

Development of cohesion in normal children's narratives.

Research Report

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Abstract

In this study the development of cohesion in narration in typical developing children was investigated. There is no assessment tool for cohesion yet. In this study, an analysis to measure cohesion was developed. Cohesion was measured using the Renfrew's Bus Story Test Dutch adaptation (RTNA)(Jansonius & Borgers 2009). Narrations of 6 groups of children 4;00 until 10;00 years of age, 30 in each age group, were analyzed for cohesion and compared with each other. Nearly all variables showed a development in cohesion between these age groups over time. The bus story test (RTNA: Jansonius et.al. 2006) proved to be a diagnostic valid instrument to measure cohesion in children's narratives. Moreover, this study proved that besides plot-structure analyses, separate analyses for cohesion are needed to assess.

Keywords: Renfrew's Bus Story Test Dutch adaptation, cohesion, narratives, typical developing children.

Introduction

Cohesion

In pragmatics, coherence and cohesion are two factors distinguished in discourse (Roelofs 1998). Coherence is seen as the relatedness of a story on macro level (Peterson 1993). That means, utterances are related on a clear, meaningful manner to each other (Craig & Tracy 1983). For coherence, there are no specific components in discourse, because coherence is established by implicit relations of meaning (Roelofs 1998).

Cohesion is a tool to attain coherence and is the meaningful connection between sentences (Norbury & Bishop 2003; Roelofs 1998). Cohesion refers to apparent components in the discourse. It occurs when the interpretation of an element in the discourse is dependent from another element inside the discourse (Halliday & Hasan 1976). Cohesive relations are semantic ones realized by the lexical-grammatical system, especially through the use of verbal devices (Adams 2002; Roelofs 1998). The use of cohesive devices sets up a series of inferences to be made by the speaker and reduces redundancy in communicative exchanges (Adams 2002). To use cohesion correctly, the narrator has to take into account the perspective of the character in order to make the actions of this character understandable for the listener and subsequently clearly explain them to him (Roelofs 1998; Wigglesworth 1997). Such a skill requires Theory of Mind abilities (Roelofs 1998) the narrator has to possess.

Cohesive ties between sentences consist of conjunctions (coordination and subordination) and references (introductions and referrals) (Halliday and Hasan 1976; Liles 1985; Strong & Shaver 1991) . For example, if a child says 'The bus drove further. *And* he came in a city. The word '*and*' is a coordination and the use of this coordination links these two utterances by expressing an additive relationship. The use of '*he*' is another example of a cohesive device, namely a referral; the speaker has referred to an individual named in a previous utterance (Strong & Shaver 1991).

One way to achieve cohesion is the use of references with pronouns and demonstratives. This, to refer to a person, object or act, which have already been established in the interaction (Adams 2002). Halliday & Hasan (1976) distinct personal, demonstrative and comparative reference. Personal and demonstrative reference is expressed by pronouns: comparative reference by adjectives or adverbs. In the current research, only personal references

(introductions and referrals) are measured. That is because, in the development of cohesion, several studies on the frequency of introductions and referrals in narratives show that the use of both of them increases with age (from two till ten years).

However, it is not clear when the acquisition starts. In scientific literature, some authors state there is an early acquisition, others say there is a late one (Roelofs 1998; Wigglesworth 1997).

According to Bamberg (1987) there are several strategies used in referring. He described those strategies guiding children's reference in a given period:

1. Nominal Strategy: children younger than four year old. Each character is named by a noun, less pronouns are used i.e.:

'The bus is going to drive'. 'The bus drives fast'.

2. Local contrast strategy: in children under six years old. No pattern for reference. Children choose references based on the situation.

3. Thematic subject strategy: middle school age children, seven, eight and nine years old. One person is referred to by pronoun. The other personages are referred with a noun, i.e.:

'The bus drives into a meadow.'

'He sees a cow.'

'The cow says moeh!'

'The cow says I can not believe what I see' .

4. Anaphora strategy: This is the adult strategy. This strategy starts to occur at the age of five and is the most important strategy in nine year old children. Introducing a character is basically done by an indefinite noun phrase. If the entity is previously mentioned, the narrator is obliged to use a definite noun phrase. In case of reference maintenance a pronoun is used.

Conjunction is another tool to achieve cohesion. Conjunction is used to express the relationship between episodes (Halliday & Hasan 1976). Furthermore, conjunctions are words that tie two syntactic components together. Besides this obligatory feature, conjunctions also possess a semantic feature, whereby the nature of the relationship can be expressed (Halliday & Hasan 1976). One of the relation can be 'cause'. (i.e. The bus continued on its own, *because* the train goes into a tunnel). The conjunction is a special form of cohesion, because the meaning of the word reflects the relationship between previous components of the discourse and that what comes next (Halliday & Hasan 1976).

Types of conjunctions the speaker can use are coordinations (e.g. but, or, thus, than etc.) and subordinations (e.g. while, next, meanwhile, because, whereby etc.). A coordination connects two head sentences with each other (i.e. 'There stands a cow *and* he says moeh'). A coordination is placed at the beginning of the following sentence or can be considered as a contracted one (Roelofs 1998). A subordination connects a depending clause with a head sentence or another depending clause (i.e. 'There stands a cow *who* says moeh'; 'there was a policeman *who* was shouting at the bus, *which* did not want to listen'). The relation between sentences can also be shown implicit in the meaning of the following episodes. When there is no conjunction used, it does not mean that no relation between episodes is present (i.e. 'Hij besloot (*om*) het nooit meer te doen'. English translation: 'He decided never to do it again') (Roelofs 1998).

In studies considering development of cohesion, the authors state that children at the age of four start to realize that every individual has its own knowledge. Besides, this knowledge (belonging to the Theory of Mind), can differ from the knowledge the child itself possess (Roelofs 1998). In child's expressive language this is not already found at this age. In addition, Wigglesworth (1997) researched cohesive devices in children in the age of four, six, eight, ten years and as an adult. Wigglesworth (1997) noticed that four-year-old narrators did not demonstrate any clear strategy in cohesion, only using strings of pronouns without any clear antecedents. Thereby, making it difficult to the listener to comprehend the story in case the listener did not see the pictures (Wigglesworth 1997). Children older than four years old choose a thematic strategy, in which they used pronouns to refer to the main character regardless of the situation. This corresponds to the strategies Bamberg (1987) mentioned earlier, talking about subdivisions in children's cohesion in narratives. Development in the use of cohesive devices in children older than four years seems to contain mainly conjunctions and references (Roelofs 1998). There was also shown that the amount of references increased with age. In conjunctions however, there were only differences in subordinations, who increased with age (Roelofs 1998).

