulties, deficits in memory, comprehension of ongoing discourse and content-impoverished language (Dennis & Barnes, 1993; Fletcher et al., 2002); dysfluency (Huber-Okrainec, Dennis, Brettschneider, & Spiegler, 2002); difficulties in making inferences as well as retrieving literal information from a text and problems with reading comprehension (Barnes & Dennis, 1998; Dennis & Barnes, 1993). Phonological and grammatical language abilities as well as lexicon are considered to be largely unaffected (Fletcher et al., 2002). Barnes and Dennis (1998) suggest that difficulty in using context to understand meaning underlie many of the discourse deficits associated with SBH.

Problems in relation to communication in children with CP are in some respects different from those of children with SBH. The CP-group is very heterogeneous, and comprises a wide range of communication disorders such as anarthria/dysarthria, apraxia/dyspraxia and language impairment. Contrary to children with SBH, pragmatic problems are not frequently reported among children with CP, with some exceptions (Dallas, Stevenson, & McGurk, 1993; Pennington, 1999; Pennington, Goldbart, & Marshall, 2004; Pennington & McConachie, 2001). However, in clinical practise it has been observed that in the CP-group, children who are able to speak as well as children using alternative and augmentative communication (AAC) relatively frequently have pragmatically related problems. The problems are often referred to as problems in conversation, and have not been as extensively explored as in the group of SBH. Possible pragmatic problems in children with CP may to some extent be masked by their conversational passivity, as these children often are described as taciturn, primarily taking a passive and respondent role in conversation (Dahlgren Sandberg & Liliedahl, 2008; Dallas et al., 1993; Hjelmquist & Dahlgren Sandberg, 1996; Pennington & McConachie, 1999), producing many yes/no answers and seldom asking questions (Pennington, 1999; Pennington & McConachie, 1999). This may result in problems with developing functional communication and narrative ability (Pennington, 1999; Pennington et al., 2004; Pennington & McConachie, 2001). Moreover, children with CP often experience

problems with phonology and grammar as well as with motor speech abilities (Pennington, Goldbart, & Marshall, 2005; Pennington et al., 2004; Pirila et al., 2007). Obviously, the motor speech ability has a great impact on the development of different aspects of communication. According to Pennington (1999), little is known about the communication development of children with CP with intelligible speech, making a prediction of future pragmatic ability difficult.

A common feature between children with CP and children with SBH is a considerable variation in their individual strengths and weaknesses concerning motor and language abilities, cognition, visual perception, and academic achievements, leading to very heterogeneous groups (Fletcher et al., 2002; Nagle & Campbell, 1998). In conclusion the communication difficulties in the two groups reported in the literature have different emphasis, in the CP-group on motor speech ability, phonology and grammar, and in the SBH-group on more pragmatically related abilities.

A third clinical group of interest, in relation to the previously mentioned groups, is children with pragmatic language impairment (PLI, previously known as semantic pragmatic disorder; Bishop, 1998, 2000). In contrast to the other two groups, children with PLI do not have established brain damage with a physical impairment as a consequence. On the other hand, they have pragmatic problems as a main characteristic. The term PLI was coined by Bishop (1997, 2000), who suggested that pragmatic difficulties can be found both in children who use fluent and complex language and in children who have problems with phonology and grammar. PLI is sometimes considered to be a subgroup to the heterogeneous SLI-group (Adams & Lloyd, 2005; McTear & Conti-Ramsden, 1992), where the children in the PLI-group are considered to have difficulties in understanding language in context. Leinonen et al. (2000) argue that it is more probable that SLI and pragmatic impairment coexist as a "multiple language handicap", and that pragmatic impairment not possibly could be a subgroup of SLI since pragmatic impairment is intrinsically linked to cognitive functioning. Children with PLI have been described to demonstrate symptoms such as impaired comprehension of discourse, notably questions; verbosity and poor maintenance of topic manifested as topic shifts and drifts (Bishop, 1997; Rapin, 1996; Rapin & Allen, 1983); to provide too little or too much information (Leinonen et al., 2000); to have fluent expressive language that is not distinctly communicative and/or appropriate (Bishop, 1997; Rapin & Allen, 1983); to produce a large quantity of initiatives (Bishop & Adams, 1989) and to have difficulty in the ability to make inferences (Letts & Leinonen, 2001; Norbury & Bishop, 2002). Thus, PLI shares a number of pragmatic and language problems associated particularly with SBH, but also to some extent with CP. A common characteristic for the three groups is problems with peer relationships (Bishop, 1997, 2000; Dallas, 1993; Thomas & Warschausky, 2006), probably partly as a consequence of the children's communication disabilities.

