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Research Report

Narrative competence in children with pragmatic language impairment: a longitudinal study

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Abstract

Background: Children with pragmatic language impairment (PLI) show impairments in the use of language in social contexts. Although the issue has been gaining attention in recent literature, not much is known about the developmental trajectories of children who experience pragmatic language problems. Since narrative competence is an important predictor of both academic and social success, evaluating narrative competence in children with PLI is deemed important.
Aims: To examine the development of narrative competence of children with PLI compared with typically developing (TD) children using a prognostic longitudinal design.
Methods & Procedures: Using the Dutch adaptation of the Renfrew *Bus Story Test*, narrative competence was assessed at ages 5–7 for a group of 84 children with PLI and a group of 81 TD children. Groups were compared on measures of narrative productivity, organization of story content and cohesion.
Outcomes & Results: Results showed an increase in narrative competence for both groups across most time points. The PLI group obtained lower scores on measures of narrative productivity and story content organization compared with their TD peers at all time points, but did not show more problems related to narrative cohesion. Most problems in the domain of narrative productivity and story content organization were shown to be independent of lower non-verbal intelligence. The developmental trajectory for the PLI group was largely similar to that of their TD peers, and showed a persistent developmental delay of approximately one year. Furthermore, qualitative differences were visible in the proportion of irrelevant T-units, which was consistently higher in the PLI group. The different narrative measures were found to be relatively stable over time.
Conclusions & Implications: The results of this study suggest that narrative difficulties of children identified as pragmatically impaired persist at least until middle childhood. The persistence of the measured developmental delay, combined with the finding of qualitative differences, support the view of PLI as a deficit, which is consistent with the addition of social communication disorder (SCD) to the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (DSM-5).

Keywords: narrative, pragmatic language impairment, longitudinal.

What this paper adds?
What is already known on this subject?
PLI can be characterized as an impairment in the use of language in social contexts. Narrative deficits have been documented in children with PLI, but research thus far has not looked into developmental trajectories of narrative competence in these children.

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What this study adds?
Children with PLI show pervasive difficulties with narrative performance. Though their performance does seem to increase with age, the gap compared with TD children remains fairly constant over time. In addition to quantitative differences the performance of children with PLI also showed qualitatively different characteristics. The results support the view of PLI as a deficit, and are consistent with the addition of the closely related SCD to DSM-5.

Introduction

Telling a story requires a variety of skills, including linguistic skills, cognitive skills, word knowledge and memory (Losh and Capps 2003). In addition, it also requires socio-pragmatic skills because a story should be adapted to the needs of the listener. All these skills are subject to large developmental growth during early childhood, and through intricate developments in both language development and cognitive development, children come to appreciate the more complex aspects of storytelling. Applying a longitudinal design, the current study examines the development of narrative competence in children with pragmatic language impairment (PLI) who have a known deficiency in the social or 'pragmatic' aspects of language in comparison with typically developing (TD) children. This study will allow us to come to more definitive answers regarding the nature of pragmatic language problems. Information regarding the developmental trajectory of narrative competence can determine whether PLI should be regarded as a delay or a disorder. In case of the former, symptoms reflect immaturity at a young age, whereas the latter suggests a deficit with possible qualitative differences. The results of this study may also provide clues regarding the nature of social communication disorder (SCD), a new disorder in DSM-5 (American Psychiatric Association 2013). Pragmatic language and social communication are not fully interchangeable concepts, and children with PLI do not necessarily meet the criteria for SCD (Norbury 2014), but the conceptual overlap between SCD and PLI is large.

Over the years there has been an increase in interest in children with pragmatic language problems, culminating in the addition of SCD to the DSM. The present study predates the introduction of the SCD diagnosis and is based on its conceptual predecessor PLI. PLI is generally considered a disorder affecting the use of language in social contexts (Bishop 2000), and is often categorized under the umbrella term specific language impairment (SLI). Whereas most problems of children with SLI are easily detected using standardized language tasks, the problems of children with PLI are more difficult to detect in assessment, due to the social nature of the experienced problems. Early studies investigating the symptoms of children with pragmatic language problems often had to resort to qualitative assessments of discourse skills (e.g. Adams and Bishop 1989, Bishop and Adams 1989, Bishop *et al.* 2000). Although this led to a greater awareness of the symptoms associated with PLI, the use of discourse analysis is considered both labour intensive and prone to subjective interpretations. More recently, several instruments have become available to assess discourse skills in a more standardized way, including several narrative assessments based on *Frog, Where Are You?* (Mayer 1969) and the *Bus Story Test* (Renfrew 1997). Although these narrative assessments only focus on a specific discourse skill, this can be considered a valid way to gain insight into pragmatic abilities. In addition, narratives are used frequently during everyday conversations, and narrative assessment can thus be considered a good reflection of naturalistic behaviour (Botting 2002).

Narrative assessment can be performed using either a story-generation design, or a story-retelling design. In story generation, children are generally asked to look at pictures and provide a story. In contrast, in a story-retelling design, children first listen to a model story and are then asked to retell the story. Both story generation and story retelling are useful measures of narrative competence. Merritt and Liles (1989) compared the results of story generation and story retelling by both language-disordered and TD children. They found that both groups told longer stories with more grammar components in the story-retelling condition. In addition, the stories in the retelling condition were more reliably scored compared with the story-generation condition. In contrast, Duinmeijer *et al.* (2012) did not find differences in grammar components between story generation and story retelling in their SLI sample. Although these results are mixed, both story generation and retelling seem to be useful instruments.