Narratives

In order to measure cohesion, narratives are often used. Narration is characterized by one long speech turn of the child in which all language abilities (e.g. language content, language form and language use) have to be integrated into a for the listener understandable story (Mc Tear 1985

in: Blankenstijn & Scheper 2003). Narration is one of the most complex skills in linguistic ability, it requires an integration of linguistic and social skills (Befi-Lopes et.al. 2008; Ketelaars 2010; Mc Tear & Conti-Ramsden 1994; Norbury & Bishop 2003; Paul & Smith 1993). It requires skills in conceptualization – such as idea formation, linearization of these ideas, adequate referring (cohesion) as well as taking adequate perspectives towards the listener in telling about the events, happening to the protagonists in the story (Levelt 1989). These different aspects of narrative competence are subject of developmental growth throughout the school years (Ketelaars 2010). At the age of six years, most of the narratives produced consist of complete episodes, with initiating events, motivating states, attempts and consequences (Peterson & McCabe 1983; Roelofs 1998)

Narratives are widely considered to be an ecologically valid measure to assess pragmatic performance (Botting 2002; Ketelaars 2010; Paul & Smith 1993; Roelofs 1998) . The advantage of using narratives as an assessment tool is that with these stories information on several linguistic levels can be obtained. Besides, it is possible to analyze specific aspects of linguistic structure both within and between sentences, but also to assess the organization of story content (Ketelaars 2010). It is useful to assess idea formation, planning, perspective taking and referencing (Befi-Lopes et.al. 2008; Levelt 1989; Norbury & Bishop 2003; Roelofs 1998). Thereby, Adams (2001) states that narration may be a sensitive instrument to profile language learning disabilities in children with pragmatic language impairment. Also, narration is a tool to measure any change in narrative ability over time, particularly in school-aged children (Adams 2001). In conclusion, narrative tasks would seem to be an ideal index for assessing these higher level language skills and thereby making predictions about academic performance in young children (Ketelaars 2010; Paul & Smith 1993).

Clinical value of the assessment of cohesion

With the test used in the current study, the RTNA (Jansonius & Borgers 2009), it is possible to diagnose children with SLI (specific language disorder) or PLI (pragmatic language disorder) (Ketelaars 2010). Ketelaars (2010) found that, with the RTNA (Jansonius & Borgers 2009), children with specific pragmatic problems (PLI) can be detected. PLI is characterized as an impairment in the use of language in social contexts and has originally been classified as a language disorder (Adams 2002; Ketelaars 2010). Children with PLI show a different language use compared with typical developing children. This is because the pragmatic difficulties are

clustered with other linguistic domains, such as syntactic or semantic difficulties (Rapin & Alan 1983; Roelofs 1998). These children show difficulties in taking perspectives in the communication, inadequate conversational skills, poor maintenance of the conversation topic and they often use stereotypes in their language output (Rapin & Allen 1983). Nowadays, language tests assessing language development deal with language content and language form. With these assessments children with PLI are hard to detect, because their syntactic skills and phonology are rather unimpaired (Rapin & Allen 1983).

Children with PLI suffer also from word finding deficits (Rapin & Allen 1983). These problems also lead to less accurate references. Furthermore, Ketelaars (2010) found in her study evidence of difficulties relating to cohesion, although she used only one measure as indicator of cohesion, namely implicit referencing.

We assume, that the narratives of children with PLI, show also poor cohesion, due to their pragmatic problem. We have the opinion that cohesion can be studied in a more detailed way with the RTNA Bus Story Test (Jansonius & Borgers). Therefore more information about the normal development in cohesion in children with a typical language development is needed.

Present study

In the current study the Bus Story Test of the RTNA (Jansonius & Borgers 2009) was used. No standardized tests are available. Studies have established simple assessment systems such as referent using linguistic context, referent recoverable from the situation and ambiguous or unrecoverable referent (Adams & Bishop 1989 in: Adams 2002). However, there are definite drawbacks to any analysis of cohesion. Although it is a fact that the linguistic markers of cohesion are observable phenomena, inter-observer reliability tends to be poor and the versatility of the use of cohesive devices in the normal child is large. This indicates poor discriminatory potential for pragmatic assessment (Adams 2002).

Although there are drawbacks in the assessment of cohesion, the Bus Story Test (RTNA, Jansonius & Borgers 2009) seems a capable test to assess cohesion. In this test a story has to be retold, told by the examiner before. Several personages are introduced in the story. In some events one head character is involved, and in other events there are more characters introduced playing a role besides the head character. That means several characters have to be introduced and the child must often change reference between different these ones. The child needs skills

to introduce the person adequately and refer to it (Roelofs 1998). In this study cohesion will be analyzed in order to answer to following questions.

Research question:

Can a developmental line in cohesion in typical developing children aged 4;0 until 10;00, with help of the Bus Story Test of the RTNA (Jansonius & Borgers 2009) be established,? If so, which variables mark this development especially ?

Sub-questions are:

- Is there a development in the use of complete ties?
- Is there a development in the use of incomplete ties?
- Is there a development in the use of introductions?
- Is there a development in the use of referrals?
- Is there a development in the use of coordination?
- Is there a development in the use of subordination?
- Does a relation exist between the quality of the plot-structure of the story of the child in relation of the quality of cohesion, the child utters?

Hypothesis of the main research question are:

H0: A developmental line regarding cohesion in children's narratives with use of the Bus Story Test in RTNA (Jansonius & Borgers 2009) can not be drawn.

H1: A developmental line regarding cohesion in children's narratives with use of the Bus Story Test in RTNA (Jansonius & Borgers 2009) can be drawn.

Method

Type of this research study

Purpose of this study is to examine if a developmental line in cohesion in typical developing children's narratives can be established. This will be described within the framework of a cross-sectional study in which language data are collected at one point in time with use of different age groups of children (4;00 until 10;00 years of age responding to a specific language task) in which the children retell a story. In doing so, the status of the specific phenomena of cohesion in children's narratives and the relationships among these phenomena at a fixed point in time (Polit & Beck 2008) can be shown.

Subjects

Cohesion data are forthcoming from already collected transcripts of narratives of typically developing children in the age of 4;0 to 10;00 years of age, part of the RTNA standardization study (Jansonius et al. forthcoming). The children were selected with help of the primary schools in the Netherlands. Child's parents were asked to fill in a questionnaire to consent the participation of their child and to give case history information. Jansonius et.al. (2007) state that deviant children in a standardization study are problematic. Therefore, all children were selected strictly (Table 1 Selection criteria). In order to determine a standard score, it is important that only typically developing children participate in such a study. In this way a normally distributed group of children was collected.

Well-trained speech therapy students, guided frequently by supervision, collected children's narratives. The DVD's with the stories were transcribed, segmented in utterances and analyzed with help of the manual of the RTNA (Jansonius et.al. 2006; Jansonius & Roelofs 2007; Jansonius & Borgers (former Roelofs) 2009) in a double blind way.

Table 1. Exclusion criteria of children in the standardization study

Child's parents were born in the Netherlands and are Dutch; the child is not bilingual.
Child's parents do not possess a speech-, language-, hearing-, reading- and/or writing disorder.
Child's main caretaker (mainly the mother) is among all classes of society, strictly categorized in socioeconomic groups
The child was born in time , between 37th and 42th week of pregnancy.
Child's birth weight was between 2750-4250 gram;

There was a medical APGAR-score between 8 and 10 established 5 minutes after birth

The child has no congenital abnormalities (such as a cleft)

The child was admitted to primary school education

- The child has no severe hearing disorder or is deaf
- The child has no severe visual handicap
- The child has no severe physical handicap
- The child has no psychiatric disorder, determined by a psychiatrist;

The child has no mental handicap according to the teacher.