As would be apparent from the different pragmatic symptoms mentioned above, associated with CP, SBH and PLI, respectively, children with different subsets of behaviours and different underlying causes may all be diagnosed as pragmatically impaired (Leinonen & Letts, 1997; Perkins, 2007). Similar surface behaviours can reflect various underlying causes, and different clinical populations may exhibit rather similar communicative behaviours (McTear & Conti-Ramsden, 1992). Although there is a shortage of knowledge about how different disorders overlap and differ (Adams, 2001), clinical experience has shown that it is not unusual for children with CP as well as children with SBH to have pragmatic problems, manifested, e.g. as poor comprehension skills and poor narrative skills. As a consequence, it would be of interest to further explore similarities and differences in linguistic and cognitive abilities associated with pragmatic ability between these two groups and a group of children with primary pragmatic problems, PLI. This approach makes it possible to depart from the diagnostic criteria and to use the same research method in all three groups. For the purpose of this study we define pragmatics as "a general cognitive, social and cultural perspective on linguistic phenomena in relation to their usage in forms of behaviour" (Grundy, 2000). We have chosen to assess pragmatic ability by focusing on pragmatically related abilities, language abilities and cognitive abilities. The pragmatically related abilities investigated are literal comprehension, inferential comprehension and narration, the language abilities are reception of grammar and lexicon, and finally the cognitive abilities are intellectual ability and memory.

The aim of this study was twofold. The first goal was to compare three clinical groups; two subsets of children with early-onset brain damage, children with CP and SBH, and a third group of children without established brain damage but with primary pragmatic problems, in order to explore the

pragmatic abilities within the groups. As described above, these three groups have previously been reported to have pragmatic problems, although in different respects and to different degrees. A group of typically developing (TD) children participated in the study as a comparison group. The second goal was to explore the pattern of possible different associations in the three clinical groups among variables of importance for pragmatic ability.

2. Method

2.1. Participants

A total of 40 children ranging from 5.2 to 10.9 years of age participated in this study: 10 children with cerebral palsy (7 boys, 3 girls), 10 children with spina bifida and hydrocephalus (6 boys, 4 girls), 10 children with primary pragmatic problems and language impairment (6 boys, 4 girls) and 10 typically developing children (7 boys, 3 girls). The group of TD children was matched for age and gender with the other three groups (Table 1). There were no significant chronological age differences between the four groups χ^2 (3, $n = 40$) = 3.42, $p = .331$. The PLI-group had higher mental age (MA) ($M = 9.4$) than the SBH-group ($M = 6.9$) ($z = -2.52$, $p = .012$).

The criterion for inclusion for the children with CP was a diagnosis of spastic diplegia. Six of the children performed on Level II, one on Level III and two on Level IV on the GMFCS (Palisano et al., 1997). Two of the children had additional language impairment, mainly affecting phonological ability but also grammar to a less degree. The criterion for inclusion for the children with SB was hydrocephalus. Two of the children in this group had additional language impairment, also mainly affecting phonological ability and grammar to a less degree. Criteria for the children with PLI were pragmatic problems as defined by the CCC, in combination with an informal assessment by a teacher and/or a speech-language therapist. Criteria for inclusion for all children were intelligible speech (one child in the CP-group had moderate dysarthria) and IQ > 70. The TD children had IQs within the normal range and no history of developmental delay. The children with CP and SBH were recruited from a wide geographical area, and the children with PLI were recruited from preschools and schools with special language units for children with language impairment in two regions in Southern Sweden. The study had ethical approval from the Ethics Committee of the Medical Faculty of Lund University. Written and informed oral consent was obtained from all parents.

