**Narrative ability in children with cerebral palsy**

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## 1. Introduction

The ability to understand and produce narratives is an example of higher-level language and cognitive skills, as e.g. understanding cause-effect relationships and being able to sequence and structure events in a way that satisfies the listener's needs (Paul, Hernandez, Taylor & Johnson, 1996). Furthermore, narration is a crucial ability in carrying out everyday activities such as relating one's own personal experiences (Humphries, Oram Cardy, Worling & Peets, 2004), and is a part of a child´s daily life at home and in school. Narratives represent not only an important communicative tool but are also essential for making sense of experiences and relationships (Losh & Capps, 2003). Children are required to produce several types of narratives, including fictional and personal narratives, summaries of assigned readings (Manhardt & Rescorla, 2002), scripts of routine activities and accounts of what usually happens (Hudson & Shapiro, 1991). Narrative skills have also been found to play an important role in academic achievement and social success (Boudreau, 2008), to be a valid predictor of longer-term language skill and to be associated with literacy ability (Botting, 2002) in children with language impairment. According to Botting (2002), narrative ability is one of the most interesting and contextually valid ways in which to measure communicative

competence both in typical and clinical populations of children, and provides an excellent quasi-naturalistic measure of children's spontaneous language. Several investigators have suggested that narrative ability may be a better indicator of linguistic ability compared to traditional tests, not least due to the failure of the latter types to catch communicative aspects (e.g. Dennis, Jacennick & Barnes, 1994). Bliss, McCabe and Miranda (1998) state that because of its importance, narrative discourse should be a major component of assessment and intervention programs for school-aged children with language impairments. Norbury and Bishop (2003) argue that narrative is a good way of assessing linguistic, pragmatic and cognitive abilities in older children with communication impairments, and Miniscalco, Hagberg, Kadesjö, Westerlund and Gillberg (2007) conclude that narratives is an excellent tool for assessing more subtle language skills such as e.g. pragmatic competence, as well as for predicting future language skills. However, the lack of more comprehensive normative data is problematic.

The understanding of narratives is achieved by decoding the literal meaning of what is heard and to comprehend and sometimes infer what is not directly stated, using contextual information and general knowledge (Dodwell & Bavin, 2008). Production of a good narrative involves complex linguistic, cognitive, and social abilities (Norbury & Bishop, 2003; Reilly, Losh, Bellugi & Wulfeck, 2004), drawing on many kinds of knowledge such as e.g. general knowledge about events, people and social interactions, memories of specific episodes and knowledge about different narrative genres. One of the challenges a narrator faces is how to coordinate this knowledge into producing a narrative (Hudson & Shapiro, 1991). Linguistically, children must encode information about the characters and events of the story lexically to be able to relate the sequence of events and their temporal relations. Cognitively, children must infer the motivation for central characters´ actions, the logical relations between events and the theme of the story. However, in a cross-population study by Reilly et al. (2004)

where children with specific language impairment (SLI), early focal brain injury and Williams syndrome participated, data suggested that skills necessary to produce a good narrative, e.g., extracting and maintaining the theme of the story, were not significantly affected by cognitive impairments. Memory is often mentioned as a cognitive factor possibly critical for the information component in narrative ability. Dodwell and Bavin (2008) found a number of associations between memory and narrative measures, indicating that children who performed well on memory tasks also performed well on narrative tasks. Their main conclusion was that maintaining information in working memory and processing the information was problematic for children with language impairment.

According to Norbury and Bishop (2003), narration also constitutes a means to investigate the relationship between language and social cognition. In order to make oneself successfully understood, the narrator has to take the interlocutor's needs, reactions and motivations into account, thus requiring a "theory of mind" (Tager-Flusberg & Sullivan, 1995, Norbury & Bishop, 2003). Associations between a number of narrative measures (e.g. amount of information, length and complexity) and theory of mind was found in a study by Tager-Flusberg and Sullivan (1995), where children with autism, children with intellectual impairment and typically developing children were compared in an investigation of the relationship between narrative ability and theory of mind. The children's theory of mind ability was tapped by using a false belief task. The authors' assumption that deficits in narrative ability are the results of impairments in theory of mind were to some extent confirmed, since it was shown that linguistic competence, narrative language abilities and theory of mind were interrelated. In a study focusing on theory of mind ability in children with cerebral palsy and severe speech impairment, Falkman, Dahlgren Sandberg and Hjelmquist (2004) suggested that an impoverished experience of communicative social

interaction could be a contributing factor to the problems the children experienced with theory of mind.