The child has a normal learning development (receives no support from Special education); the child is not repeating a class or has a history of repeating a class. (Jansonius et.al. 2007)

In the Bus Story Test, part of RTNA (Jansonius & Borgers 2009), children retell a story about a bus told by the examiner before, with help of 12 pictures, visualizing the story. With these data of children's narratives the presence of plot-structure components, side issues and irrelevant utterances and cohesion (variables are shown in Figure 1) can be analyzed.

In order to estimate the criterion validity of the RTNA (Jansonius & Borgers 2009), some other test are also assessed namely the Raven Coloured Progressive Matrices (CPM) (Raven et.al. 1984), Taaltoets Alle Kinderen Passive Vocabulary (Verhoeven & Vermeer 2001) and Taaltoets Allochtone Kinderen Sentence Comprehension 2 and 3 (Verhoeven & Vermeer 1986) were performed.

In order to examine how many narratives were needed to answer the research questions of this study, a power analysis was executed. In power analysis, the ability to detect relationships that exist among variables, is expressed (Polit & Beck 2008). A power analysis is a method for estimating the probability of committing a Type II error or indicating sample requirements (Polit & Beck 2008). Power of this study is calculated with the program GPower 3.1. For the sample size calculation an effect size of 0.5 and an alpha of 0.05 was assumed.

The calculations showed that 26 subjects within each age group were needed to obtain a power of 0.80 (see Table 2).

Table 2. Outcomes of the Power analysis based on th Gpower 3.1 program.

Analysis:	A priori: Compute required sample size		
Input:	Tail(s)	=	Two
	Effect size p	=	0.5
	α err prob	=	0.05
	Power (1- β err prob)	=	0.80
Output:	Noncentrality parameter δ	=	2.9439203
	Critical t	=	2.0638986
	Df	=	24
	Total sample size	=	26
	Actual power	=	0.806317

For the purpose of this study, 6 age groups were formed with 30 children each, 4;00 until 10;00 years of age (Table 3).

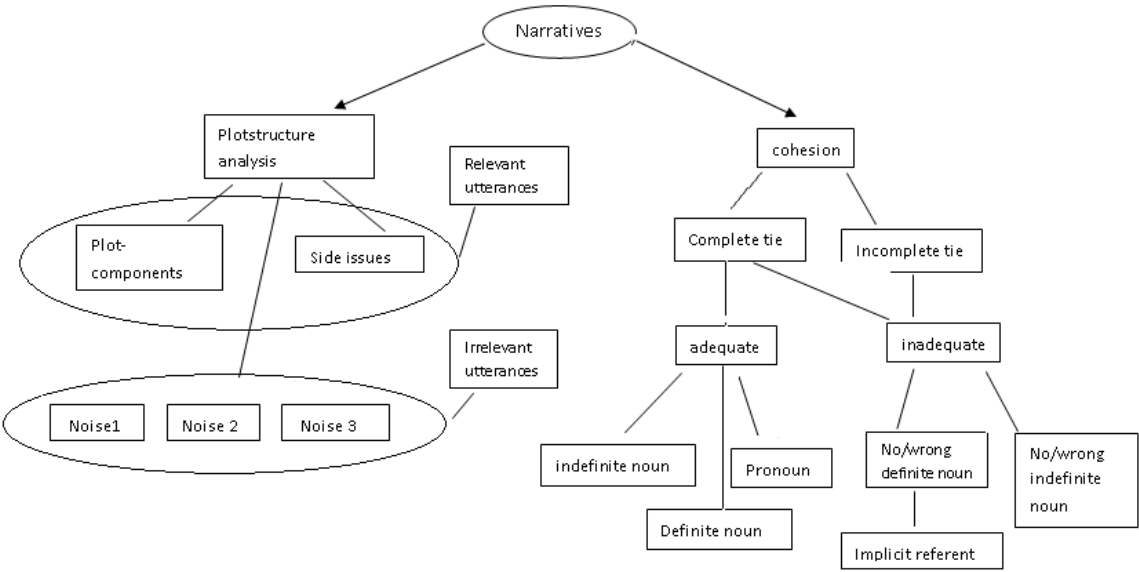
Table 3. Subjects in this study divided in age groups

Group	Mean (age in years)	N	SD
4;00 -4;11	4;6	30	0,28
5;00- 5;11	5;5	30	0,23
6;00 – 6;11	6;5	30	0,23
7;00 – 7;11	7;5	30	0,29
8;00 – 8;11	8;4	30	0,22
9;00 – 9;11	9;5	30	0,26

Analyzing procedure

In the Bus Story Test of RTNA (Jansonius & Borgers 2009), no design for the analysis of cohesion is described yet. In this study, an analysis will be developed to assess cohesion, especially to be used within the analytic framework of the Bus Story Test (RTNA, Jansonius & Borgers 2009). The analysis of cohesion for the Bus Story Test is based on the study of Halliday and Hasan (1976), Liles (1985) and Roelofs (1998) (see figure 1).

Figure 1. Overview of variables measured in this study and their intrinsic relationship.



Plot-structure components, side-issues and irrelevant utterances (the information given by the child that did not correspond to the story as told by the examiner before) were identified and counted (in proportion) such as seen in Figure 1 (left side), described in the manual of the RTNA (Jansonius & Borgers 2009).

Before analyzing cohesion on a micro level, each sentence had to be read separately on a macro level as a complete unit. Thereafter, the relation of the utterance with the previous sentences was examined (Halliday & Hasan 1976). Then, cohesive ties were identified and counted. Each tie was coded as a complete or incomplete tie (see Table 4). In case of a complete tie, it means that the information referred to by the cohesive is correctly understood and defined without any ambiguity. A tie is incomplete if the information referred to by the cohesive tie is not provided in the text (Halliday & Hasan 1976).

Table 4. Examples of coding complete and incomplete ties.

Dutch	English
<i>Complete tie (seven year old girl) :</i>	
Er was eens <i>een bus</i>	<i>Once upon a time, there was a bus</i>
En <i>de buschauffeur</i> reed erin	And the bus driver was driving him
‘ him ’ refers to the bus	
<i>Incomplete tie (eight year old girl):</i>	
<i>De bus en de trein</i> trokken gekke bekken naar Elkaar. Toen moest hij alleen verder	The bus and the train made funny faces to each other. But he had to go on alone.
It is not sure who is meant by ‘ he ’, the bus or the train	

Thereafter, each character in the tie was categorized as introduction or referral (see Table 6 and 7). The number of introductions and referrals were counted. Then introductions and referrals were scored whether they were adequate or inadequate. When the references were adequate, they were subdivided into type of reference: indefinite noun (indefNP), definite noun (defNP) or pronoun (personal or demonstrative). When the head character, the bus is introduced first, one would expect an indefinite noun to be used (e.g. ‘Once up on a time there was *a* bus’). Use of a definite noun (*‘The bus meets a train’*) or a pronoun (*‘He meets a train’*) assumes prior knowledge of the listener. The use of a definite noun phrase would also be required to reintroduce the referent after another character has become the focus of attention (Norbury & Bishop 2003).

If the references were inadequate they were categorized as wrong/missing definite noun or indefinite noun (See table 5). If the utterance was an incomplete tie with inadequate references, the utterance was paraphrased into a meaningful sentence in order to analyze cohesion mistakes in an adequate way.