2.2. Materials

2.2.1. Assessments of pragmatically related abilities

Inferential and literal comprehension was assessed using a material from Bishop and Adams (1992; translated to Swedish by the two first authors). The children were asked to listen to two short stories, and were subsequently asked 14 questions after each story (in total 28 questions). 14 questions concerned the literal contents, and 14 questions required inferential processing.

Story recall. For this purpose the Bus Story Test (BST) was used (Renfrew, 1997). The child is told the story whilst looking at each picture, and is subsequently asked to retell the story using the pictures as prompts. The narrative is recorded, transcribed orthographically and analysed for amount of original information included, number of subordinate clauses and mean sentence length of the longest five sentences. In this study only the results for information is reported.

Table 1
Distribution of chronological age (CA) and mental age (MA) across the groups.

	M		SD		Range	
	CA	MA	CA	MA	CA	MA
CP	7.11	7.4	1.58	1.73	6.0–10.6	4.6–9.6
SB	7.2	6.9	1.97	1.71	5.2–10.9	4.0–9.6
PLI	8.2	9.4	1.91	2.14	5.3–10.2	6:0–11.6
TD	7.2	8.0	1.44	1.71	5.4–9.1	4.6–10.0

Children's Communication Checklist (CCC; Bishop, 1998). The CCC is a 79-item checklist assessing children's communication behaviour across 11 subscales, 5 of them constituting the pragmatic composite, i.e. the part of the CCC where the pragmatic ability is estimated. Parents and teachers were asked to complete CCCs separately. The Swedish CCC (Nettelbladt, Radeborg, & Sahlén, 2003) has Swedish norms, resulting in a Swedish cut-off at 140 (compared to the original at 132).

2.2.2. Assessments of language ability

Language comprehension. The Test for Reception of Grammar (TROG; Bishop, 1982) and the Peabody Picture Vocabulary Test - revised (PPVT; Dunn & Dunn, 1997) were used.

Language production. Two Swedish tests were used; a phonology test (Hellquist, 1991) and a test of grammar; Gramba (Hansson & Nettelbladt, 2004). On basis of the phonology test, the children were scored as having 0 = normal phonology, 1 = minor phonological problems, and 2 = major phonological problems.

2.2.3. Assessments of cognitive ability

Intellectual ability. To establish the children's mental age Raven's progressive matrices, coloured version was used (Raven, Court, & Raven, 1986). This is a non-verbal test, frequently used in studies of children with speech- and language impairment.

Memory. The Digit Span subtest of the WISC was used as a measure of verbal short-term memory and working memory (Wechsler, 1999). The children were asked to repeat single digit numbers read out loud, forwards and backwards.

2.3. Procedure

The first author collected the data for the children with CP and SBH. The data for the children with PLI were collected by the children's speech-language therapists (in all two). The data for the TD children were collected by one of the speech-language therapists and the first author. The tests were administered to the participants individually, in the children's preschools, schools or homes.

2.4. Statistical analysis

The SPSS (version 16.0) was used. An ANCOVA with mental age as covariate was performed to assess group differences, since the groups differed significantly on that variable. To explore specific group differences a Bonferroni test was performed. The association between variables was evaluated with a partial correlation, controlling for mental age. The level of significance was set at 0.05.