Leinonen, Letts and Smith (2000) stated that several underlying abilities are required, such as e.g. an understanding of the task itself, remembering the input-text in the case of retelling and integration of visual and textual information. In addition, the child has to master the structure for a story. According to Hudson and Shapiro (1991), with some variations there is considerable agreement on the minimally acceptable characteristics, i.e. story elements, of a story. It must include a *formal beginning* (e.g. “Once upon a time”) and *orientation* to introduce setting and characters, an *initiating event*, a *problem* to achieve the intended goal, a *resolution* of the problem, and a *formal ending device.* The different story elements are important since they contribute to the construction of a mental model of the narrative, thus supporting the narrator in generating a story and the listener in comprehending a story (Soto and Hartmann 2006). Finally, telling a story is also a social activity, where the relationship of the narrator to the audience has to be taken into consideration (Reilly et al. 2004). With all this taken into account, it is not surprising that it is not until around fifth grade that children are able to tell coherent and goal-based fictional stories according to Hudson and Shapiro (1991).

Problems in narrative ability may have several possible causes, thus complicating the understanding of its nature. Numerous studies have shown that narrative ability is challenging for children with language impairment (e.g. Botting, 2002, Norbury & Bishop, 2003). In a study by Manhardt and Rescorla (2002), it was found that a group of late talkers, eight years of age, demonstrated weaknesses in narrative skills independent of the variance accounted for by their weaker general language skills. According to the authors, the results suggested that the use of narrative structure may be a specific area of underachievement for late talkers relative to typically developing children. Reilly et al. (2004) concluded that core language

abilities rather than pragmatic skill were likely to influence narrative ability in the children in their study. It is also known that children with language impairment produce stories with less syntactic complexity, shorter story length and poorer story organisation, similar to those found in younger children (Leinonen et al., 2000; Reilly et al., 2004). In addition mazes, i.e. pauses, repetitions and revisions, have been found to be more frequent in children with SLI than in MLU matched controls (Nettelbladt & Hansson, 1999). It was also noted that a considerable variation in number of mazes existed, the use of mazes being more pronounced in the SLI group than in the control group.

The amount of information that is expressed, a measure frequently used in narrative assessment, was shown to be within normal limits among children with SLI and children with pragmatic language impairment (PLI) in a study by Botting (2002). Similar results were found in a study by Norbury and Bishop (2003), where children with SLI, PLI and autism spectrum disorders were compared, with no differences between clinical groups and controls being revealed.

Regarding verbal comprehension, other studies such as Reuterskiöld Wagner et al. (1999) and Norbury and Bishop (2002) have found a covariance between verbal comprehension and narrative ability, and Boudreau (2008) suggests that children whose linguistic profile includes comprehension difficulties may be particularly at risk for difficulties with narrative tasks. However, the children in the studies by Miniscalco et al. (2007) and Manhardt and Rescorla (2002) presented problems with narrative ability even in the presence of adequate verbal comprehension. This was also the case in an earlier study by Holck, Nettelbladt and Dahlgren Sandberg (2009) concerning children with cerebral palsy (CP), spina bifida with hydrocephalus (SBH) and PLI. However, the relationship disappeared when mental age was accounted for.

As previously mentioned, memory is one of the cognitive abilities that commonly is regarded as vital for narration. In a study of six-year-old children with SLI concerning the relationship between memory and narrative ability, Dodwell and Bevan (2008) found that the narrative abilities of the 6-year-old children were linked to their verbal working memory. A conclusion was that children with SLI are likely to be at a disadvantage in classroom situations, especially when complex information is presented aurally.

