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Text comprehension and its relation to coherence and cohesion in children's fictional narratives Kate Cain University of Essex Running title: TEXT COMPREHENSION AND NARRATIVE PRODUCTION * Requests for reprints should be addressed to Kate Cain, Department of Psychology, University of Essex, Wivenhoe Park, Colchester, CO4 3SQ, UK. (E-mail: !! HYPERLINK mailto:kcain@essex.ac.uk r¶kcain@essex.ac.uk^L) To appear in British Journal of Developmental Psychology.

Text comprehension and its relation to coherence and cohesion in children's fictional narratives Abstract This study investigated the relation between children's text comprehension, their ability to produce a coherent and cohesive story, and the extent to which external cues aid these aspects of narrative production. Children with reading comprehension difficulties demonstrated deficits in both aspects of story organization, relative to same-age skilled comprehenders and younger children of equivalent comprehension ability. Their performance was poor when a topic title was used to elicit the narrative, but performance improved when stories were elicited with more informative verbal and pictorial prompts. Stories with poorer structures did not contain proportionately fewer connectives in general, but the type of connective included differed in relation to story event structure. These findings are discussed in relation to the use of coherence and cohesion in narratives and their relation to comprehension skill.

Narrative production has been used extensively to investigate developmental differences in children's story knowledge and their ability to produce structurally coherent and linguistically cohesive stories (e.g. Applebee, 1978; Peterson & McCabe, 1983; see Stein & Trabasso, 1981, and Yussen & Ozcan, 1996, for reviews). This body of work demonstrates considerable change during the early school years. Conventional features of stories such as formal openings, e.g. 'once upon a time,' and endings, e.g. 'and they all lived happily ever after', indicate knowledge of the narrative form. These story conventions occur more frequently in the narratives produced by 6- and 8-year-olds than in those produced by preschoolers (Applebee, 1978; Spinillo & Pinto, 1994). There are also age differences in the type of structural framework that children use to place events within a narrative. Four-year-olds tend to produce character or temporally bound narratives, but by 8-10 years of age children produce more sophisticated event sequences that are causally related and integrated (Applebee, 1978; Peterson & McCabe, 1983; Shapiro & Hudson, 1991; Spinillo & Pinto, 1994; Stein & Glenn, 1982). Finally, children's use of interclausal connectives to provide cohesion between the different sentences and clauses in their narratives becomes more sophisticated between 5 and 10 years of age (Shapiro & Hudson, 1991; Stenning & Mitchell, 1985). It is likely that some of the developmental gains in knowledge about story conventions, the structural coherence and linguistic cohesion of narratives are facilitated by literacy experience. Children with several years' experience of reading and listening to stories will simply have had more exposure to story conventions and well-formed stories than preschoolers. Indeed, children's recall of stories indicates that tacit knowledge of the structural importance of story units is related to general reading ability (Smiley, Oakley, Worthen, Campione & Brown, 1977). Knowledge about stories may also influence reading performance. For example, Perfetti (1994) proposes that a possible source of comprehension failure is inadequate knowledge about text structures, which may arise because of insufficient reading experience, and Peterson and Dodsworth (1991) note that narrative production is used in school to develop children's reading and writing skills. However, given the strong relation that exists between age and the organization of narratives, and the proposed relation between reading ability and story knowledge, it is surprising that there has been so little work investigating the relation between narration skills and text processing skills. The purpose of the current work was to address this issue by comparing the quality of oral fictional narratives produced by children with differing levels of reading comprehension ability. The analysis of the narrative productions was designed to explore the relation between two important characteristics of narrative, structural coherence and linguistic cohesion, and text processing skill. Structural coherence refers to the event structure (or macrostructure) of a narrative, which is how the events are related to one another. Linguistic cohesion concerns the semantic relations between different sentences or clauses (Karmiloff-Smith, 1985; Peterson & McCabe, 1991; Shapiro & Hudson, 1991, 1997). Coherence in a text may be realised by different types of cue that signal how people and things are related, e.g. referential coherence, and how events within that discourse are related on the basis of time, location, causality, and structure (Gernsbacher, 1997). The definition of coherence used in the current research was that used by Shapiro and Hudson's (1991, 1997) and concerns how the events and different parts of a story are interrelated and organized in a meaningful way, for example sequencing the events within a temporal or causal framework. According to this definition, coherence refers to the overall event structure of the narrative. Cohesion within a narrative is established by linguistic devices, such as interclausal connectives, which express the relations between the sentences or clauses that make up the story (1). In this sense, cohesive devices tie the story together at a local level by indicating the semantic relations between events, for example whether or not two events are causally related or the temporal sequence of two events. Coherence and cohesion describe different aspects of organization within a narrative. Shapiro and Hudson (1991) propose that mastery of structural coherence (overall event structure) enables children to focus on establishing linguistic cohesion (local