Table 5. Scheme for analyzing referring

Reference	Adequate	Inadequate
Introduction	Indefinite Noun Phrase	Definite Noun Phrase Pronoun
Referral	Definite Noun Phrase Pronoun	Indefinite Noun Phrase Pronoun (implicite referral)

Table 6. Example of analyzing adequate and inadequate introductions.

Dutch	English
<i>Adequate Introduction (six year old boy):</i>	
<Nou eh> er was eens <één eh meneer~> een buschauffeur	<eh> there was <one, eh, man> a bus driver
(introduction, adequate: indefinite noun)	
<i>Inadequate Introduction (five year old boy):</i>	
{en} hij rijdt het allereerste langs de trein	<And> first, he drives beside the train
<i>Paraphrase: First, he drives along a train</i>	
(introduction, inadequate: no indefinite Noun, <i>because the train was not mentioned earlier.</i>).	

Table 7. Example of analyzing adequate and inadequate references.

Dutch	English
<i>Adequate Referral (nine year old girl):</i>	
Er was eens een hele ondeugende bus. Maar hij was kapot.	Once upon a time, there was a very naughty bus. But he was out of order
(referral, adequate, pronoun)	
<i>Inadequate Referral (four year old boy):</i>	
Daar zag de bus een trein. Was die gaan rijden.	Overthere, the bus saw a train. He was starting to drive.
(referral, inadequaar, no definite noun)	
<i>Paraphrase: The bus was starting to drive</i>	

Finally, conjunctions in narratives were analyzed (see table 8).

Table 8. Example of analyzing coordinations and subordinations

Dutch	English
<i>Coordination (nine year old girl):</i>	
Maar hij ging er vandoor	But he ran away
<i>Subordination (eight year old boy):</i>	
En toen deden ze wie het hardste kon rijden	And then they started to race each other

Statistical Analysis

For statistical analysis, the data of the measurements on cohesion had to be transferred to SPSS 17.0. The six groups (4,5,6,7,8,9 year) were compared with each other using multifactor ANOVA, an appropriate statistical measurement for answering the question if children of a specific age group were more/less advanced in cohesion than others. ANOVA is the parametric method for testing differences between means with three or more normally distributed groups (Polit & Beck 2008), which is the case in this research. Thereafter, post-hoc tests (Bonferroni) were executed for all groups which showed to be significantly different from each other. A post-hoc test is a procedure comparing all possible pairs of groups following a significant test of overall group differences (Polit & Beck 2008). Correlations between data were measured with Paerson's r-product-moment correlation coefficient. A correlation (r) up to 0.7 will be considered as strong (Polit & Beck 2008).

Interjudge Reliability

In order to examine whether the measurements were reliable the inter-judge reliability between examiners was counted. Interjudge reliability is the degree to which two observers, operating independently, adjudge the same ratings or values to the cohesive ties being measured (Polit & Beck 2008). Two examiners analyzed in each age group six bus stories and the comparison was calculated with Pearson's coefficient (r). A reliability between 0.8 and 1.00 is considered as good, between 0.6 and 0.8 as moderate, between 0.4 and 0.6 as weak and below 0.4 as insufficient (Sacket et.al. 1991) (see table 9).

Table 9. Degree of correlation in Sacket et.al. 1991

$r < 0.4$	Insufficient
$r 0.4 < > r 0.6$	Weak
$r 0.6 < > r 0.8$	Moderate
$> r 0.8$	Good

In cohesive adequacy, a good inter-judge reliability was found for complete ties ($r = .98^{**}$), incomplete ties ($r = .954^{**}$), adequate reference ($r = .973^{**}$), inadequate reference ($r = .929^{**}$). Also for cohesive categories as introductions ($r = .972^{**}$), referrals ($r = .987^{**}$), implicit references ($r = .992^{**}$), definite noun phrases ($r = .990^{**}$), indefinite noun phrases ($r = .985^{**}$), pronouns ($r = .951^{**}$), no definite noun ($r = .884^{*}$) no indefinite noun ($r = .919^{**}$) a good reliability was

found. Concerning the conjunctions coordination ($r=.971^{**}$) as well as subordination ($r=.966^{**}$) showed a good reliability.

*: Correlation is significant at the 0.05 level (2-tailed).

** : Correlation is significant at the 0.01 level (2-tailed).

Results

Cohesive adequacy

Within cohesive adequacy the following data were found (see table 10).

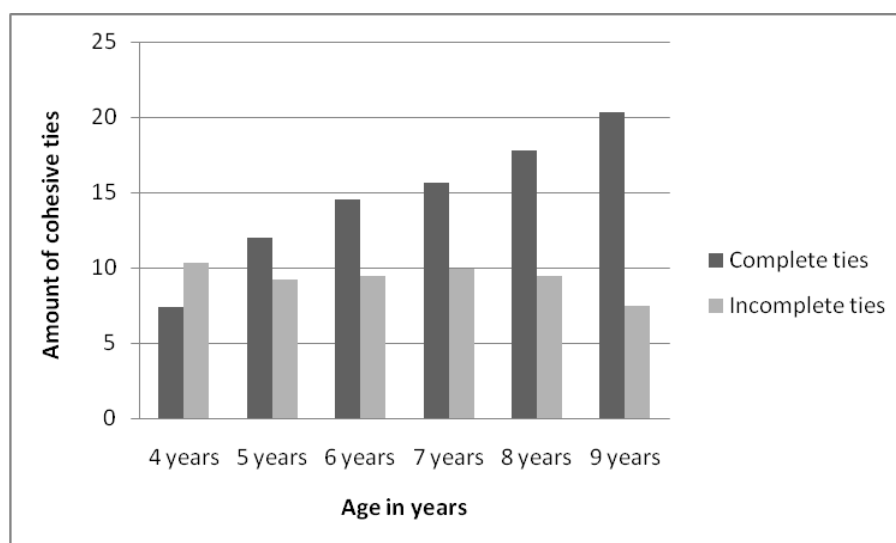
Table 10. Development in Complete and Incomplete ties (N=30 for each group).

group	Complete ties			Incomplete ties		
	mean	SD	p-value	mean	SD	p-value
4 year old	7,40	4,18	0,000***	10,30	4,24	0,185
5 year old	12,00	4,46	0,003**	9,20	3,85	0,882
6 year old	14,53	6,35	0,947	9,47	5,14	0,835
7 year old	15,67	4,99	0,251	9,93	4,53	0,405
8 year old	17,77	7,40	0,007**	9,47	4,82	0,835
9 year old	20,30	6,43	0,000***	7,50	3,91	0,015*

* p<0.05, ** p< 0.01 en *** p< 0.001

There was a significant difference on the complete ties between age groups ($p=.000$). The four year old children differed significantly from all other age groups ($p=.000$). The six year old group differed significantly from four- ($p=.000$) and nine year old children ($p=.002$), however not from five- ($p=.219$), seven- ($p=1.00$) and eight year old children ($p=1.00$). The nine year old group differed significantly with all groups ($p=.000$), except the eight year old group ($p=1.00$). Figure 2 shows an increase in complete ties between different age groups.

Figure 2. Development in cohesive adequacy



Concerning the incomplete ties no significant differences were found. However, nine year old children showed a significant difference with the other groups ($p=.015$), a decrease in incomplete ties.