No studies concerning the narrative ability of speaking children with CP have been found, but narrative ability has been examined specifically in children with CP using augmentative and alternative communication (AAC; Soto & Hartmann, 2006) and another group of children with early-onset brain damage, namely children with hydrocephalus, in a large study by Dennis and colleagues (1994). In the latter study the task involved retelling of two fairy tales. In relation to age-matched peers, the narratives of the children with hydrocephalus were less cohesive and less coherent. The narratives also contained less information, fewer inferences and more referentially ambiguous material, and, finally, sometimes included implausible content. At the same time as the stories contained less information, they extended the stories quantitatively produced by the age-matched peers. Dennis et al. (1994) concluded that the problems with narratives should be seen as pragmatic deficits deriving from core problems in language processing. In the study of Holck et al. (2009) the performance of the children with CP was similar to the performance of the children with SBH, thus indicating a possible similarity between the groups concerning narrative ability.

A narrative task can be presented in various ways, either in form of story generation or as story retelling. The form of the task is important to consider, since young children have been found to be sensitive to different elicitation tasks and story genres. Story generation is considered to be more taxing than story retelling, since it emerges from the child itself

without external input with an adult as model (Leinonen et al., 2000). In addition, story generation reflects a natural form of discourse and represents children's functional discourse abilities (Hudson & Shapiro, 1991). An obvious advantage with story generation is that it is more representative of spontaneous communication. Boudreau (2008) argues that since story retelling is less demanding it is particularly appropriate for preschool-aged children. Retold stories have been found to be longer, containing fewer inaccuracies and more grammar components and complete episode structures than generated stories. An advantage with retold stories is that the evaluator is familiar with the content of the story, thus making the scoring easier and more reliable. On the other hand, in an experimental elicitation context there is no intrinsic motivation to produce a complete story with a wide range of story elements, since the child only has to relate what happened (Hudson & Shapiro, 1991). One of the most informative aspects of narrative production is the subjects' departure from the expected, i.e. "errors", providing rich sources of data. Boudreau (2008) found that stories told in the absence of picture cues included better narrative structure, whereas picture-supported narratives resulted in more context-dependent utterances.

Earlier research on the persistence of narrative difficulties is not entirely unanimous. According to Paul et al. (1996) deficits in narrative skills tend to disappear in the early school years. In another study of children with late developing language, Miniscalco et al. (2007) found that children who had late developing language at two and a half years of age also had persisting difficulties with narrative skill at age seven to eight years. This applied even if the child had acquired adequate language skills. Boudreau (2008) found that longitudinal studies have shown that narrative difficulties in children with language impairment are persistent, and claims that problems with connected discourse remain long after early markers of language difficulties have resolved.

It is commonly held that inference generation is a prerequisite for understanding and producing narratives, given that inference generation facilitates coherence and thus supports comprehension (Norbury & Bishop, 2002). In a recent study by Holck et al. (2009) it was found that children with CP experienced some difficulties with inferencing, although they performed better on inferential than on literal questions. The same group of children was found to have considerable difficulties with narratives, performing several standard deviations below the criteria for different tasks. The present study is an attempt to investigate in depth the narrative ability in this group of children and to search for possible underlying causes to the problems, comparing the results of the children with CP with the results of a group of typically developing (TD) children.

## 2. Method

### *2.1 Participants*

A total of 20 children ranging from 5;4 to 10;0 years of age participated in this study: 10 children with cerebral palsy (7 boys, 3 girls) and 10 typically developing children (7 boys, 3 girls). The group of TD children was matched for age and gender with the CP group (table 1). There was no significant chronological age difference between the CP group ($M$ = 7.11) and the TD group ($M$ = 7.2) ($z$ = -.983, $p$ = .326) and no significant mental age difference between the CP group ($M$ = 7.4) and the TD group ($M$ = 8.0) ($z$ = -.875, $p$ = .382).