integration) when producing a narrative. They found that 6-year-olds produced stories with a greater proportion of temporal connectives relative to the stories produced by 4-year-olds, and that stories with the most coherent structures contained a greater proportion of dependent connectives than stories with less coherent structures. In addition, they suggest that the complexity of a story's structure will affect the interclausal devices that are used in that story. However, Peterson and McCabe (1991) note that the semantic function of many intersentence connectives is redundant because the narrator tends to relate events in their chronological order. They argue that the interclausal linguistic function of cohesive devices is only one of their roles and propose that these units also serve a conceptual or pragmatic function in the construction of mental models, where they can be used to indicate the relation between structural elements within the discourse (see also Segal & Duchan, 1997). Connectives may, therefore, be used by the author or reader of a text as signals which indicate how to integrate information into the text and what should be inferred about the relation between two events (e.g., Gernsbacher, 1997). According to this viewpoint, connectives may be crucial to the construction of a coherent integrated representation of a text, because they are used to provide explicit cues to the dependent relations between events and to establish structural coherence. Comprehension and coherence Text comprehension involves the construction of an integrated and coherent representation of a text's meaning (Gernsbacher, 1997). Therefore, we might predict a relation between a reader's ability to comprehend text and their ability to produce a structurally coherent narrative. Cain and Oakhill (1996) explored this idea by comparing the story productions of 7-8-year-olds who differed in comprehension level. Two different prompts were used to elicit the narratives, topic prompts and picture sequences. The topic prompts comprised a single word or phrase, such as "Pirates". Each picture sequence comprised six pictures that provided a clear story line in which the events were causally linked and in which the final outcome was the unintended consequence of a previous action. For example, in "The Fishing Trip" a family goes on a boat trip. At first the father has no luck catching any fish, then the little girl feeds bread to some birds which attracts the fish, and the father finally catches a fish. The reason for the happy outcome to this story depends upon causal linkage between these events. When narrating from topic prompts, children with weak reading comprehension skills were more likely to produce stories in which the main events were not causally related relative to the stories produced by both same-age skilled comprehenders and a younger comprehension-age match group. However, the less-skilled comprehenders' performance improved when they narrated from the picture sequences and they were more likely to produce stories that contained a causally integrated sequence of events in this condition. This study demonstrates a strong relation between story comprehension skill and the quality of story production. Furthermore, poorer performance by the less skilled comprehenders relative to the comprehension-age match group indicates that the ability to produce structured coherent stories does not simply arise from good reading comprehension experience. Rather, a deficit in this skill is more plausibly associated with the causes of poor comprehension. One limitation of the previous study was that the two types of story prompt differed not only in terms of content, but also modality: The topic title was verbal, whereas the more informative prompt was pictorial. The less-skilled comprehenders told more coherent stories when given pictorial help, suggesting that they were able to coordinate the picture information with their own story schema knowledge. Alternatively, they may simply have narrated the contents of a set of pictures, which were constructed to depict a related set of events. In the current study, the efficacy of informative verbal prompts was compared to that of picture sequences. These new prompts took the form of informative titles, such as 'how the pirates lost their treasure', which provided a direction for the story. The prediction was that stories elicited with these directed titles would have more coherent structures than those prompted by topic titles and would be similar in structural coherence to those elicited from picture sequences. This is because both the picture sequences and directed titles provide information about the