Narratives are considered 'a series of actions and events that unfold over time, according to causal principles' (Mar 2004: 1415). By age 6 most of the narratives consist of complete episodes with initiating events, motivating states, attempts and consequences (Peterson and McCabe 1983). Starting from a very young age, skills of children increase in the three major areas of narrative competence: sentence production (also called narrative productivity), organization of story content or story grammar, and cohesion (Coelho *et al.* 2003). Concerning sentence production, Berman (1988) found significant increases in story length during the preschool

and school-age years. Progress was found both in the use of propositions and in the use of utterances with a subject and predicate. Related to this developmental growth is an increase in the use of cohesive devices. Already at age 3.5 children tend to use connectives such as 'then' and 'because' in their narratives (Peterson and McCabe 1983). Later developments are marked by an increase in the use of sequences and causality.

Similar developments are also evident in the story content of narratives. For example, Schneider *et al.* (2006) found significant improvements in the quantity of relevant information between the ages of 4 and 8, and Munoz *et al.* (2003) found more complete episodes in their older Latino sample. One of the key elements that are found to enter narratives slowly during the later preschool years are utterances relating to human intentionality and mental states (Trabasso *et al.* 1992).

Only a few studies have studied narrative development in children with language disorders. Paul and Smith (1993) found persisting problems in late-talkers until second grade. At this point, 80% of the late talkers showed age-appropriate expressive language skills. Manhardt and Rescorla (2002), however, found narrative deficits to persist until the age of 9. Miniscalco *et al.* (2007) found that a community sample of children with a history of language delay (assessed at age 2.5) exhibited impaired narrative competence at ages 7 and 8. Although they did not use a longitudinal set-up, Wetherell *et al.* (2007) found that narrative deficits were visible in adolescents as well. They did note that some aspects pertaining to narrative productivity seemed intact. They concluded that while adolescents with SLI are able to catch up to some extent, problems are persistent and are of a qualitative nature.

As stated above, narrative competence is often reported to involve socio-pragmatic skills. Hence it is surprising that a gap exists concerning research into narrative competence in children with pragmatic language problems. To the best of our knowledge, so far only a few studies have explicitly investigated narrative competence in children with PLI, with mixed results possibly due to a limited number of participants, and a limited assessment of narrative competence. Conti-Ramsden *et al.* (1997) studied story content organization and found that 7-year-old children with PLI contributed less information compared with children with SLI in a story-generation task. Also applying a story-generation design, Norbury and Bishop (2002) failed to find significant differences between TD children and children with SLI, PLI or autism aged 9, although some of the differences bordered significance. The lack of significant differences might be caused by the relatively small number of participants or age effects. Taking a more in-depth approach of narrative assessment, Botting (2002) found problems in the organization of content similar to those reported by Conti-Ramsden *et al.* (1997) in both a story-retelling and a story-generation task. Detailed examination of children's narratives showed that children with PLI expressed a lower number of utterances related to the setting and ending of a story compared with groups with autism or SLI that were examined in other studies. However, she found different results in a story-retelling task compared with a story-generation task; whereas she did find a lower sentence length and a reduced number of subordinate clauses in the story-retelling task, there were no differences in the story-generation task. These results match the findings for a retelling task in Ketelaars *et al.* (2012), who report on the first-year data from the present longitudinal study.

The studies on narrative competence in children with PLI conducted so far can at best be called inconclusive. In some studies, children with PLI showed several deficits, while other studies did not find specific deficits. Moreover, a longitudinal design was lacking in all these studies. Therefore, the present study will examine the development of narrative competence in 77 children with PLI in the Netherlands in the age range 5–7 using a longitudinal design. The children's narrative development will also be compared with a control group of 75 TD peers. The longitudinal design of this study allows for the analysis of developmental trajectories, which can subsequently provide information regarding the nature of PLI. Considering possible outcomes of growth trajectory analyses, at least three possible trajectories are to be considered (Catts *et al.* 2008). The first is consistent with a deficit model and states that a low initial level is followed by a parallel growth over the years. In addition, qualitative differences as indicated by wholly incomparable developmental trajectories are also indicative of a deficit. A second possible trajectory is consistent with a delay model, and assumes that a low initial level is followed by an accelerated growth in which children catch up with their TD peers. A last possible trajectory consists of a low initial level as well as a slower growth pattern, causing an ever widening gap. This last pattern of growth is often referred to as the Matthew effect (Stanovich 1986). The aim of the present study is to explore the developmental trajectories of the key aspects of narrative competence in children with PLI, namely narrative productivity, organization of story content and cohesion. Using a prognostic design and the application of structural equation modelling (SEM), the aim is to examine the developmental progression of narrative competence in children with PLI in comparison with a group of TD peers. In addition, more insight is to be gained into the dimensions of narrative competence and their stability over time.

Table 1. Mean (standard deviation) CCC scores for both groups

	TD	PLI
CCC Speech	34.84 (2.27)	26.48 (5.87)
CCC Syntax	30.88 (1.05)	27.55 (2.32)
CCC Inappropriate initiations	28.19 (1.58)	25.22 (3.35)
CCC Coherence	33.61 (2.32)	25.26 (3.01)
CCC Stereotyped conversation	28.76 (1.60)	24.96 (2.82)
CCC Use of context	29.87 (1.39)	23.93 (2.32)
CCC Rapport	31.56 (2.18)	26.54 (3.49)
CCC Social	32.59 (1.69)	27.81 (3.13)
CCC Interests	32.09 (1.69)	31.35 (1.99)
Pragmatic composite	151.90 (4.87)	125.87 (5.44)

Note: TD, typically developing group; PLI, pragmatic language impaired group.