Cohesive categories

In order to answer the sub-question whether there is a development in introductions and referrals, results are shown in table 11. A significant difference between groups in the use of introductions ($p=.000$) as well as referrals ($p=.000$) was found. In introductions the four-, five-, eight- and nine year old children each differ significant with the other age groups. Figure 3 shows a steady development from four year on in the number of introductions.

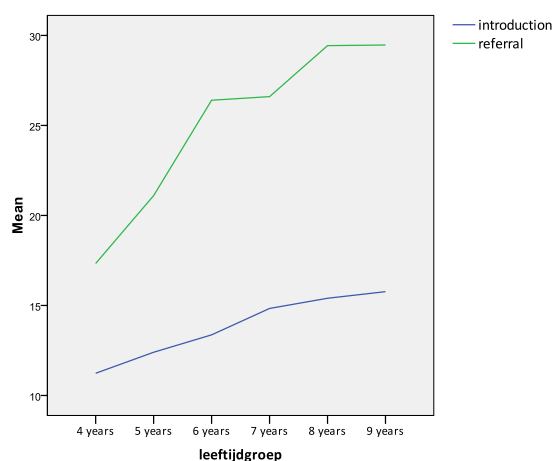
On post-hoc tests, the four year old children differed significantly with all age groups, except for the five year olds ($p=1.00$). The five year old group differed significantly from the seven- ($p=.009$), eight- ($p=.000$) and nine year ($p=.000$) ones, but did not differ from the four- ($p=1.00$) and six year old children ($p=1.00$).

Table 6. Development in introductions and referrals (N=30 for each group).

group	Introductions			Referrals		
	mean	SD	p-value	mean	SD	p-value
4 year old	11,23	2,88	0,000***	17,33	7,54	0,000***
5 year old	12,40	2,71	0,006**	21,10	7,06	0,002**
6 year old	13,37	2,59	0,371	26,40	6,35	0,299
7 year old	14,83	2,68	0,054	26,60	6,17	0,233
8 year old	15,40	2,54	0,002**	29,43	6,06	0,001***
9 year old	15,77	2,69	0,000***	29,47	5,16	0,000***

* $p<0.05$, ** $p<0.01$ en *** $p<0.001$

Figure 8. Development in introductions and referrals



Concerning referrals, significant differences between four year old children and older children were also found, except for the five year olds ($p=0.375$). The six-, seven-, eight- and nine year old groups did not differ significantly from each other. Furthermore, in figure 3 is seen a stagnation in the use of referrals between six- and seven year old children can be detected, also between eight- and nine year old children.

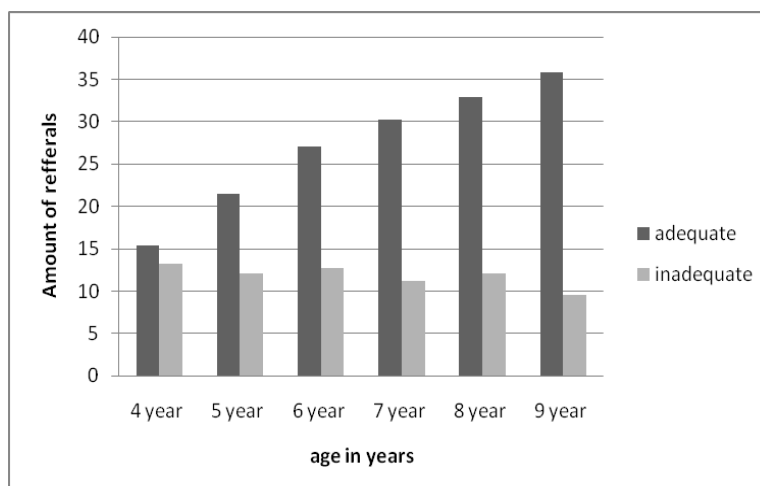
In this study, also a distinction was made between adequate and inadequate references (see figure 4). With help of ANOVA, a significant difference in age ($p=.000$) in adequate references was seen. There was a significant difference between the four year old children and all other groups. The six-, seven-, eight-, and nine year old groups did not significant differ from each other. In inadequate references no significant difference in age was shown, except for nine year olds. They differed significantly with all other groups (see table 12).

Table 12. Development in adequate and inadequate references (N=30 for each group).

group	Adequate			Inadequate		
	Mean	SD	p-values	mean	SD	p-values
4 year	15,37	7,80	0,000***	13,27	5,26	0,130
5 year	21,47	8,28	0,000***	12,07	5,82	0,784
6 year	27,10	8,89	0,976	12,70	6,12	0,354
7 year	30,30	8,38	0,040*	11,17	6,10	0,514
8 year	32,90	9,88	0,002**	12,03	6,25	0,810
9 year	35,80	8,61	0,000***	9,57	4,96	0,021*

* $p<0.05$, ** $p<0.01$ en *** $p<0.001$

Figure 4. Development in adequate and inadequate references.



In introductions and referrals a subdivision was made on types of adequate and inadequate ones (see table 13). The use of definite noun phrase ($p = .000$), indefinite noun phrase ($p = .000$) and pronoun ($p = .000$) differed significant between the age groups. There was a strong positive correlation between the use of adequate referents and the use of definite noun phrases ($r = .899$), indefinite noun phrases ($r = .721$) and pronouns ($r = .860$). The use of false/missing definite nouns did not differ significantly between groups. However, in four- ($p = .002$), five- ($p = .013$) and seven year old children ($p = .002$) each group significantly differed from the other age group (see table 13). In addition, a strong positive correlation was found between the use of inadequate referents and the use of implicit referents ($r = .943$) and wrong/missing definite noun phrases ($r = .942$).

Table 13. Development in definite noun phrases, indefinite noun phrases, pronouns, wrong/missing definite noun phrase, wrong /missing indefinite noun phrase.

		4 year (N=30)	5 year (N=30)	6 year (N=30)	7 year (N=30)	8 year (N=30)	9 year (N=30)
defNP	mean	8,63	12,20	14,50	14,87	17,27	18,20
	SD	4,97	4,15	4,66	5,05	5,48	6,15
	p-value	0,000***	0,008**	0,824	0,555	0,002**	0,000***
indefNP	mean	3,57	4,37	5,53	7,53	7,17	8,03
	SD	2,50	2,51	2,26	2,60	2,12	2,43
	p-value	0,000***	0,001***	0,216	0,002**	0,017*	0,000***
pronoun	mean	3,33	5,40	7,13	8,10	8,63	9,90
	SD	2,52	3,33	4,33	3,18	4,12	3,80
	p-value	0,000***	0,013*	0,943	0,078	0,025*	0,000***
wrong /missing defNP	mean	9,13	8,30	9,27	9,10	9,03	6,97
	SD	5,13	5,10	5,95	5,52	5,40	4,85
	p-value	0,658	0,708	0,684	0,600	0,653	0,060
wrong /missing indefNP	mean	3,83	3,63	3,17	1,93	2,43	2,30
	SD	2,12	1,71	1,78	1,48	1,57	1,51
	p-value	0,002**	0,013*	0,354	0,002**	0,189	0,082