direction (and, therefore the event structure) of the story, which the child can integrate with their knowledge about stories. However, if the less-skilled comprehenders lack an elaborate concept of a story their performance should not improve greatly in the directed title condition. Comprehension and cohesion Adult readers appear to use connectives to signal the relation between two events, thus facilitating their comprehension (e.g. Gernsbacher, 1997; Murray, 1997). It is not clear whether children's comprehension skill is related to their use of these cohesive devices. When retelling stories, less-skilled comprehenders include fewer causal connectives and are more likely to use referential ties ambiguously than are skilled comprehenders (Yuill & Oakhill, 1991). However, when producing their own fictional narratives, less-skilled comprehenders use of interclausal connectives, such as 'and,' 'then,' and 'because,' is comparable to that of skilled peers (Cain & Oakhill, 1996). This latter finding is somewhat surprising because the less-skilled comprehenders' stories were more poorly structured in general and one would expect to find more sophisticated use of locally cohesive devices when the event structure is more causally integrated (Shapiro & Hudson, 1991). These contradictory findings may have arisen through the use of different classification systems. Shapiro and Hudson (1991) categorised connectives on the basis of the relations that they specify between two clauses, whether the clauses are independent of each other, e.g. "Once upon a time there were these fearless pirates and they had loads of treasure on their ship", temporally linked, e.g. "The wicked pirates stole their treasure while they were asleep", or dependent, e.g. "Julie was very excited because it was her birthday" (examples taken from corpus of stories collected in the current study). The categorization adopted by Cain and Oakhill (1996) confounded the different functions of connectives by grouping the temporal connective 'then' with the independent connective 'and'. This may have masked differences between skill groups or story prompts. In the current study, Shapiro and Hudson's classification system was used. If less-skilled comprehenders are sensitive to the different functions of interclausal connectives, their use of them should be similar to that of skilled comprehenders. Shapiro and Hudson (1991, 1997) also propose that cohesive devices will be more sophisticated when the task of narration is made easier by external aids, such as picture sequences, because under these conditions children will have more processing capacity to devote to cohesion. Cain and Oakhill (1996) found some support for this claim: The proportion of causal connectives was higher for narratives prompted by a sequence of pictures, relative to those prompted by a topic title. Less-skilled comprehenders' processing capacity is impaired relative to that of skilled comprehenders (Yuill, Oakhill & Parkin, 1989). Therefore, it was predicted that less-skilled comprehenders would make less use of connectives to link story propositions when structural support was not provided, relative to the other groups, but that all groups would demonstrate comparable connective use in the more supportive picture prompt condition. An additional problem with the interpretation of connective use in previous studies is the method used to calculate frequency. Both Shapiro and Hudson (1991) and Cain and Oakhill (1996) calculated the frequency of connective use as a proportion of all connectives in a particular story. Thus, neither study could actually look at whether the groups (comparing age and comprehension skill, respectively) differed in their absolute use of connectives. A story containing two instances of 'and' and one of 'because' would be awarded the same proportionate score as one containing four 'ands' and two instances of 'because,' regardless of the number of sentences or clauses. A more sensitive index of a narrator's attempts to provide linguistic cohesion would be to express connective use as a proportion of the number of propositions in the narrative, where a proposition comprises a subject and a predicate (Shapiro & Hudson, 1991). This measure was used in the current study. Coherence and cohesion As outlined earlier, coherence and cohesion are separate theoretical concepts. It is therefore important not to confound these two factors when measuring their occurrence. In the present study, event structure (or coherence) of a story was scored according to Cain and Oakhill's (1996) system, where the most 'coherent' stories were narratives comprising a causally related sequence of events in which the ending was dependent upon a