Method

Participants

Participants were recruited from primary schools in the Netherlands. The 5-year-old children with PLI were selected based on the pragmatic composite score of the Children's Communication Checklist (CCC; Bishop 1998, Dutch translation: Hartman *et al.* 1998), which was administered in the preceding year. The CCC is a teacher/therapist questionnaire that can be used to identify children with pragmatic language difficulties. Children with a pragmatic composite below the cut-off score of 132 were identified as children with PLI. This cut-off has been identified as a marker for discriminating children with PLI from children with more typical SLI and has been used extensively in research (e.g. Bishop 1998, Bishop and Baird 2001, Ketelaars *et al.* 2009). Children with diagnosed developmental disorders such as autism were not screened out, since more insight into developmental aspects of pragmatic language problems regardless of a predefined diagnosis was needed.

A matching group of 5-year-old TD children (TD group) was selected based on classroom, gender and age (within 6 months). As confirmation of their normal development, the children had to show a pragmatic composite above 140 (the lowest normal score of a TD sample of Bishop and Baird 2001). In addition, they did not show any developmental issues as assessed by their teachers using a short questionnaire assessing specific developmental domains (language, motor, social, etc.). Table 1 summarizes the CCC scores of both groups.

To control for possible differences in non-verbal reasoning skills, all children were assessed using Raven Coloured Progressive Matrices (Raven 1956) at the first assessment. Both groups were followed over the course of two years. Detailed information on the participants can be found in table 2.

Table 2. Participants information

	Time 1		Time 2		Time 3	
	TD	PLI	TD	PLI	TD	PLI
Number of participants	75	77	75	75	74	74
Boys/girls	54/21	53/24	54/21	52/23	53/21	53/21
Age, years (SD, months)	5;6 (3.6)	5;6 (3.5)	6;6 (3.3)	6;6 (3.8)	7;6 (3.7)	7;6 (4.1)
Age range (months)	59–73	59–73	72–86	71–88	83–99	83–102

Note: TD, typically developing group; PLI, pragmatic language impaired group.

Procedure

This study took place in the context of a wider study on the skills and deficits of children with PLI in order to classify this type of disorder in context of other language disorders. Ethical guidelines as per the Declaration of Helsinki were carried out. Schools were approached with information on the nature of the research. If consent was granted, teachers sent out informational letters to parents of children aged 4. After written consent was given by parents, appointments were set up. Children were tested at their schools in two sessions of approximately 50 min each. Upon entering the room the children were first familiarized with the situation and with the experimenter. The experimenters were extensively trained on administering the assessment battery, and similar procedures were adopted at all time points.

Narrative competence was assessed using a Dutch adaptation of the Renfrew *Bus Story Test* (Jansonius *et al.* 2014), which comprises the retelling of a story about a naughty bus. During the narrative task, children were told the story while being shown a picture book which depicts some, but not all, key components of the story. After having heard the story, the children were asked to retell the story with the aid of the picture book. The narratives were recorded on tape and transcribed. Using Hunt's method (Hunt 1970), each utterance was segmented into T-units.

Narrative measures

Six measures were assessed to determine narrative competence. They were thought to reflect three narrative components: narrative productivity, organization of story content and cohesion.

Narrative productivity

As measures of narrative productivity we analysed three measures: total number of T-units, mean length of five longest T-units (ML5LU) and number of subordinate clauses. T-units (Hunt 1970) are roughly equivalent to sentences, but are better defined. They consist of an independent clause and possible subordinate clauses. ML5LU was chosen over MLU since ML5LU is more representative of the maximum language capacity of children and less sensitive to some of the strategies employed to narrate stories, such as using many short

sentences (Johnston 2001). Subordinate clauses were those T-units that consisted of an adverbial clause, an adjective clause or a complement clause. The narrative as told to the child contained 11 subordinate clauses (three adverbial clauses, three adjective clauses and five complement clauses). Although related, these three measures are thought to provide differential information on the linguistic proficiency. In addition, several of these measures have been shown to be sensitive at detecting children with pragmatic language problems.

Organization of story content

Organization of story content was measured by the proportion of plot structure components (number of plot structure components divided by the total number of T-units), and the proportion of irrelevant T-units.

Plot structure components

The division in 24 plot structure components was derived from Stein and Glenn (1979). The plot structure components are largely similar to the Renfrew Information score, but allow for more own wording compared with the Renfrew Information score.

Irrelevant T-units

T-units that did not correspond to the story as told by the examiner were considered irrelevant T-units. Irrelevant T-units were counted, and the proportion of irrelevant T-units was computed as a proportion of the total number of T-units, since the amount of irrelevant T-units should be considered in the context of the length of the story. The irrelevant T-units included incomprehensible T-units, of which the semantic content is unclear (e.g. 'And the bus didn't make anything in it.'), made up T-units, which consist of information that fits into the original story but is not actually part of it (e.g. 'But the motor still carried on.'), and wrong event T-units, consisting of correct information in the wrong chronological order (e.g. 'Then he fell into the water. Then the brakes didn't work anymore.'). Although made up T-units could be considered as relevant embellishment of the story, when used in abundance they can easily confuse the listener by making it more difficult to follow the story line. We have therefore chosen to regard them as irrelevant.