…….Please insert table 1 about here……..

Criteria for inclusion were intelligible speech and IQ >70. An additional criterion for inclusion was a diagnosis of spastic diplegia. Two of the children had additional language

impairment, mainly affecting phonological ability but also grammar to a lesser degree. The TD children had IQs within the normal range and no history of developmental delay.

### *2.2. Materials*

#### *2.2.1. Assessment of background variables*

*Language comprehension.* The receptive language skills were assessed with the Test for Reception of Grammar (TROG; Bishop 1982, Swedish translation Holmberg & Lundälv 1998) and the Peabody Picture Vocabulary Test - revised (PPVT; Dunn & Dunn, 1997, Swedish translation).

*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.

*Theory of mind.* The false belief items of the "Thought picture" test (Woolfe, Want & Siegal, 2002) were used. This test is considered to minimize verbal task-performance requirements, which is an advantage since there is evidence for an association between language impairment and theory of mind (Gillott, Furniss & Walter, 2004). Two so-called "thought pictures" were presented to the child. The pictures involved the understanding of a central character's false belief (FB). A correct response on both questions gave 1 point and maximal 2 points could be given. The order of the pictures was random.

*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.

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

### *2.2.2. Narrative assessment*

*Story recall.* For this purpose the Bus Story Test (BST; Renfrew, 1997; Swedish version Svensson & Tuominen-Eriksson, 2002) was used. This is a standardized test (up to the age of 8;5), which consists of a storybook with pictures and no written words. 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. The BST is easy and fast to administer, but has a lengthy scoring process.

## *2.3. Procedure*

The first author collected the data for the children with CP. The data for the TD children were collected by a speech-language therapist and the first author. The tests were administered to the participants individually, in the children's preschools, schools or homes.

The administration of TROG and PPVT followed the usual procedures. As for the BST, the children were told the story whilst looking at each picture, in all 12 pictures. Subsequently the child was asked to retell the story as close to the original as possible using the pictures as prompts. The examiner told the child "I'll help you to get started. Once upon a time…" Only minimal support such as nodding and confirmation by a "mhm" or a yes was provided. If the child was silent or did not continue the story, the examiner provided support such as asking "and then?" or repeating the child's utterance. The narration task was recorded.

## *2.4. Analyses and scoring procedures*

To examine story retelling abilities, recorded narrative samples were transcribed into CHAT format (Codes for the Human Analysis of Transcripts; MacWhinney, 2000), a transcription and coding format, onto computer. Together with CLAN (Computerized Language Analysis System), CHAT and a database constitute the Child Language Data Exchange System (CHILDES).

The BST provides a norm-referenced information score that indicates the number of relevant pieces of information the child includes in the story, out of a possible total of 54. Two points are given for each item that is designated as "essential" and one point for each item that is designated "subsidiary". The total number of points each participant earns on this analysis constitutes the information score. In addition, the number of subordinate clauses and the mean sentence length of the longest five sentences are calculated.

To achieve a more thorough analysis, some additional analyses were carried out. Firstly, the Narrative Assessment Profile (NAP; Bliss et al,. 1998) was used. The NAP was developed to evaluate the multidimensional nature of discourse with people with communicative impairments on a macrolevel, and enables clinicians to assess diverse patterns of discourse with one instrument. The result is a profile of the strengths and weaknesses that the child exhibits regarding a range of dimensions considered to be fundamental to the production of structurally appropriate narrative discourse; *topic maintenance, event sequencing, explicitness, referencing, conjunctive cohesion,* and *fluency* (see Bliss et al. 1998 for an extensive description of the dimensions). The child's achievement on each dimension is assessed with one to three points: 3 points – appropriate, 2 points – variable, 1 point – inappropriate. The *conjunction cohesion* dimension was supplemented by an account of the occurrence of different conjunction types, i.e. simple, causal, temporal and adversative conjunctions. Secondly, a sample of quantitative measures was calculated through the use of CLAN (MacWhinney, 2000). These included total number of words, pauses, repairs (e.g. self-

corrections), repetitions (same word or words without correction) and fillers (e.g. hmm). Pauses, repairs, repetitions and fillers were merged into one group, labelled *mazes* (Nettelbladt & Hansson, 1999). To quantify story length the number of propositions was tallied. A proposition was defined as a complete phrase structure with at least a noun and a verb present (Botting, 2002). Finally, a descriptive analysis of story elements, i.e. the occurrence of a formal beginning and orientation, initiating event, problem, resolution and formal ending device was conducted.