previous event in the narrative, such a building a new sandcastle to replace one that has been knocked down by a wave. However, it is not dependent upon the presence of a causal connective to specify this relation. Shapiro and Hudson (1991, 1997) propose that competence in structuring stories (coherence) may facilitate the use of local cohesive devices, such as connectives, because children will have more resources to devote to linguistic cohesion. If so, temporal and dependent connectives should not be found in the most poorly structured stories but should become more common as stories increase in coherence. Another (not mutually exclusive) view is that the event structure of a story may, in part, determine the selection of cohesive devices because cohesive devices can be used as discourse markers to link story events, rather than just story propositions (Peterson & McCabe, 1991; Segal & Duchan, 1997). According to this view, qualitative differences in connective use should be related to narrative coherence. Specifically, stories that lack a causal sequence of events should contain a smaller proportion of dependent connectives relative to causally related stories, where connectives are (partly) being used to provide explicit cues to the dependent relations between story events. The current study In summary, the current study was designed to further explore the relation between comprehension skill and narrative production and to address some of the limitations of previous work, as detailed above. Three groups participated in the experiment: Skilled comprehenders, same-age less-skilled comprehenders, and a comprehension-age match group. The comprehension-age match group was included to assess the likely direction of the relation between comprehension skill, cohesion and coherence (Cain, Oakhill & Bryant, 2000). Each child narrated stories from three different sorts of prompt: a topic title, a directed title, and a sequence of pictures. The aims of the study were as follows. First, to investigate whether verbal prompts in the form of directed titles were sufficiently informative to provide the necessary structural framework (or access to that framework) for a narrative, to enable less-skilled comprehenders to produce a structurally coherent story. It was expected that less-skilled comprehenders would benefit from informative verbal prompts to a greater extent than the comparison groups. Second, to determine whether less-skilled comprehenders are as sensitive to the different functions of connectives as their skilled peers. It was predicted that when given sufficient structural support for their narrative productions, that the less-skilled comprehenders would demonstrate comparable use of independent, temporal, and dependent connectives to their peers. Third, to explore the relation between coherence and cohesion, specifically to determine how the use of different connective types was affected by the event structure of a story. It was proposed that narratives with more coherent structures would contain a greater proportion of sophisticated connectives than narratives with less coherent structures. In addition, use of story conventions was assessed as an index of story knowledge but no group differences were predicted. Method Participants Three groups participated in this study: twelve skilled comprehenders (6 girls, 6 boys), 14 less-skilled comprehenders (11 girls, 3 boys), and twelve comprehension-age match children (9 girls, 3 boys). The skilled and less-skilled comprehenders were selected from an initial screening of 110 children aged 7-8 years, and the comprehension-age match group was selected from an initial sample of 106 children aged 6-7 years, attending schools in Brighton and Hove that served socially mixed catchment areas. All of the children spoke British English as their first language and had no known behavioral or learning difficulties. Selection tests Sight vocabulary. Children completed the Gates-MacGinitie Primary Two Vocabulary Test (Gates & MacGinitie, 1965) to assess their ability to read and understand single words out of context. This is a group-administered test in which children select one of four words that goes best with an accompanying picture. This test was administered first and used to screen out children who obtained either very low or very high scores and whose reading-age (calculated using the Neale Analysis) would be predicted to be either substantially below or above their chronological age. Reading ability. Word reading and text comprehension were assessed using Form One of the Neale Analysis of Reading Ability - Revised British Edition (Neale, 1989). The Neale

Analysis is an individually administered test, comprising a series of short passages that children read aloud. The Neale Analysis provides separate age equivalent scores for both reading accuracy, based on the number of word pronunciation errors that a child makes, and reading comprehension, based on the number of questions about each story that are answered correctly. Listening comprehension. An assessment of listening comprehension was included to confirm the pattern of language comprehension skill found on the reading comprehension measure. Children heard the first four stories of Form Two of the Neale Analysis recorded onto audiotape. After each story they answered a series of questions. Their responses were recorded verbatim and scored later. This test was administered individually. Group matching The less-skilled comprehenders all had age-appropriate reading accuracy, but their comprehension ages were below their chronological ages, and at least six months below their reading accuracy age. The skilled comprehenders also had age-appropriate reading accuracy but their comprehension scores were at or above that predicted by their reading accuracy age. These two groups were matched for reading accuracy, $t(24) < 1.0$ (skilled = 7 years 11 months; less-skilled = 7 years 9 months) but differed with respect to reading comprehension, $t(24) = 10.45$, $p < .001$ (skilled = 8 years one month; less-skilled = six years seven months), and listening comprehension, $t(24) = 5.04$, $p < .001$. These two groups were also matched for chronological age, sight vocabulary (measured by the Gates-MacGinitie) and the number of stories that they had read from the Neale Analysis (all t s < 1.0). -----