Cohesion

As a measure of cohesion we assessed the number of implicit references that occurred in relevant T-units, and expressed them as a proportion of the total number of relevant T-units. Irrelevant T-units were not coded for implicit references, as some of these T-units could not be judged on the appropriateness of the references. Implicit references consisted of the use of anaphoric references to objects, persons or places, in situations that required the use of nouns. For example, the utterance 'And the bus ran away. Then they made funny faces at each other.' was judged an implicit reference since [they] does not refer correctly to persons mentioned before.

Reliability

All the measures were judged separately on inter-rater reliability. Reliability was assessed for a subset of 10% of the children in the first year by two experts in linguistics who were blind to the CCC scores of the participants. Since the agreement for all measures exceeded 80%, all scores were used for analyses.

Statistical analyses

Data were analysed in several steps. First, means and standard deviations (SDs) were computed for all narrative measures at ages 5–7. To assess differences in narrative development, a repeated-measures analysis of variance (ANOVA) with Group as between-subjects factor and Time as a within-subjects factor was conducted. Subsequent *t*-tests were performed to investigate group differences within one Time point. Three outliers were identified and excluded and normality was inspected using Q-Q plots.

To investigate whether differences in non-verbal reasoning skills could account for differences in narrative competence, the ANOVAs were rerun using the Raven scores as a covariate following the procedure of Thomas *et al.* (2009). Next, confirmatory factor analyses were performed on each group separately to find whether the data supported an underlying division into three narrative factors (narrative productivity, story content, cohesion), and whether this division was robust over time. Finally, the stability of these three factors was investigated using structural equation modelling (SEM).

Results

Table 3 presents the means and SDs of the narrative measures at all Time points. To assess the developmental progression of narrative competence, means and SDs were computed for all narrative measures at Times 1–3. Figure 1 depicts the developmental trajectories of the different narrative measures. As illustrated, the narrative development of the PLI group largely resembles the development of the TD group. Judging from figure 1, the PLI group consistently attains scores that are approximately one year behind those of their TD peers. The exception to this is the proportion of irrelevant T-units,

Table 3. Means (standard deviation) of narrative measures at Times 1–3 for both groups

	Time 1		Time 2		Time 3	
	TD	PLI	TD	PLI	TD	PLI
Narrative productivity						
Total number of T-units	20.19 (5.52)	16.60 (4.40)	22.67 (5.01)	20.36 (5.30)	25.42 (5.25)	22.11 (5.07)
Mean length of the five longest T-units	9.01 (1.47)	7.74 (1.56)	9.81 (1.63)	9.03 (1.69)	10.44 (1.63)	9.41 (1.66)
Total number of subordinate clauses	2.21 (1.62)	1.21 (1.40)	3.61 (2.23)	2.51 (1.76)	4.03 (2.52)	2.50 (1.75)
Story content						
Proportion of plot structure components	0.58 (0.14)	0.52 (0.15)	0.59 (0.13)	0.58 (0.12)	0.64 (0.09)	0.59 (0.13)
Proportion of irrelevant T-units	0.13 (0.11)	0.20 (0.16)	0.11 (0.11)	0.15 (0.13)	0.10 (0.10)	0.14 (0.12)
Cohesion						
Proportion of implicit references	0.22 (0.13)	0.26 (0.16)	0.19 (0.13)	0.20 (0.13)	0.17 (0.13)	0.19 (0.14)

Note: TD, typically developing group; PLI, pragmatic language impaired group.

which seems consistently higher in the PLI group. Next, repeated-measures ANOVAs were performed to assess whether there was significant growth in narrative abilities from Time 1 to Time 2, and from Time 2 to Time 3. In addition, *t*-tests were conducted to find whether group differences were visible at all time points.

Growth of narrative productivity

We used three measures of narrative productivity: total number of T-units, mean length of five longest T-units (ML5LU) and number of subordinate clauses. The repeated-measures ANOVA on the total number of T-units showed a significant effect for time ($F(2, 254) = 52.41$, $p < .001$, $\eta p^2 = .29$). Post-hoc comparisons using the Bonferroni adjustment for multiple comparisons showed a significant increase in number of T-units both from Time 1 to 2, and from Time 2 to 3 ($ps < .001$). In addition, a significant main effect of Group was visible ($F(1, 127) = 19.65$, $p < .001$, $\eta p^2 = .13$). This significant group effect was further examined by *t*-tests split out by time. The *t*-tests revealed that the PLI group attained a lower number of T-units in their narratives at all time points ($ps < .01$).

The repeated-measures ANOVA on the ML5LU also showed a significant effect for both Time ($F(2, 258) = 46.72$, $p < .001$, $\eta p^2 = .27$) and Group ($F(1, 129) = 20.08$, $p < .001$, $\eta p^2 = .14$). Post-hoc comparisons using the Bonferroni adjustment showed that the ML5LU significantly increased between Times 1 and 2 and between Times 2 and 3 ($ps < .001$). Subsequent *t*-tests revealed an overall lower ML5LU of the PLI group in comparison with the TD group ($ps < .01$).

A repeated-measures ANOVA on the number of subordinate clauses also showed a significant effect for both Time ($F(2, 256) = 33.74$, $p < .001$, $\eta p^2 = .21$) and Group ($F(1, 128) = 21.33$, $p < .001$, $\eta p^2 = .16$). Post-hoc comparisons using the Bonferroni adjustment showed that the number of subordinate clauses increased between Times 1 and 2 ($p < .001$), but not between Times 2 and 3 ($p = .25$). Concerning the main effect for Group, *t*-tests revealed that the PLI group used fewer subordinate clauses in their narratives at all time points, compared with the TD group ($ps < .01$).