### *2.5. Statistical analysis*

The SPSS (version 16.0) was used. Nonparametric methods were used due to small sample sizes. Between-groups comparisons were made with the Mann Whitney *U* test. The Wilcoxon signed rank test was used for within-groups comparisons. Association between variables was evaluated with the Spearman rank correlation coefficient. The level of significance was set at 5%.

### *2.6. Reliability*

Interrater reliability assessments were conducted for the BST and for the NAP analysis. As for the BST, the first author performed the initial scoring procedure. An independent coder checked the scoring, and a correlation analysis was performed. The analysis showed that the correlation between the results was significant at the 0.01 level, *r* varying from .727 to .971.

With the NAP analysis, the first and third author coded 20% of the transcripts in common to practice the coding scheme. Disagreements were resolved through discussion. Following this all transcripts were coded independently by the first and the third author to determine interrater reliability, and the correlation analysis showed *r* varying from .578 to .999 ($p = < .10$).

## 3. Results

### *3.1. Background assessment*

Table 1 shows data for language comprehension (TROG and PPVT), literal and inferential comprehension, false belief and memory. As is apparent from the table, the TD children performed significantly better on the PPVT, literal comprehension and false belief.

### *3.2. Narrative assessment*

#### *3.2.1. BST*

For the results of the BST, see table 2.

*Information*: No significant differences between the groups were found. However, both groups performed below the norms of the test, the CP group 1.8 SD and the TD children 0.7 SD below the norms.

*Subordinate clauses*: The CP group ($M$ = 2.6) had significantly fewer subordinate clauses than the TD children ($M$ = 4.9) ($z$ = 2.53, $p$ = .011).

*MLU*: No significant differences between the groups were found.

…….Please insert table 2 about here……

#### *3.2.2. NAP*

For the results of the NAP, see figure 1. As can be seen in the figure, the two groups performed very similarly, the CP group performing a little worse than the TD group.

……..Please insert figure 1 about here…….

*Topic maintenance*: The ability to keep the narrative on topic proved to be a strength compared to the other dimensions in both groups. However, in the CP group three of the children added off-topic contributions. One of the children did this only on one occasion, another child changed the characters to represent himself and a friend, and the narrative of the third child was bizarre and impossible to follow.

*Event sequencing*: Event sequencing, i.e. providing a temporal structure to the narratives, was assessed to be appropriate more than any other dimension in both groups. Neither group had problems with chronological or logic sequencing. In fact, all TD children received the maximum score.

*Explicitness*. This was the dimension causing most problems for the CP group. It was manifested as a shortage of crucial information and coherence, making it hard for the listener to follow the narrative. The narratives ranged from including very limited details to an appropriate amount of information.

*Reference*. Adequate use of reference contributes to the coherence of the narrative. Problems with this dimension were manifested in the use of pronouns without previous introduction, or with the use of nouns when pronouns would have been expected. The CP group performed slightly below the mean of the TD group, achieving a mean of 2 points. This implicates a variable rather than appropriate or inappropriate ability.

*Conjunctive cohesion.* All children used conjunctions to varying extent. A further analysis of the use of conjunctions revealed that the most frequently used conjunction was the simple conjunction “and”, followed by temporal conjunctions. A significant difference was detected between groups. The TD group ($M$ = 4.6) used causal conjunctions significantly more than the CP group ($M$ = 1.7) ($z$ = -2.37, $p$ = .018). Adversative conjunctions were used sparsely in both groups.