* $p < 0.05$, ** $p < 0.01$ en *** $p < 0.001$

Conjunctions

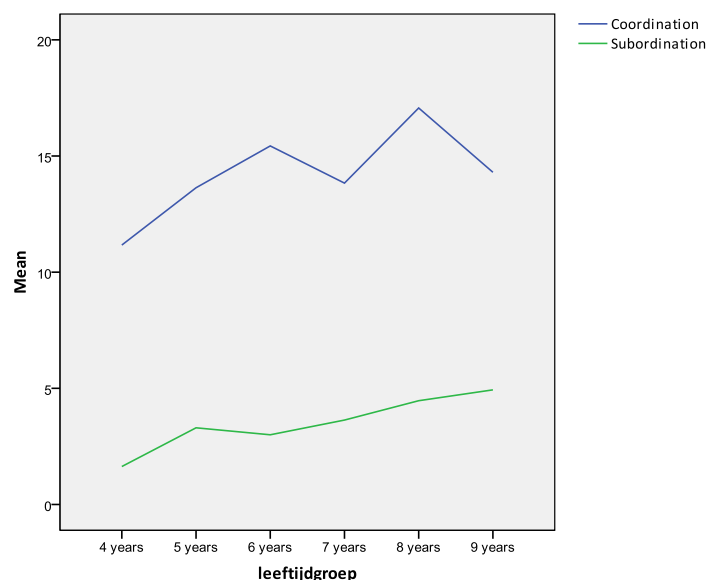
In conjunctions, coordination ($p=.004$) as well as subordination ($p=.000$), significant differences between age groups could be established. However, post-hoc tests were extracted and coordination only differed from each other between four- and eight year old children ($p=.001$)(Table 14). Figure 5 shows a dip in the use of coordination at the age of seven years. In the use of subordination children showed a quite steady development with a small dip at the age of six.

Table 14. Development in conjunctions (N=30 for each group).

group	Coordinations			Subordinations		
	Mean	SD	p-value	mean	SD	p-value
4 year old	11,17	6,78	0,002**	1,63	2,12	0,000***
5 year old	13,63	5,65	0,539	3,30	1,90	0,613
6 year old	15,43	4,54	0,144	3,00	1,84	0,237
7 year old	13,83	4,62	0,622	3,63	1,97	0,718
8 year old	17,07	5,99	0,004**	4,47	2,14	0,011*
9 year old	14,30	6,16	0,951	4,93	4,97	0,000***

* $p<0.05$, ** $p<0.01$ en *** $p<0.001$

Figure 5. Development in conjunctions



Plot-structure analysis in relation to cohesion

Based on Pearson's correlation coefficient a strong positive correlation was found between plot-structure components and introductions ($r= .721$) respectively referrals ($r= .751$). Also, the use of

side issues in children's narratives and introductions ($r = .7$) showed a strong correlation. Furthermore, there was a good, positive correlation between plot-structure components and adequate referents ($r = .783$) in one hand and between plot-structure components and indefinite noun phrases ($r = .703$) at the other hand. Finally, the number of utterances was correlated in a strong way with the use of complete ties ($r = .705$), the number of introductions ($r = .742$) and the number of referrals ($r = .912$) (See appendix).

Conclusion and discussion

Our aim of the present study was to find out whether there is a specific development in cohesion to establish in the narratives of children (4;00 until 10;00 years of age) with a typical language development. Our results showed that on every level of examination, nearly all variables belonging to a adequate use of cohesion showed significant progress with a decrease in cohesion mistakes. For each age the outcomes are presented in table 5 until 9. The most important outcomes are shown in Table 15.

Table 15. Most important results for each group

Domain	Measure	Age group	Most important results for each group
Narrative cohesion	Cohesive adequacy	4, 5 years	There is a development in complete ties up to age of six
		8,9 years	Development in complete ties continues
	Cohesive categories		
	Definite noun phrase	All age groups	All age groups used mainly definite noun phrases
	Indefinite noun phrase	All age groups	All age groups are able to use the indefinite noun phrase to introduce a character
	Pronoun	4 years 9 years	Very few pronouns After definite noun phrases, pronouns are mostly used
	Wrong/missing definite noun	4, 5, 6, 7 and 8 years 9 years	Many wrong/missing definite noun phrases . Less wrong/missing definite noun phrases compared to other ages groups.
Wrong/Missing indefinite noun phrase	All age groups	Wrong/missing indefinite noun phrases were minimally used .	
Conjunctions			
Coordination	7 years	A dip is shown compared to other age groups	

Complete and incomplete ties were examined in the whole group. The development in complete ties continued up to the age of six. Thereafter, at the age of six and seven progression was not seen anymore. From eight- and nine year old development in complete ties continues. This finding is partly consistent with results found in other studies. Liles (1985) stated that cohesive adequacy is fairly stable by age 7;6. Furthermore, Halliday and Hasan (1976) indicated that the quality of cohesion is already fairly stable by age six years.

Complete ties were subdivided into introductions and referrals. Introductions were expressed with a indefinite noun phrase. In referrals definite noun phrases and pronouns were used. Then, for referrals the development continued up to the age of six. Four year old children used mainly adequate definite noun phrases ($m=8,63$, $SD=4,97$) along with wrong definite noun phrases ($m=9,13$, $SD=5,13$). Pronouns were used in a very small amount ($m=3,33$, $SD=2,52$). A nominal strategy (Bamberg 1987), described earlier, could be established in this age group. In addition, Bamberg (1987) stated that children before age five could not handle nominal and pronominal forms in narratives of more extended length or in narrations containing more than one character in order to achieve a better coherence (Bamberg 1987). In addition, Wigglesworth (1997) had the opinion that four-year-olds did not demonstrate any clear strategy at all. This group showed pronouns without clear antecedents. The four-year olds tended to lack an overall organization in cohesion, namely a lack of apparent control over the pronominal system (Wigglesworth 1997). In five year old children predominantly the definite noun phrase ($m=12,2$ $SD=4,15$) was used in order to refer. A few amount of pronouns were present ($m=5,4$, $SD=3,33$). The wrong indefinite noun phrase was not expressed so often by the child. These five year old children seem to understand that a new subject has always to be introduced with an indefinite article, an 'a' standing before the noun phrase. Between four and five years of age, an increasing ability was seen in controlling the number of noun phrases (Liles 1993).

In the six year old group, again, these children used predominantly the definite noun phrase ($m=14,5$ $SD=4,66$) in their referrals. However, the other referrals were more equal to each other. These findings are in accordance with outcomes in previous studies. Roelofs (1998) described that six year old children used more often definite noun phrases than pronouns. Explanation is that they want to avoid being too implicit. Therefore, they prefer to be too obvious. Six year old children start referring anaphoric, but they are not very confident about it yet (Roelofs 1998). In

the current study, It is not clear whether the local contrast strategy or the thematic subject strategy (Bamberg 1987) is used by six year old children. No specific pattern for referrals was found. It is possible that the thematic subject strategy is already in development at this age. To examine which strategy is at issue, a more thorough analysis in the line of Wigglesworth (1997), is needed, looking at each cohesive tie per event in the story. Such an analysis was not executed here. In Wigglesworth's (1997) opinion, six year old children used nominal and anaphoric strategies as well as thematic ones. Adopting and maintaining strategy types was influenced by the referential load required in each segment. So, in the first event of the story, the thematic strategy was used more often, but for the second event it was given up, because more characters were introduced (Wigglesworth 1997). Within the narrative the complexity of the plot-structure differed.