Growth of story content organization

As measures of story content organization we used the proportion of plot structure components and the proportion of irrelevant T-units. A repeated-measures ANOVA on the proportion of plot structure components in the story showed a significant effect for Time ($F(2, 254) = 11.62$, $p < .001$, $\eta p^2 = .08$). While the proportion of plot structure components did not show an increase from Time 1 to 2 ($p = .07$), the increase between Times 2 and 3 did reach significance ($p < .01$). The main effect of Group was significant ($F(1, 127) = 4.41$, $p = .04$, $\eta p^2 = .03$). *T*-tests revealed a significant difference at Times 1 and 3, but not at Time 2 ($p = .58$). Both at Times 1 and 3, the PLI group attained a lower proportion of plot structure components ($p = .01$ and $p < .01$ consecutively).

A repeated-measures ANOVA was also conducted on the proportion of irrelevant T-units in the story. Since the sphericity assumption was not met, the Huynh–Feldt correction was applied. The main effect of Time was significant ($F(1.91, 251.46) = 8.68$, $p < .01$, $\eta p^2 = .06$). The decrease in proportion of irrelevant T-units was significant from Time 1 to 2 ($p = .01$), but not from Time 2 to 3 ($p = .23$). The main effect of Group was also significant ($F(1, 129) = 8.10$, $p = .01$, $\eta p^2 = .06$), with the PLI group showing a higher

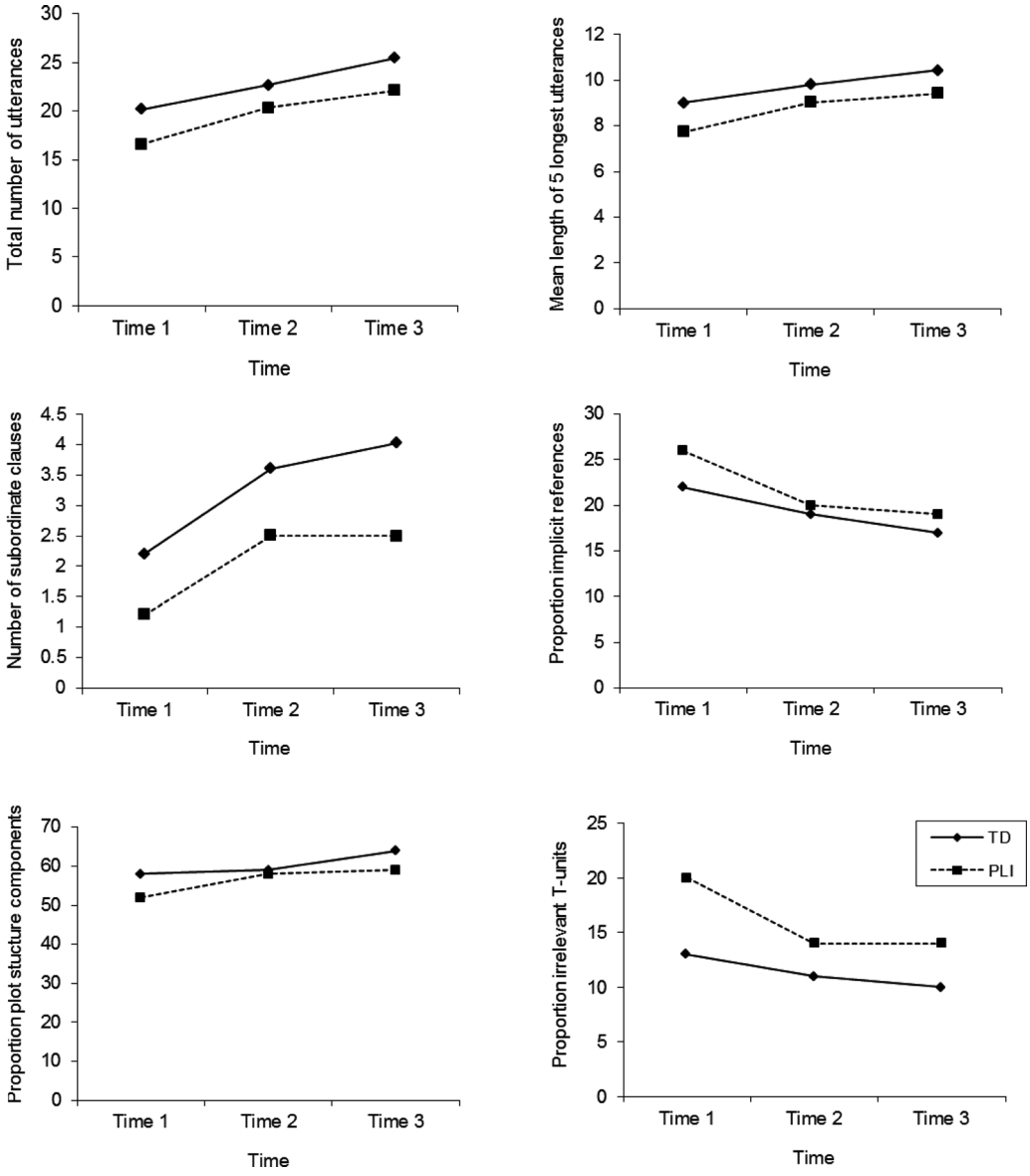

Figure 1. Narrative development over time for the pragmatic language impaired (PLI) and typically developing (TD) groups.

proportion of irrelevant T-units. Subsequent *t*-tests revealed a significantly higher proportion of irrelevant T-units at all Time points ($p < .01$, $p = .03$ and $p = .02$).