3. Results

3.1. Comparisons between groups

The most apparent result was the many similarities between the three clinical groups. As could be expected for the *pragmatic variables* the significant differences were found in the PLI-group, performing worse than the TD children on both inferential comprehension, $M = 16.1$ and 21.6, respectively ($p = .012$), literal comprehension, $M = 17.5$ and 22.3, respectively ($p = .016$) and the CCC, $M = 133.2$ and 156.7, respectively ($p = .000$). The PLI-group also performed worse than the CP-group on inferential comprehension, $M = 16.1$ and $M = 22.7$, respectively ($p = .001$) and on the CCC, $M = 133.2$ and 148.6, respectively ($p = .000$). In addition, on the CCC the PLI-group performed worse than the SB-group, $M = 133.2$, respectively 145.9 ($p = .000$). On the CCC there was one additional difference between one of the clinical groups: SB and the TD children, $M = 145.9$ and 156.7, respectively ($p = .024$).

Linguistic variables. On grammatical production the PLI-group ($M = 34.2$) performed significantly worse than the CP-group ($M = 37.7$) ($p = .012$) and the typically developing children ($M = 41.7$) ($p = .001$). In addition, the SBH-group performed worse than the TD-group, $M = 30.9$, respectively $M = 41.7$ ($p = .017$). There was a main effect of group on lexical comprehension ($p = .036$). The Bonferroni test did not reveal any specific group differences, but the mean result in the group of

Table 2
Means of the results for the different groups.

	CP		SB		PLI		TD	
	M	SD	M	SD	M	SD	M	SD
CCC (max 162)	148.6	4.4	145.9	7.6	133.2	7.1	156.7	5.8
Grammar recall (max 80)	67.8	7.2	67.0	9.0	69.2	5.5	71.6	7.5
Lexical comprehension (max 192)	94.9	17.2	100.3	31.6	111.2	31.8	131.3	36.8
Literal comprehension (max 28)	17.9	4.1	15.1	7.7	17.5	5.2	22.3	3.4
Inferential comprehension (max 28)	22.7	3.8	16.3	8.4	16.1	7.5	21.6	2.8
Grammatical production (max 44)	37.7	4.2	30.9	12.5	34.2	8.2	41.7	2.4
Phonological production (max 0)	.40	.70	.30	.68	.60	.84	.10	.32
Story recall (max 54)	20.8	13.1	13.3	10.5	26.7	5.4	27.4	7.7
Short-term memory	5.1	1.7	3.0	2.4	2.6	1.4	4.4	1.6
Working memory	2.4	2.6	1.6	2.2	2.5	2.0	2.4	1.1

typically developing children was 131.3, compared to 94.9 in the CP-group, 100.3 in the SB-group and 111.2 in the PLI-group. There were no statistically significant differences on the reception of grammar and on the measure of phonology.

Cognitive variable. The PLI-group ($M = 2.6$) performed significantly worse on the short-term memory task than the CP-group ($M = 5.1$) ($p = .000$) and the typically developing children ($M = 4.4$) ($p = .011$). In Table 2 the means of the results for the four groups are shown.

3.2. Relationship between tasks

Partial correlations were performed, one for each of the three clinical groups, with mental age as the covariate since the groups differed statistically significantly on mental age. Tables 3a–3c show the

Table 3a
Partial correlations on variables relevant for pragmatic ability (with mental age as a covariate) in the CP group.

	Inferential compr.	Literal compr.	Story recall	CCC	Reception of gramm.	Lexical comprehension
Inferential comprehension	–	.893[***]	.746[*]	.693[*]	.681[*]	.630
Literal comprehension		–	.853[***]	.853[***]	.512	.795[*]
Story recall			–	.611	.412	.700[*]
CCC				–	.159	.646
Reception of grammar					–	.423
Lexical comprehension						–

$n = 10$.
[*] $p = < 0.05$ two-tailed.
[***] $p = < 0.005$ two-tailed.

Table 3b
Partial correlations on variables relevant for pragmatic ability (with mental age as a covariate) in the MMC group.