*Fluency*. This was the dimension where the two groups performed most similarly, achieving around 2 points. This implicates that fluency was assessed as variable rather than appropriate or inappropriate for both groups.

To sum up, no significant differences between groups occurred on any of the original NAP dimensions, although a significant difference was detected when the use of conjunctions was examined closer. In addition, the TD children ($M$ =14.8) performed significantly better than the CP group ($M$ = 12.8) when all the NAP dimensions were merged into one ($z$ = -2.21=, $p$ = .027).

*3.2.3. CLAN analysis and analysis of propositions*

For the results of the CLAN analysis, see table 3. As is apparent from table 3, the two groups performed similarly on total number of words, mazes and propositions with no significant differences found.

…….Please insert table 3 about here…….

*3.2.4. Story elements*

None of the children in either group used all the story elements considered to constitute the minimally acceptable characteristics. The element most often excluded was the *formal ending device*, which all children except one in the CP group failed to use. Five of the children in this group excluded *orientation* to introduce setting and characters, and five children excluded an *initiating event*. The children in the TD group used more of the elements, but all of them excluded a *formal ending device*. Only one child in this group excluded *orientation*, and two children the *initiating event*.

*3.2.5. Correlations*

When relationships concerning the information part of the BST were specifically examined, some relationships could be traced in the CP group. The information score correlated positively with mazes ($r$ = .68; $n$ = 10; $p$ = .030), inferential comprehension ($r$ = .71; $n$ = 10; $p$ = .020), literal comprehension ($r$ = .83; $n$ = 10; $p$ = .003) and the explicitness dimension of the NAP ($r$ = .87; $n$ = 10; $p$ = .001). No correlation was obtained in relation to the result of TROG ($r$ = .30; $n$ = 10; $p$ = .407), working memory ($r$ = .32; $n$ = 10; $p$ = .361) or short term memory ($r$ = .56; $n$ = 10; $p$ = .091). In the TD group, the explicitness dimension of the NAP ($r$ = .64; $n$ = 10; $p$ = .048) and short term memory ($r$ = .77; $n$ = 10; $p$ = .010) were also associated with the information score, but not with mazes ($r$ = -.05; $n$ = 10; $p$ = .887), inferential comprehension ($r$ = .36; $n$ = 10; $p$ = .306) and literal comprehension ($r$ = .53; $n$ = 10; $p$ = .116). In contrast to the CP group ($r$ = .63; $n$ = 10; $p$ = .052), the amount of propositions correlated with BST Information ($r$ = .93; $n$ = 10; $p$ = .000) in the TD group.

## 4. Discussion

This study took its point of departure from a finding in a previous study, namely that children with CP showed problems with narration, manifested as a result of almost two standard deviations below the norms of the BST Information (Holck et al., 2009). Interestingly, these findings are not supported in previous research on SLI and PLI (Botting, 2002; Norbury & Bishop, 2003). In the study by Botting the BST Information scores were found to be in the normal range for both groups. On the other hand, our findings are supported in a study of children with a history of language impairment (Miniscalco et al., 2007) and children with early onset hydrocephalus (Dennis et al., 1994). Thus, the focus of this study has been to

further explore the nature of these problems, seen in relation to the results of a typically developing group of children.

On most measures the CP group performed just a little inferior to the TD group on both linguistically and cognitively related narrative measures, following the profile of the TD children. This suggests that the children in the CP group were delayed in their narrative ability rather than deviant. Similar results have been found in several studies concerning children with language impairment (Leinonen et al., 2000; Reilly et al., 2004). However, some interesting significant differences between groups possibly important for the information score occurred. To begin with, the CP group had significantly lower results on literal comprehension questions, but not on the TROG, suggesting that part of their difficulties with recall could be caused by comprehension difficulties on text level rather than on sentence level as measured by the TROG. Furthermore, the results of the TROG were not related to the results of literal comprehension or the BST Information. On the other hand, both literal and inferential comprehension was related to the BST Information score. The relationship between literal and inferential comprehension on the one hand and story recall on the other seems to be rather obvious; if the child has been unable to understand some part of the target story this is bound to affect the information quality in the retold story, and inferential comprehension has been found to facilitate coherence. Further support for this was found in the study of Norbury and Bishop (2002), where a significant relationship between story comprehension and story recall occurred.