Growth of cohesion

As a measure of cohesion we used the proportion of implicit references. Since the sphericity assumption was not met, the Huynh–Feldt correction was applied. The main effect of Time was significant ($F(1.94, 248.13) = 7.61$, $p = .001$, $\eta p^2 = .06$), with a significant decrease of proportion of implicit utterances from Time 1 to 2 ($p = .01$) but not from Time 2 to 3 ($p = .35$). The main effect of Group was not significant ($F(1, 128) = 1.94$, $p = .17$). To investigate whether the groups did not differ at any of the time points, *t*-tests were performed. At Time 1, the difference between both groups fell short of significance ($p = .06$). At the other time points no differences were observed ($p = .60$ and $p = .53$ consecutively).

Role of non-verbal reasoning skills

Because we found differences in non-verbal reasoning skills, the above analyses were repeated using the Raven score as a covariate. The effects of group on the dependent variables all remained similar, except for the difference in proportion of plot structure components, which was no longer significant after controlling for non-verbal reasoning skills. In addition, an interaction was visible in the analysis of the total number of utterances: we found a significant interaction between Time and non-verbal reasoning skills.

Table 4. Goodness-of-fit statistics for confirmatory factor analyses at Times 1–3

Model	χ^2	d.f.	p	AGFI	CFI	NFI	RMSEA	SRMR
Time 1	13.08	4	.01	.89	.97	.95	.12	.05
Time 2	41.67	5	.00	.75	.84	.83	.21	.10
Time 3	9.77	6	.14	.94	.98	.96	.06	.05

Dimensions in narrative competence

To investigate whether our measures of narrative competence could indeed be subcategorized into the three proposed factors, confirmatory factors analyses were performed over both groups. The first factor narrative productivity consisted of the total number of T-units, the mean length of the five longest T-units, and the total number of subordinate clauses. The second factor story content organization consisted of only the proportion of plot structure components. The proportion of irrelevant utterances was left out of the analysis, since it showed extremely high correlations with the proportion of plot structure components, which increases the risk of multicollinearity. The third factor cohesion consisted of the proportion of implicit references. Goodness of fit of the models was assessed by several indices: the standard χ^2 test and alternative goodness-of-fit indices such as the adjusted goodness-of-fit index (AGFI), the comparative fit index (CFI), the normed fit index (NFI), the root-mean-square error of approximation (RMSEA), and the standardized root-mean-square residual (SRMR). An acceptable fit of the χ^2 test is attained when the ratio of the χ^2 to the degrees of freedom is smaller than 2:1. The AGFI, CFI and NFI should ideally be higher than .80 (Hu and Bentler 1999). The RMSEA should be lower than .08 to indicate a reasonable fit (Browne and Cudeck 1993). The SRMR finally should ideally be below .08 to reflect a good fit (Hu and Bentler 1999), while values below .10 are considered acceptable or even good. As can be gathered from table 4, the fit of the three-factor solution was acceptable at all Time points, indicating that the factors were robust over time. At Time 2, the fit indices were somewhat lower than at Times 1 and 3, but could still be considered marginally acceptable. Correlations among the factors at Time 1 were .17 (story content organization and narrative productivity), –.31 (story content organization and cohesion), and –.20 (cohesion and narrative productivity), all $ps < .05$. At Time 2, the correlations among the factors were .27 (story content organization and narrative productivity) and –.33 (cohesion and narrative productivity). The correlation between the factors story content organization and cohesion was not significant. At Time 3, only the correlation between the factors cohesion and narrative productivity remained significant ($r = -.30$).

Stability in narrative competence over time

After establishing the dimensions of narrative competence for all time points, the longitudinal stability was investigated using quasi-simplex models in AMOS 6.0 (Arbuckle 2005). Errors for the same test measured at successive time points were allowed to correlate. The goodness-of-fit statistics of the three models are presented in table 5 (Models A–C), separated by group.

As the different goodness-of-fit indices suggest, the fit of most quasi-simplex models was acceptable for both groups. Figures 2 and 3 depict the final quasi-simplex SEM models of the TD and PLI groups respectively. The regression coefficients are indicated by the labels of the arrows. Two interesting aspects of the models should be mentioned. The PLI group showed a deviant trajectory on the factor story content organization: the standardized regression coefficient from Time 1 to 2 was .23. Although there was also a significant relation from Time 2 to 3, the standardized regression coefficient from Time 1 to 3 was higher (.53). Since the small number of degrees of freedom allowed for only two coefficients to be computed, the final model we computed consisted of a computation of the regression coefficients from Time 1 to 2, and from Time 1 to 3. A second interesting aspect is found in the factor cohesion, which did not show stability from Time 1 to 2 for either group.