An explanation for the developmental line in reference found in our study is that the use of references demands a complex integration of ideas. Referring back by 'he' or 'it' requires an organization of ideas primarily on a global level. That is, the speaker must maintain the distinction between characters, events and their relationships (Liles 1985). In this study was shown that the four- and five year old children were less able to chain different events to each other and did not oversee the global structure of the story. After the age of five no developmental differences in referrals between age groups were found. This means, a plateauing effect from the age of five on is present in development of referrals.

Possibly, the inconsistency with the current study can be due to task difference. Roelofs (1998) used a story generating design with the booklet ('The Frog Story': Mayer 1969). May be, story retelling (the current task with the Bus Story Test, Jansonius et.al. 2006) is more difficult to use references in.

In seven- and eight year old children the same pattern in referencing was shown. Definite noun phrases were mostly used, the other referrals were more equal to each other. Probably, children used the thematic strategy or anaphora strategy, looking at both age-groups and comparing them in terms of subdivision as proposed by Bamberg (1987). Similar to the current study, Roelofs (1998) found that seven year old children expressed more often definite noun phrases than pronouns. Seven year old children used more often pronouns than six year old children did, leading to an increase in implicit referents (Roelofs 1998). Moreover, as well in our study as in

the study of Wigglesworth (1997), eight year old children showed initially a strong preference for the anaphoric strategy, but switched over to the thematic or nominal one (Wigglesworth 1997). In togetherness with the findings in the current study, eight year old children seem not to have developed an anaphora strategy completely.

In the nine year old group the most used referral was, as at younger ages, the definite noun phrase ($m=18,2$ $SD=6,15$). Indefinite noun phrase ($m=8,03$ $SD=2,43$) and pronoun ($m=9,9$ $SD=3,79$) were equally used. A slight decrease in the use of wrong definite noun phrases was seen. It is likely that the nine year olds were using most of the time an anaphoric strategy.

Incomplete ties and inadequate references showed no significant difference in age. Also, implicit references did not. However, Ketelaars (2010) found a significant decrease of implicit references between 5 and 6 years old children as well as between 6 and 7 years old children, studied however longitudinally and not cross-sectionally as in our study. In addition, implicit referents also decreased in age in Roelof's study (1998), except in six year old children. In Adams' study (2002) the number of reference errors decreased later, between age nine and twelve. A decrease in implicit references took place at an older age than the children in this current study possessed.

Correlation Plot-structure components and Cohesion

In the current study the following correlations between plot-structure components and cohesion were found. First, as expected, the more utterances expressed, the more complete ties were present. Secondly, the more plot-structure components were used, the more introductions and referrals were present. When more plot-structure components were expressed, more new characters were introduced to refer too. Thirdly, the more side issues were heard, the more introductions were used. In side issues, there were fewer introductions, because they concern characters already introduced in the plot-structure. At last, the more plot-structure components were expressed, the more adequate references were found. If the child has more to tell, probably, the chance on more adequate references grows. However, the chance to an increase in indefinite noun phrases is also present. This was the fact in our study.

A close relation between plot-structure and cohesion was also found in previous studies. As mentioned before, Ketelaars (2010) stated that a lack of cohesion can be explained by language

skills. Also Orsolini (1990) believed that the application of cohesion across utterances was dependent on the still-developing episodic structure of the narrative. Story organization does not appear out of nothing. It is the result of cognitive plans (Liles 1993) growing in time. In accordance with the growth in expressing plot-structure components, also growth in cohesion was seen in Roelofs's study, showing a more advanced cognitive growth. Further, as mentioned before, cohesive relations are generated by a more advanced semantic-lexical-grammatical system (Adams 2002; Ketelaars 2010; Roelofs 1998). Adequate, more advanced syntactic skills are required to be able to produce better cohesive narratives (Ketelaars, 2010).

To conclude, a correlation between plot-structure components and some cohesive variables was found. However, not all cohesive ties correlate to the plot-structure components, thus not all linguistic skills needed for the construction of the plot-structure are inherent to cohesion. Therefore, a separate analysis for cohesion is needed to assess cohesion.

In literature, cohesion has been analyzed in generating and retelling stories (Liles 1993). In addition, different ways of providing the stories, for example visually or auditory were used in these studies. However, despite these task differences, in this study story retelling found the same results in development of cohesion as other studies did. The Bus Story test is thus a valuable tool for analyzing cohesion.

Recommendations

First, in this study an analysis for cohesion is developed. Longitudinal data is necessary to make this analysis an useable, valid and reliable measurement.

Secondly, Ketelaars (2010) found no difference in PLI and SLI children concerning cohesion. However, she examined only implicit referents in order to measure cohesion. Therefore, it would be interesting to examine development in PLI and SLI children with the more extended analysis of cohesion set up for the current study. In general, not only in PLI, cohesion can be studied. In all groups of language disturbed children in order to figure out which language ingredients contribute to cohesion.

At last, to examine which strategy (Bamberg 1987) is at issue, it would be interesting to examine a more thorough analysis in the line of Wigglesworth (1997), looking at each cohesive tie per event in the story in a larger group of children with a typical language development.

Summary

This current cross-sectional study describes the development of cohesion in narration in typical developing children in the age of 4;00 until 10;00 years of age. To measure cohesion, an analyzing tool was developed for The Bus Story Test (RTNA: Jansonius et.al. 2006). With help of this test not only cohesion development in children with a typical language development, but also with an atypical one can be studied. Most variables showed development in cohesion between age groups. Besides that, this study has proved that an analysis for cohesion is needed to assess cohesion. A plot-structure analysis only is insufficient for detecting specific pragmatic problems. Therefore, validation of this analysis would be an addition to Renfrew's Language Scales Dutch adaptation (Jansonius et.al. 2006) (RTNA) in which the authors enlarged the analyses with pragmatic ones.

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Appendix

- I. Form for analyzing cohesion
- II. Plot-structure Components in the Bus Story Test
- III. Correlations between cohesion and plot-structure components

I. Form for analyzing cohesion

Nummer Kind:	Transcriptie (code ideale plotsstructuur is hier weergegeven om plot** beter te kunnen scoren)	Plotcompon											IR	NS	O		
		Bijzaken	Ruis	Aantal	Uitlijnen	CT	IT	Introductie	Verwijzing	Adequat	Mier-ad						
	SETTING																
S1	1. Er was eens een heel <u>ondeugende</u> <u>bus</u>																
S2																	
S3	2. Op een dag wilde de buschauffeur met hem gaan rijden.																
	INITIËRENDE GEBEURTENIS																
I1	3. Maar hij was kapot																
I2	4. Dus moest de <u>buschauffeur</u> hem eerst <u>repareren</u> .																