----- insert table 1 around here -----

- The comprehension-age match group comprised twelve children whose reading accuracy and comprehension ages were within six months of their chronological age. This group was selected so that its mean comprehension age was not significantly different from that of the less-skilled comprehender group, $t(24) < 1.0$, ns (less-skilled = six years seven months; CAM group = six years eight months) (2). The two groups did not differ on the listening comprehension measure, $t(24) < 1.0$. All group means are presented in Table 1. Materials Three types of prompt were used to elicit the stories: Topic titles, picture sequences, and directed titles. The first two prompts were similar to those used by Cain and Oakhill (1996). Topic prompt. This prompt was a topic, given as a title, for the children to plan their story around. There were three titles in this condition: 'The Farm,' 'The Circus,' and 'The Holiday.' Picture prompt. The same picture sequences used by Cain and Oakhill (1996) were used as prompts in this experiment. Each sequence comprised six pictures shown with a title, in which the final outcome was the unintended consequence of a previous action. For example, in "The Fishing Trip" sequence the first two pictures are illustrations of a family walking up to a fishing boat and sailing away from the harbour, the third picture is of the family on the boat with the father not catching any fish, the fourth and fifth pictures show the little girl feeding bread to the seagulls and the fish swimming up to eat the bread that remains on the water, and the final picture shows the father catching one of these fish. In this story sequence, the outcome of the successful catch is the unintended result of the girl's bird-feeding activities. Directed title prompt. This prompt was a title that provided a direction for the sequence of events in the narrative. The prompts used were: 'How the pirates lost their treasure,' 'The boy/girl who learned to fly,' and 'Jack/Julie's birthday surprise'. These prompts were considered to be more directive and informative than the topic title prompts. Children told three stories in each prompt condition, preceded by a practice story for each type of prompt. No time limits were placed on their productions. When the ending was not explicitly announced with, for example, 'The End', a non-specific prompt of "is there any more?" was asked after a few seconds delay. Design The experiment was a 3 (Skill Group: skilled, less-skilled, CAM) x 3 (Prompt: topic, picture sequence, directed title) design. Skill Group was a between-subjects factor and Prompt was a within-subjects factor. Each prompt was administered in a separate session, the order of which was counterbalanced within groups. The order of the three prompts used in each condition was randomized. Procedure In the first session, children were told the following: 'Do you like telling stories? Today, I would like you to tell me some

stories. I want you to make up the stories - don't just repeat back a story that you already know. I am going to record your stories on my tape recorder here and play it back to some other children later, so try to make up a really good story that someone else would like to listen to. Let us have a practice first.' In the Topic title and Directed title conditions the children were then shown the title, which the experimenter read out to them. In the Picture sequence condition the children were shown the title, which was again read out to them, and the pictures were laid out, in sequence, in front of them. No specific feedback was given on the quality of each story, although children were given non-specific encouragement after each one. Stories were audiotaped and transcribed for scoring later. Scoring Stories were scored for the occurrence of story conventions (markers of narrative knowledge), story event structure (coherence), and use of connectives (cohesion), as follows. Story conventions. For each narrative, one point was awarded for the use of each of the four story conventions. These were temporal openings such as 'Once upon a time', character-setting information such as 'there were these fearless pirates,' scene-setting information 'they had gone out to sea to find some treasure', and endings such as 'The End.' For each prompt condition, the sum of the scores for each of the four conventions was calculated separately (maximum = 3 for each convention). Story event structure. The event structure of each story was classified into one of the three categories used by Cain and Oakhill (1996): Non-stories, which were either completely incoherent or which lacked an event sequence; Intermediate stories, narratives that contained a sequence of events, but lacked causality between them; Complete stories, narratives comprising a causally related sequence of events in which the ending was dependent upon a previous action in the narrative. Examples from each category can be found in the appendix. No points were awarded for non-stories, one point for intermediate stories, and two points for complete stories. The sum of the scores awarded was calculated for each prompt, making the possible range of scores for each prompt 0 - 6 points. The stories were marked 'blind' by the author. A second marker, who was also unaware of the skill group of the story producer, scored half of the stories. The two markers agreed on 87% of the structure categories, and all disagreements were resolved by discussion. Use of connectives. First, the total number of propositions was calculated using Shapiro and Hudson's (1991) criterion: A proposition comprises a statement with a subject and a predicate. Interclausal connectives refer to conjunctions used to link propositions. The proportion of propositions that were linked by these connectives was calculated as an index of local cohesion. The interclausal connectives were categorized according to the relation they specified between the two clauses, either independent, temporal, or dependent (Shapiro & Hudson, 1991). Additive connectives, such as 'and,' and continuative connectives, such as 'now,' were taken to signify an independent relation between two clauses; temporal connectives, including 'then,' 'later,' 'first,' denote a temporal relation between clauses; and adversative connectives, such as 'but,' and causal connectives, such as 'because,' indicate a dependent relation between clauses (3). The number of instances of each type was calculated and expressed as a proportion of all linked clauses. Results Narrative production The data for the four different story conventions, event structure, and connective usage, were analyzed in separate two-way analyses of variance with Skill Group and Prompt as factors. Preliminary analyses revealed no main effects or interactions involving session order (all ps > .20), so that factor has been collapsed across Skill Group in the analyses reported below. Comparisons using Bonferroni's t' to control for Type I errors were conducted (according to Howell, 1992) to test significant effects and interactions. Story conventions. The use of the four story conventions was comparable across groups and there were no significant effects of Skill Group: Beginnings, $F(2, 35) = 1.01, p > .37$, all other Fs < 1.0. The type of Prompt significantly affected the use of conventional story endings, $F(2, 70) = 3.60, p < .035$. This information was included more frequently in the directed title condition than in the picture prompt condition (topic = 1.39, directed = 1.53, picture = .99), $t'(37) = 2.63, p < .05$. Prompt also affected the inclusion of scene-setting information, $F(2, 70) = 5.17, p <$