	Inferential compr.	Literal compr.	Story recall	CCC	Reception of gramm.	Lexical compr.
Inferential comprehension	–	.797[**]	.626	.266	.844[***]	.647
Literal comprehension		–	.643	−.002	.494	.430
Story recall			–	.618	.564	.337
CCC				–	.558	.286
Reception of grammar					–	.778[*]
Lexical comprehension						–

$n = 10$.
[*] $p = < 0.05$ two-tailed.
[**] $p = < 0.01$ two-tailed.
[***] $p = < 0.005$ two-tailed.

Table 3c
Partial correlations on variables relevant for pragmatic ability (with mental age as a covariate) in the PLI group.

	Inferential compr.	Literal compr.	Story recall	CCC	Reception of gramm.	Lexical compr.
Inferential comprehension	–	.526	−.202	−.493	.489	.676[*]
Literal comprehension		–	.431	.284	.654	.827[**]
Story recall			–	.364	.002	.334
CCC				–	.435	.149
Reception of grammar					–	.651
Lexical comprehension						–

$n = 10$.
[*] $p = \; < 0.05$ two-tailed.
[**] $p = \; < 0.01$ two-tailed.

relationships between the variables relevant for pragmatic ability. No correlations appeared concerning STM and WM.

4. Discussion

In this study, pragmatic abilities in three groups of children, children with CP, children with SBH and children with PLI, were explored and compared. In addition, possible associations between pragmatic, linguistic and cognitive abilities were investigated. The most salient and interesting results were the lack of differences, and particularly the similarity between two of the clinical groups, the children with CP and the children with SBH. On the whole, there were no clear boundaries between the three clinical groups. Some of the differences shown in previous studies were not reproduced in the present study, e.g. did the group with SBH not present pragmatic problems according to the CCC.

A common feature for the three groups, though, was an appearance of pragmatically related problems such as, e.g. problems with story recall, inferencing and comprehension, although manifested in different ways and to different extent. As could be expected the CP group was presented with the least pragmatically related problems. According to prior research, some pragmatic problems would be anticipated in the SBH-group, and, obviously, in the PLI-group, but were more unexpected in the CP-group. On the other hand, the pragmatic problems appearing in the CP-group were not unpredicted related to clinical experience.

Some of the assessments carried out do not have Swedish norms, which was one of the reasons to include a group of typically developing children for comparison. When the results were compared to the Swedish TROG norms, the CP-group performed slightly under the 30th centile. The SBH-group and the PLI-group performed just under the 40th centile. When the results were compared to the Swedish BST norms, the CP-group and the SBH-group performed almost two SD below the norms, whereas the PLI-group and the TD-group performed 0.75 SD below the norms. These values further support the indications that the three clinical groups had problems with language comprehension and story retell, thus supporting previous research by, e.g. Barnes and Dennis (1998), Pennington et al. (2004) and Bishop (1997).

In this study the CCC was used as the primary tool to determine whether a child could be considered to have pragmatic problems or not. It can be argued that the CCC is only one, although possibly the most comprehensive, way of measuring pragmatic ability. The results of the CCC proved to correlate with only a few of the other variables commonly associated with pragmatic ability, namely inferential and literal comprehension. This was the case in the CP-group. In the other groups the CCC did not correlate with any other variable. The results in this study point to the possibility that the CCC is more sensitive to socially related pragmatic abilities. Our suggestion is that it may be meaningful to make a division of pragmatically related problems into more socially versus more linguistically associated problems, where the CCC could be argued to mainly capture the former, whereas the latter to include narrative and inferential ability. The story recall task, on the other hand, correlated significantly with a majority of the other tasks. However, this correlation disappeared when mental age was taken into account, indicating that the connection at least in part was caused by

cognitive factors. It can be argued that the Bus Story Test, used for story recall, is a rather blunt instrument. Several different abilities, as e.g. language comprehension, memory, attention and sequencing may interact with this task.