The conjunctive cohesion dimension did not differ significantly between the groups, but the use of different types of conjunctions did. The fact that the TD children used causal conjunctions to a significantly higher extent than the CP group implies that the transfer of comprehensible information to the listener could be affected in the latter group. In the absence

of explanatory cohesion devices such as causal conjunctions the listener has to rely more on inferential understanding.

The significant difference between the groups on the false belief task may also have affected the BST Information scores, although no relationship was found between the false belief task and BST Information. According to e.g. Tager-Flusberg and Sullivan (1995) and Norbury and Bishop (2003), narration requires a theory of mind in that the narrator has to take the listener´s needs in account. Possibly this is not as applicable in a retold narrative, where the listener obviously is familiar with the narrative he or she has recently told the child, as in a personal narrative, but can nonetheless be of some relevance also in this context.

An interesting finding occurred in the CP group when relationships within the group were explored. A positive correlation between the BST Information score and the amount of mazes was found, indicating that mazes unconsciously were used as a means of facilitating the finding of words and recall of story contents. In fact, the two children with the lowest BST Information score in the CP group had the smallest amount of mazes, and were the only ones with 3 points on the fluency dimension of the NAP. The use of mazes seems to buy the child some time figuring out what would come next, perhaps reflecting word finding problems or more general mobilization or planning problems. On the other hand, the children with poor results on the BST Information score and a high degree of fluency “ramble on”, perhaps reflecting a weakness in executive functions such as inhibitory control, monitoring and planning. Correspondingly, in a study by Miniscalco et al. (2007) it was suggested that executive function deficits have a strong impact on the narrative outcome in children with language impairment.

The CLAN analysis and the analysis of propositions did not reveal any significant differences. Similar results were found in a study of children with spina bifida, where the authors concluded that the children were able to communicate less of the semantic content of

a story compared to a group of TD children, even in the presence of equal amount of language produced (Fletcher, Barnes & Dennis, 2002). The correlation analysis revealed that amount of propositions was related to BST Information score only in the TD group. This implies that the children in the CP group did not gain information scores by having longer narratives manifested as more propositions, as opposed to the results of the TD children.

As was discussed in the introduction, story recall and story generation tasks both have advantages and disadvantages. In this study a story recall task was used, chosen primarily because of its frequent use in clinical settings. One of the disadvantages discovered with this task was that some of the children tended to comment on persons and events visually observable rather than to recall and narrate the target story, thus perhaps not truly reflecting the child's ability (Reuterskiöld Wagner et al., 1999; Boudreau, 2008). On the other hand it can be argued that the narration task, only one of many tasks for the child in an extensive series of test, caused most resistance on the part of the children. Many of the children, especially in the CP group, initially declared an insufficient ability. In addition, the limited use of story elements by some children could possibly be caused by the original story to some extent.

In the present study two main methods were used to assess narrative ability, the BST and the NAP, the latter primarily as a complement to the BST. Whereas the BST is a conventional test for clinical use with norms and a limited analysis, the NAP is an analytic assessment procedure. After using the two methods on the same material, it can be stated the NAP appears to be more sensitive and precise since it assesses additional dimensions. This means that the strengths and weaknesses of the child´s narrative ability are more distinctly disentangled, thus making it easier to propose an adequate intervention plan. A further advantage with the NAP is that it can be used in connection to varying materials and narrative genres. A disadvantage is that norms are not applicable with the use of the NAP.

Finally, some methodological issues must be considered. Our sample size is small, due to the fact that the group of children with spastic diplegia is very limited. This calls for caution in interpreting the results. Furthermore, as has been discussed earlier the BST represents only one genre of oral narrative discourse, that of the sequential, goal-based, fictional and retold story.