.01. This information was included less frequently when the stories were elicited by a directed title than when other prompts were used (topic = 2.82, directed = 2.52, picture = 2.87): directed vs picture, $t' (37) = 2.62$; directed vs topic, $t' (37) = 2.99$, both $ps < .05$. There was no effect of Prompt in the analysis of beginning and character-setting information, and there were no significant interactions between the two factors for any of the story conventions, all $Fs < 1.0$. Story event structure. There was a main effect of Skill Group, $F (2,35) = 3.92$, $p < .03$. The scores (in Table 2) demonstrate that the skilled comprehenders produced stories with the most coherent structures in each condition. The Prompt manipulation resulted in significant differences between conditions, $F (2,70) = 12.45$, $p < .001$. Each group produced their most poorly structured stories from topic title prompts and their best from the picture sequences. The interaction between the two factors, Skill Group and Prompt, did not reach conventional levels of significance, $F (4, 70) = 1.59$, $p < .19$. T-tests (with Bonferroni adjustment) were conducted to test the prediction that the less-skilled comprehenders would benefit from the informative verbal prompts to a greater extent than the comparison groups. The predictions were confirmed: the less-skilled comprehenders produced stories with significantly poorer structure scores from topic prompts than from directed prompts, $t' (24) = 4.27$, $p < .01$, and from picture sequences, $t' (24) = 4.57$, $p < .01$. Performance in the directed prompt and picture prompt conditions did not differ for this group, $t' (24) < .30$, ns. There were no significant differences between these conditions for the other groups, all $t's < 1.30$. -----

--- insert table 2 around here ----- Use of connectives. The mean proportions of propositions that were linked by an interclausal connective are presented in Table 3. There was a significant effect of Skill Group, $F (2,35) = 3.67$, $p < .04$, and a marginal effect of Prompt, $F (2,70) = 2.64$, $p < .08$. These effects were qualified by a significant interaction, $F (4,70) = 3.17$, $p < .02$. The interaction arose because the less-skilled comprehenders linked a significantly greater proportion of propositions in the directed and picture sequence prompt conditions than in the topic title condition: Topic vs directed: $t' (24) = 3.42$, $p < .01$, topic vs picture, $t' (24) = 3.64$, $p < .01$. The other groups did not differ in their use of connectives, all $t's < 1.31$. ----- insert table 3 around here --

----- An additional analysis was conducted to assess whether the type of story prompt affected the quality or function of the connectives that were used by the three groups. These data were analyzed in the following way. First, the proportion of connectives that were additive and continuative, indicating an independent relation between two propositions, was analyzed in a two-way analysis of variance with Prompt and Skill Group as factors. These types of connective accounted for between 47 - 55 % of all connective use. Their use was fairly uniform across groups and conditions, and there were no significant effects, all $Fs < 1.0$. The remaining connectives signified either a temporal or dependent relation between propositions. An analysis on the proportion of these remaining connectives that indicated dependent relations was conducted. There was no effect of Skill Group, $F (2,35) = 1.34$, $p > .10$ and no effect of Prompt, $F (2,70) < 1.0$, but there was a significant interaction between these two factors, $F (4,70) = 2.54$, $p < .05$. The interaction arose because the less-skilled comprehenders use of dependent connectives was affected by Prompt. They were less likely to use dependent connectives in the topic condition relative to both other prompt conditions: topic vs directed, $t' (24) = 3.00$, $p < .05$, topic vs picture, $t' (24) = 3.01$, $p < .05$. Prompt differences were not found for the two other skill groups, all $t's < 1.0$. Mean proportions are shown in Table 4. -----

insert table 4 around here ----- The relation between cohesion and coherence. A further analysis was conducted on these data to explore the relation between coherence and cohesion. Stories were categorised according to the event structure (coherence) score awarded. Stories awarded either zero or one point were treated as one category because only eleven stories fell into the 'non-story' category. The dependent variable was the proportion of propositions connected by each type of interclausal connective.