Discussion

This study examined the development of narrative competence in a sample of children with PLI and a group of TD children who were followed from ages 5 to 7. With this study, we aimed to shed more light on the nature of PLI, its pervasiveness and persistence, and the areas in which children with PLI show qualitative differences from their TD peers. The results of our study indicate that children who screened positive for PLI at age four exhibit narrative deficits until at least age 7. It is important to note that the same conclusion can be arrived at after the role of non-verbal reasoning skills is taken into account. The narrative difficulties of children with PLI include lower narrative productivity, as measured with the total number of T-units, mean length of T-units and number of subordinate clauses. In addition, difficulties are found in the domain of story content organization. Children with PLI show lower proportions of plot structure components, whereas the proportion of irrelevant utterances is higher. However, the PLI group did not show problems in the domain of narrative cohesion. Skills related to cohesion, such as the use of pronouns, are often considered to develop over an extended period of time (Colle *et al.* 2008). For example, Karmiloff-Smith (1985) proposed a three-phase model, in which the use of anaphora develops until the age of 10. The

Table 5. Goodness-of-fit statistics for structural models at Times 1–3 for both groups

Model	χ^2	d.f.	*p*	AGFI	CFI	NFI	RMSEA	SRMR
TD group								
A: Quasi-simplex sentence production	36.69	24	.05	.83	.96	.89	.08	.10
B: Quasi-simplex story content	0.31	1	.58	.79	1.00	.99	.00	.02
C: Quasi-simplex cohesion	0.54	1	.46	.97	1.00	.96	.00	.04
PLI group								
A: Quasi-simplex sentence production	35.98	25	.07	.86	.97	.90	.07	.07
B: Quasi-simplex story content	2.73	1	.10	.84	.95	.92	.14	.06
C: Quasi-simplex cohesion	3.11	2	.21	.93	.91	.80	.08	.08

Note: TD, typically developing group; PLI, pragmatic language impaired group.

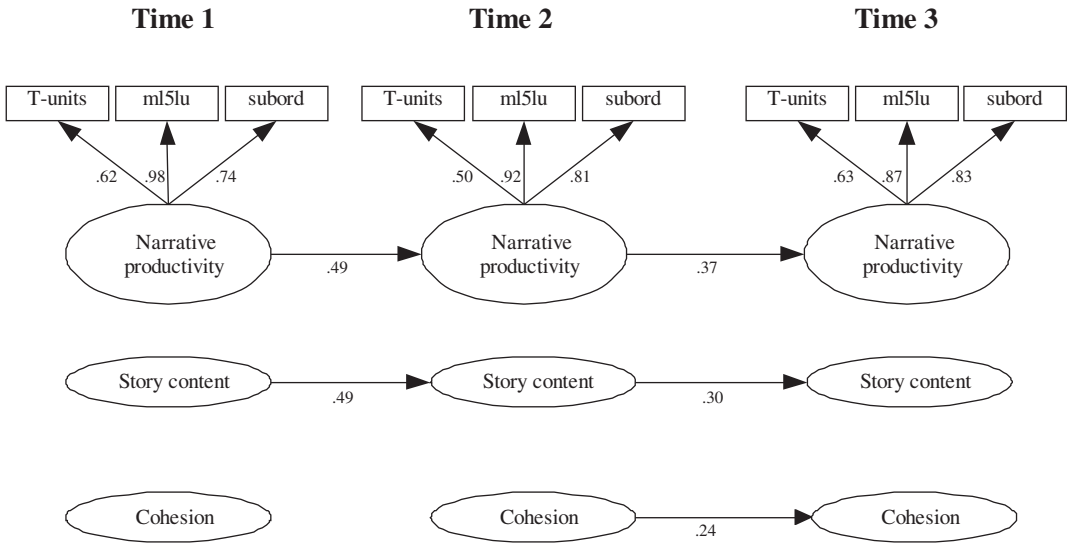

Figure 2. Final quasi-simplex models of narrative factors for the typically developing (TD) group.

fact that we could not establish differences in cohesion skills might reflect the fact that they are still very much under development at the ages the measurements were taken.

The narrative difficulties of the PLI group notwithstanding, the PLI group did show significant developments in the realm of narrative competence. The scores of the PLI group were largely consistent with those of the TD group one year earlier, which suggests a delay of about one year. Two exceptions were visible, however. The use of subordinate clauses of the PLI group at age 6 was similar to the use of subordinate clauses of their TD peers at age 5. However, at age 7, the PLI group did not match the level of the TD group one year earlier. In addition, qualitative differences were visible in the proportion of irrelevant T-units, which was higher in the PLI group at age 7 compared with the TD group at age 5, indicating a delay of at least two years. So, in addition to the fact that the PLI group did not catch up to the TD group, qualitative differences, as evidenced by the much larger delay seen in the proportion of irrelevant T-units, are consistent with a deficit. It is interesting to note that a high proportion of irrelevant T-units could be regarded as a pragmatic deficit, since it is an indication of a lack of consideration for the needs of a listener.

The second goal was to gain more insight into the dimensions of narrative competence and their stability over time. The results of our analyses suggest that narrative competence consists of several related but independent skills. These skills show a certain level of stability over time. For instance, our measures of narrative productivity did indeed comprise a separate dimension, and showed stability in time for both groups. To a lesser extent the same was true for story content organization. Since our two measures of story content organization showed considerable relatedness with each other, we only included one of the measures in the analyses. The results suggested that story content organization did indeed constitute a separate aspect of narrative competence. In addition, story content organization also showed stability over time for the TD children. This was somewhat less true for the PLI group, whose scores at Time 1 proved to be an important significant predictor even two years later. Finally, although narrative cohesion was found to constitute a separate aspect of narrative competence, it did not show stability for either of the