## 5. Conclusions and implications

As is apparent from the text above, different studies have reached contrasting results and findings. This applies e.g. to the relationship between narration on the one side and comprehension and memory on the other. This can be taken as evidence for the complexity of narrative ability and how to measure it, and may further be a result of the use of different assessment tools and different groups of children being investigated. The results of the present study point out that although no major significant differences between the groups were found, the CP group experienced problems with the explicitness dimension on the NAP. Furthermore, there was a significant relationship between the explicitness dimension and the BST Information score in the CP group. This suggests that the problems with the BST Information score in the CP group could be derived from a shortage of information and cohesion. In addition the CP group had significantly less causal conjunctions. Taken together these results indicate a problem with cohesion in the CP group. The use of mazes did not differ quantitatively between groups, but in the CP group mazes correlated positively with the BST Information score, suggesting that mazes were used as a means to find words and recall relevant pieces of information. Consequently, these findings pinpoint the difficulties of recall in the children with CP in this study to problems with explicitness and causal conjunctions, thus narrowing down and facilitating the design of an intervention. In addition, the results suggest that a behaviour often thought of as unwanted, such as an abundant use of hesitation phenomena may, although unconsciously, help the child to an enhanced achievement.

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**Table 1. Distribution of chronological age, mental age and results of the background assessment across groups.**

| | CP | | TD | | |
|---|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* | *p-value* |
| Chronological age | 7;11 | 1.58 | 7;2 | 1.44 | .353 |
| Mental age | 7;4 | 1.73 | 8;0 | 1.71 | .393 |
| TROG (max 80) | 67.8 | 7.2 | 71.6 | 7.5 | .105 |
| PPVT (max 192) | 94.9 | 17.2 | 131.3 | 36.8 | .016 |
| Literal comprehension (max 28) | 18.6 | 3.6 | 22.9 | 3.7 | .023 |
| Inferential comprehension (max 28) | 22.3 | 3.6 | 22.9 | 3.0 | .853 |
| False belief (max 2) | .60 | .70 | 1.30 | .68 | .039 |
| Working memory | 2.4 | 2.6 | 2.4 | 1.1 | .785 |
| Short term memory | 5.1 | 1.7 | 4.4 | 1.6 | .373 |

**Table 2. Results of the BST task.**

| | CP | | TD | | |
|---|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* | *p-value* |
| Information (max 54) | 20.8 | | 27.4 | | .161 |
| MLU | 9.1 | | 10.2 | | .251 |
| Subordinate clauses | 2.6 | | 4.9 | | .011 |

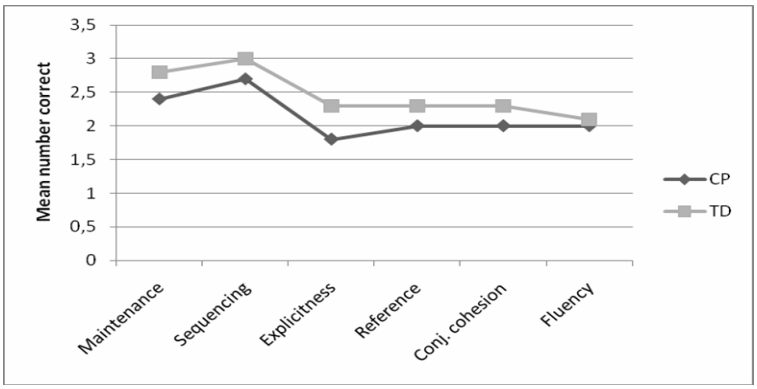


**Figure 1. Results of the NAP assessment.**

**Table 3. Results of the CLAN analysis and the analysis of propositions.**

| | CP | | TD | | |
|---|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* | *p-value* |
| Total number of words | 134.2 | 57.0 | 133.6 | 43.5 | .705 |
| Mazes | 9.2 | 7.0 | 8.0 | 8.2 | .570 |
| Propositions | 16.1 | 5.9 | 16.6 | 4.6 | .594 |