These data were entered into a two-way analysis of variance. Story Coherence (non-stories and intermediate, complete stories) was treated as a between-items factor and Connective Type (independent, temporal, or dependent) as a within-items factor (4). There was a main effect of Connective Type, $F(1, 340) = 43.18, p < .001$, which was involved in a significant interaction with Story Coherence, $F(1, 340) = 8.78, p < .004$. A significantly higher proportion of propositions were connected with independent connectives in less coherent stories than in complete stories, $t'(340) = 3.59, p < .01$. The opposite pattern was found for dependent connectives, where complete stories contained a higher proportion of dependent connectives than did intermediate and non-stories, $t'(340) = 4.66, p < .01$. There were no differences in the use of temporal connectives between the two story types, $t' < 1.0$. The mean scores are given in Table 5. ----- insert table 5 around here -----

----- Discussion This study was designed to explore the relation between reading comprehension skill and three aspects of narrative production: Inclusion of story conventions, coherence of event structure, and linguistic cohesion. Children with weak text comprehension skills demonstrated comparable use of story conventions to same-age skilled peers. However, they produced narratives that had less integrated event structures than both skilled comprehenders and a comprehension-age match group, and they made less use of dependent connectives when topic titles were used as story prompts. The less-skilled comprehenders' performance improved with more informative story prompts. Finally, stories with more coherent structures contained a greater proportion of connectives that signaled dependence between propositions. These findings are summarized and their implications discussed, in turn. In line with previous work, comprehension skill was not related to the inclusion of narrative conventions, such as beginnings and endings. Story prompt did, however, affect the use of two story conventions, scene-setting information and endings. The latter finding replicates a previous study, which demonstrated that children were less likely to include formal endings in stories elicited by picture sequences (Cain & Oakhill, 1996). It was suggested that this difference arose because stories prompted by picture sequences were better formed. However, in the current study, better formed stories were told in the directed title condition than in the topic condition, yet the use of endings did not differ significantly between the two. Furthermore, children in all groups made less use of scene-setting information when a directed title was the story prompt compared to the other conditions. The titles in the directed prompt condition provided such information to a greater degree than the other prompts. These findings suggest that narrative prompt can affect the inclusion of specific story conventions. When such information is contained in a title or a picture sequence, children are selective and may omit it from their narrative production. The high incidence of all story conventions indicates these children already had a well-formed concept of a story, at least with regard to these rudimentary structural components. Comprehension skill was related to the coherence of narratives. Less-skilled comprehenders were poorer at producing structured, purposeful stories than both skilled comprehenders and a comprehension-age match group in the topic title condition, replicating Cain and Oakhill (1996). The difference between the less-skilled comprehenders and the comprehension-age match group demonstrates that the ability to produce coherent and integrated oral narratives is not simply the result of reading comprehension level. Instead, this finding suggests that the factors limiting children's ability to structure narratives are also restricting their comprehension skill. Stories that were generated from directed titles and picture sequences had more coherent event structures than those generated from topic title prompts. Moreover, the more informative prompts aided the coherence of less-skilled comprehenders' stories to a greater degree than the other groups: Group differences apparent in the topic title condition were not evident when either directed titles or picture sequences were prompts. Thus, directed titles provided sufficient information to enable less-skilled comprehenders to produce coherent, organized stories and were as beneficial as picture sequences. There are at least two explanations for these findings. First, the less-skilled