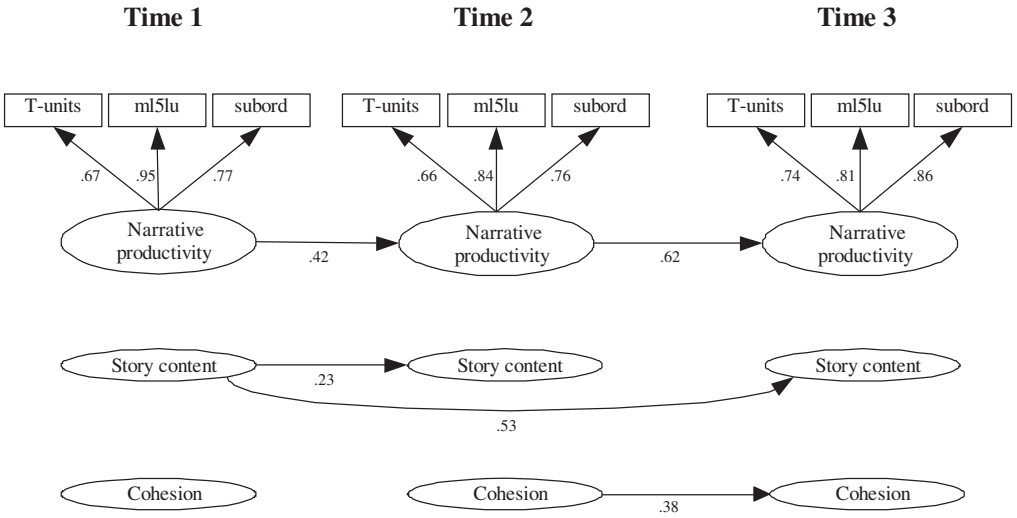

Figure 3. Final quasi-simplex models of narrative factors for the pragmatic language impaired (PLI) group.

groups between the ages of 5 and 6. Stability was visible, however, from age 6 to 7. The lack of evidence of stability in the use of cohesive devices in the youngest age ranges might have been the result of the intricacies involved in the use of cohesive devices. Indeed, mounting evidence suggests that the use of cohesive devices develops in later childhood Karmiloff-Smith (1985). Corroborating evidence for the hypothesis that the use of cohesive devices was still out of the scope of the children at age 5 was the lack of significant differences between the TD children and the children with PLI.

Of course, several limitations apply to the present study. First of all, our study made use of a retelling task. Although this design has been shown to show high inter-rater reliability (Merritt and Liles 1989) and takes relatively little time to score, it has some disadvantages. For example, retelling might be considered easier than story generating, and would thus provide an overly positive view of the narrative competence of our children. However, since we only used the task as a relative measure, to compare children over time and across two groups, overestimation of skills does not pose a problem as long as it is consistent.

Another limitation concerns the ages of the participants. Ideally, narrative competence should be investigated over a larger period of time. The fact that our measure of narrative cohesion did not show stability in the early years of our assessment suggests that important developments may indeed take place outside our tested age range. It would be interesting to follow these children to find whether later developments indeed take place, and whether the narrative deficits of the PLI group might diminish over time. In addition, it would be preferable to include a second measure of narrative cohesion for purposes of validity, as the proportion of implicit references only provides a limited view into the use of cohesive devices.

A last limitation concerns the use of the CCC to identify children with PLI. While the CCC has been found adequate for screening purposes (Ketelaars *et al.* 2009), one should be careful to use it as a clinical tool for diagnosis. As we did not exclude children with a diagnosis in the PLI group, our PLI group might in fact consist of children with a range of developmental issues and should not be equated to children with the new diagnosis of SCD. The fact that our group shows delays and deficits in more pragmatic aspects of narrative competence (i.e. story content) as well as more linguistic aspects of narrative competence (i.e. subordinate clauses, ML5LU) supports this idea. However, the young age of the children in our study makes it infeasible to rely on diagnoses for inclusion as well as exclusion criteria, as many children will not have been diagnosed at this age. To capture a group using consistent criteria, we used a prognostic design, using an instrument that can screen for pragmatic language problems.

Although not the primary goal of our research, the results also increase our knowledge of the development of narrative competence in TD children. With our longitudinal approach we were able to identify important developments that take place between 5 and 7 years of age. In accordance with findings of Schneider *et al.* (2006), we found an increase in narrated plot components and in line with Berman (1988) we found marked improvements in story length and subordinate clauses. As such, the early school years seem to be an important source of enrichment for narrative competence.

Two important clinical implications follow from the present study. Firstly, this study has provided us with information concerning the use of narrative assessments.

Although many studies have made use of narrative assessment and clinicians increasingly apply narrative tasks for diagnostic purposes, few studies have explicitly investigated dimensions and stability of narrative competence. Our findings concerning separate dimensions and stability support the use of narrative assessments in clinical practice. In combination with the fact that narrative assessment is considered ecologically valid, narrative assessment provides a valuable tool for clinical practice.

A second important clinical implication of this study concerns the questions surrounding the nature of PLI. Our results show that children who screen positive for PLI at an early age exhibit serious problems even after an extended period of time. The narrative developments visible in these children are consistent with the view of PLI as a disorder: not only did the PLI group fail to show a tendency to catch up with their TD peers, but their performance was sometimes not even comparable with the performance of younger TD children, suggesting a qualitative difference rather than a quantitative. As reduced narrative competence can have large repercussions at the social as well as the academic level, the results suggest that therapy might be necessary to improve the long-term outcomes for these children. Preliminary results suggest that interventions aimed at improving narrative skills can lead to marked improvements in narrative competence as well as transfer to other areas of development (for a review, see Petersen 2011), making it a valuable tool for clinicians. Effective treatment, however, requires more in-depth research into the long-term effects of narrative treatments in various clinical and non-clinical populations. It also requires improvements in differential diagnosis of PLI (or its successor SCD) versus developmental disorders such as autism spectrum disorders, as the required approaches may be different depending on the underlying causes of the PLI symptoms.

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