II. Plot-structure Components in the Bus Story Test

	Plot-structure components
Setting	Once upon a time Introduction of the bus Introduction of the driver
Initiating Event	Bus is broken Driver mends the bus Bus runs away
Event 1	Beside a train Racing each other Train went into a tunnel
Event 2	Into the city Meeting a policeman Policeman shouts stop Ran on into the country
Event 3	Driving into a pasture Meeting a cow Racing down a hill
Event 4	Seeing water Falling into the pond
Outcome	Driver finds bus Telephoning for a crane Crane puts bus back on the road
Morality	Bus promises not to run away again
Emotional responses	Bus is tired of going on the road Driver is happy upon finding the bus

III. Correlations between cohesion and plot-structure components

		Correlations											
		Leeftijd	plot	bijzaken	OP	Ruis1	Ruis2	Ruis3	aantuit	CT	IT	intro	verw
Leeftijd	Pearson Correlation	1	,616	,442	-,027	-,283	,031	-,130	,470	,578	-,139	,520	,542
	Sig. (2-tailed)		,000	,000	,714	,000	,876	,082	,000	,000	,062	,000	,000
	N	180	180	180	180	180	180	180	180	180	180	180	180
plot	Pearson Correlation	,616	1	,589	-,203	-,362	-,125	-,151	,686	,689	-,039	,721	,751
	Sig. (2-tailed)	,000		,000	,006	,000	,095	,044	,000	,000	,807	,000	,000
	N	180	180	180	180	180	180	180	180	180	180	180	180
bijzaken	Pearson Correlation	,442	,589	1	-,227	-,271	-,082	-,048	,642	,591	,020	,700	,638
	Sig. (2-tailed)	,000	,000		,002	,000	,275	,521	,000	,000	,789	,000	,000
	N	180	180	180	180	180	180	180	180	180	180	180	180
OP	Pearson Correlation	-,027	-,203	-,227	1	,145	,129	-,031	,039	-,056	,082	-,257	-,056
	Sig. (2-tailed)	,714	,006	,002		,052	,085	,681	,607	,456	,277	,001	,453
	N	180	180	180	180	180	180	180	180	180	180	180	180
Ruis1	Pearson Correlation	-,283	-,362	-,271	,145	1	,185	,087	-,050	-,223	,093	-,146	-,125
	Sig. (2-tailed)	,000	,000	,000	,052		,013	,368	,502	,003	,212	,050	,094
	N	180	180	180	180	180	180	180	180	180	180	180	180
Ruis2	Pearson Correlation	,031	-,125	-,082	,129	,185	1	-,028	,446	,188	,190	,154	,329
	Sig. (2-tailed)	,876	,095	,275	,085	,013		,710	,000	,011	,011	,039	,000
	N	180	180	180	180	180	180	180	180	180	180	180	180
Ruis3	Pearson Correlation	-,130	-,151	-,048	-,031	,087	-,028	1	,053	-,112	,161	,004	,030
	Sig. (2-tailed)	,082	,044	,521	,681	,368	,710		,482	,134	,031	,952	,685
	N	180	180	180	180	180	180	180	180	180	180	180	180
aantuit	Pearson Correlation	,470	,686	,642	,039	-,050	,446	,053	1	,705	,174	,742	,912
	Sig. (2-tailed)	,000	,000	,000	,607	,502	,000	,482		,000	,020	,000	,000
	N	180	180	180	180	180	180	180	180	180	180	180	180
CT	Pearson Correlation	,578	,689	,591	-,056	-,223	,188	-,112	,705	1	-,534	,688	,668
	Sig. (2-tailed)	,000	,000	,000	,456	,003	,011	,134	,000		,000	,000	,000
	N	180	180	180	180	180	180	180	180	180	180	180	180
IT	Pearson Correlation	-,139	-,039	,020	,082	,093	,190	,161	,174	-,534	1	-,008	,184
	Sig. (2-tailed)	,062	,807	,789	,277	,212	,011	,031	,020	,000		,933	,014
	N	180	180	180	180	180	180	180	180	180	180	180	180
intro	Pearson Correlation	,520	,721	,700	-,257	-,146	,154	,004	,742	,688	-,008	1	,730
	Sig. (2-tailed)	,000	,000	,000	,001	,050	,039	,952	,000	,000	,933		,000
	N	180	180	180	180	180	180	180	180	180	180	180	180

Correlations

		Leeftijd	adeq	nietadeq	IR	NS	OS	defNP	indefNP	pron	geendeNP	geenindefNP
Leeftijd	Pearson Correlation	1	,820	-,170	-,087	,203	,439	,520	,552	,511	-,081	-,334
	Sig. (2-tailed)		,000	,023	,246	,006	,000	,000	,000	,000	,280	,000
	N	180	180	180	180	180	180	180	180	180	180	179
adeq	Pearson Correlation	,820	1	-,388	-,290	,343	,632	,899	,721	,860	-,283	-,426
	Sig. (2-tailed)	,000		,000	,000	,000	,000	,000	,000	,000	,000	,000
	N	180	180	180	180	180	180	180	180	180	180	179
nietadeq	Pearson Correlation	-,170	-,388	1	,943	,272	-,071	-,265	-,246	-,453	,942	,369
	Sig. (2-tailed)	,023	,000		,000	,000	,345	,000	,001	,000	,000	,000
	N	180	180	180	180	180	180	180	180	180	180	179
IR	Pearson Correlation	-,087	-,290	,943	1	,312	-,022	-,236	-,038	-,396	,983	,092
	Sig. (2-tailed)	,246	,000	,000		,000	,770	,001	,609	,000	,000	,219
	N	180	180	180	180	180	180	180	180	180	180	179
NS	Pearson Correlation	,203	,343	,272	,312	1	,199	,274	,257	,337	,306	-,099
	Sig. (2-tailed)	,006	,000	,000	,000		,007	,000	,000	,000	,000	,187
	N	180	180	180	180	180	180	180	180	180	180	179
OS	Pearson Correlation	,439	,632	-,071	-,022	,199	1	,612	,438	,516	-,015	-,234
	Sig. (2-tailed)	,000	,000	,345	,770	,007		,000	,000	,000	,839	,002
	N	180	180	180	180	180	180	180	180	180	180	179
defNP	Pearson Correlation	,520	,899	-,265	-,236	,274	,612	1	,465	,642	-,235	-,190
	Sig. (2-tailed)	,000	,000	,000	,001	,000	,000		,000	,000	,002	,011
	N	180	180	180	180	180	180	180	180	180	180	179
indefNP	Pearson Correlation	,552	,721	-,246	-,038	,257	,438	,465	1	,556	-,025	-,721
	Sig. (2-tailed)	,000	,000	,001	,609	,000	,000	,000		,000	,737	,000
	N	180	180	180	180	180	180	180	180	180	180	179
pron	Pearson Correlation	,511	,860	-,453	-,396	,337	,516	,642	,556	1	-,392	-,361
	Sig. (2-tailed)	,000	,000	,000	,000	,000	,000	,000	,000		,000	,000
	N	180	180	180	180	180	180	180	180	180	180	179
geendeNP	Pearson Correlation	-,081	-,283	,942	,983	,306	-,015	-,235	-,025	-,392	1	,072
	Sig. (2-tailed)	,280	,000	,000	,000	,000	,839	,002	,737	,000		,337
	N	180	180	180	180	180	180	180	180	180	180	179
geenindefNP	Pearson Correlation	-,334	-,426	,369	,092	-,099	-,234	-,190	-,721	-,361	,072	1
	Sig. (2-tailed)	,000	,000	,000	,219	,187	,002	,011	,000	,000	,337	