Primary pragmatic problems were an inclusion criterion for the children with PLI. On group level the other two clinical groups did not show pragmatic problems as measured by the CCC. However, on an individual level four children in the SBH-group presented pragmatic problems. Three out of these four children showed problems particularly in the subscale *Inappropriate initiation* (problems in taking adequate conversational initiatives and being able to maintain a conversation), and all four children experienced problems in the subscale *Stereotyped conversation* (problems to conduct a conversation according to implicit rules). These symptoms are in accordance with traits commonly associated with SBH such as verbosity. Two of the children in the CP-group presented pragmatic problems as well, but these were spread across all the different subscales, no pattern to be discerned. As previously mentioned, the three clinical groups had difficulties with pragmatically related abilities such as language comprehension, story recall and short-term memory, achieving under their age level according to the norms of the tests used. The PLI-group had problems with inferential comprehension compared to the TD-group.

The present results showed that pragmatically related problems such as story recall, inference ability and memory were more pronounced, whereas phonology and grammar did not constitute a major problem for the majority of the children in this sample. The children with CP performed significantly better than the PLI-group on the short-term memory task and the inference task. The PLI-group performed significantly better than the SBH-group on the narration task. However, the latter could be explained by mental age differences since the significance disappeared when MA was controlled for. Thus, the significant differences in this sample involved the PLI-group, and were in the domains of inference and short-term memory, abilities associated with pragmatic ability. The lack of significant differences between the results of the children with CP and the children with SBH suggests that the two groups were more similar than expected.

Although there was a shortage of significant differences between the groups, the analysis of relationships between tasks revealed some interesting differences in the patterns of correlations. A pattern indicating that the ability to make inferences relies on different underlying causes can be discerned. In the CP-group and the group with SBH inferencing correlates with receptive grammar and literal comprehension, thus constituting a language comprehension related underlying factor. In the PLI-group, on the other hand, inferential ability correlates with lexical comprehension, indicating that lexical ability is essential for making inferences in this group. It has been suggested that children with PLI have word-finding problems (Botting & Conti-Ramsden, 1999). Some additional connections occurred in the CP-group; inferential and literal comprehension correlated with story recall and the results of the CCC. The CP-group was the only group where story recall and the CCC correlated with any other pragmatically related ability when mental age was controlled for. Thus, different underlying abilities such as reception of grammar, inferential comprehension and lexical comprehension seem to affect pragmatic ability in various ways.

There are some methodological concerns with this study. The recruitment of the children and their families was time consuming and ineffective as we could not approach them directly. As a consequence the number of children in each group is relatively small. As the mean chronological age of the children with CP and PLI was somewhat higher than for the other groups, as was the mean mental age of the PLI-group in particular, the groups are more heterogeneous than would have been wished for. However, the difference in mental age was controlled for in the statistic calculations.

5. Conclusion

One interpretation of the results is that children with CP and children with SBH share a number of pragmatically related traits. With this in mind, and taking the common diagnostic descriptions associated with the respective disorders into account, children with CP could risk to be under-diagnosed concerning problems related to pragmatics such as story recall and short-term memory, and children with SBH could risk being under-diagnosed concerning language abilities such as language comprehension. Further, pragmatically related problems in the CP-group may be masked if

the children are taciturn and passive, thus not showing possible problems with, e.g. narration, a crucial ability in carrying out everyday activities such as relating one's own personal experiences (Humphries, Oram Cardy, Worling, & Peets, 2004). When the correlation patterns were explored different patterns emerged in the groups, thus indicating partly different underlying skills to the occurring pragmatic problems. Mental age proved to be crucial, since several significant differences and correlations disappeared when mental age was controlled for. The present results indicate the importance for children with early-onset physical impairments to undergo an assessment procedure unprejudiced by diagnosis, especially concerning pragmatic ability.

The lack of norms earlier mentioned may be compensated for by an extensive evaluation in the assessment of pragmatic ability, encompassing pragmatic, linguistic and cognitive abilities. A suggestion is that pragmatic assessment is further subdivided into a socially versus a linguistically related assessment. The child's performance should also be evaluated in different contexts and preferably over time. From a clinical perspective an exhaustive assessment of pragmatic ability is time consuming, but does on the other hand constitute a foundation for intervention.

Acknowledgements

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