comprehenders' performance in the topic title condition may have been impaired because of their poor working memory skills (Yuill, Oakhill & Parkin, 1989). The information or framework provided by these prompts might have reduced the effects of this limited processing capacity. However, Stothard and Hulme (1992) failed to find a difference between the working memory capacity of less-skilled comprehenders and a comprehension-age match. Processing limitations are, therefore, unlikely to provide a full explanation of these findings. Another possibility is that knowledge about stories may influence comprehension (as well as production) skill by affecting the ability to build a representation of a story. The directed titles may have aided the children by enabling them to access difficult to retrieve schema to plan their stories around, or because the titles themselves provided such a framework. Such prompts may have provided the necessary guidance for the poorer comprehenders to plan the 'thread' of the narrative and to establish relations between motives, actions and goals. The analysis of connective usage does not support the earlier work by Cain and Oakhill (1996). In the current study, less-skilled comprehenders used fewer connectives in the stories they produced in the topic title condition, relative to their stories in the other two prompt conditions. The other groups' use of connectives was not affected by prompt. It seems likely that the less-skilled comprehenders were aware of the need to integrate individual propositions and/or story elements by means of cohesive devices and were also aware of the different functions of these conjunctions. They did not simply increase connective use by including independent terms when structural support was provided. However, for whatever reason, the less-skilled comprehenders failed to make adequate use of connectives in the topic prompt condition. It is possible that the less-skilled comprehenders simply inserted a greater proportion of sophisticated connectives during their narration of the picture sequence because of the nature of the story. Performance in the directed prompt condition cannot be interpreted in this way. The directed prompts did not specify a rigid event structure, but simply suggested a direction for the narrative. Thus, the greater proportion of connectives must have been a consequence of attempting to construct a more integrated narrative at a local and/or global level. In the introduction, two roles for cohesive devices were outlined: indication of the relations between individual propositions and between structural elements within the discourse. There is evidence that sophisticated cohesive devices were being used in this study to signal local cohesion: Dependent connectives were included in the intermediate stories, which did not contain a causally related event sequence. Thus, there is support for Shapiro and Hudson's (1991, 1997) proposal that better coherence, through knowledge of structural form and/or support from external aids, leads to a focus on local cohesion. In addition, stories with more coherent structures contained a greater proportion of dependent connectives than intermediate stories. Stories with more integrated and elaborate event sequences require a greater number of dependent cohesive devices to act as discourse markers and explicitly relate the different elements. The gain in dependent connective usage suggests that the cohesive devices in these narratives were not simply signaling integration at a local level, but that they were also part of the model building process, helping to integrate events as well as propositions, supporting Peterson and McCabe (1991) and Segal and Duchan (1997). To summarise, this study replicates the main finding of Cain and Oakhill (1996) that children with weak reading comprehension skills do not lack story knowledge, as assessed by inclusion of conventional markers, but do tell less structurally coherent stories than both same-age skilled peers and younger children of the same reading comprehension level. Contrary to Cain and Oakhill (1996) less skilled comprehenders were found to be less likely to include cohesive devices to mark local or global integration when stories were elicited by simple topic titles. However, both coherence and cohesion of stories improved with verbal and pictorial aids. Poorer performance by the less skilled comprehenders, relative to the comprehension-age match group, indicates that the ability to produce structured coherent stories and to use sophisticated connectives does not simply arise from good reading comprehension experience. Rather, deficits in these skills are more plausibly associated with the causes

of poor comprehension. Furthermore, these findings suggest that there may be a common basis for the underlying causes of poor reading comprehension and poor narrative production skills. Perfetti (1994) has suggested that one possible source of reading comprehension failure is inadequate knowledge about text structures. The current study suggests a more complex scenario. The gains in the picture prompt condition could be interpreted as support for Perfetti's proposal, for these sequences provided a fully structured story. However, the directed title prompts did not provide as much structural support. Trabasso and Nickels (1992) propose that children's understanding and production of stories can be guided by their knowledge about story organisation and goal-directed actions. Thus, the directed title prompts may have provided this level of information, the essential direction and guidance that the less-skilled group needed. An analysis of the nature and quality of the plans children develop before they tell narratives elicited from different prompts would test this hypothesis. The directed titles may also have enabled the less-skilled comprehenders to access specific content information. The stories produced in this study were all new fictional stories - children were instructed not to retell a familiar story. Stein and Albro (1997) found no developmental differences in the coherence of children's narratives of personal events. The structural analysis of skilled and less-skilled comprehenders' narratives about personal events would indicate the extent to which content knowledge affects coherence and cohesion. Finally, these findings indicate a very simple way to assist less-skilled comprehenders' narrative abilities: support from directed titles. Other work has demonstrated that integrated titles, which specify the main point of a story, facilitate less-skilled comprehenders' understanding of abstract stories (Yuill & Joscelyne, 1988). Thus, there is strong evidence that these children's text comprehension and text production can be aided by directional verbal information. The findings in this study demonstrate that children with weak text comprehension skills produce narratives that are poor in terms of both structural coherence and local cohesion when little external support is provided. Further research, into both the use and accessibility of content and structure information is necessary to determine the precise reason for the less-skilled comprehenders' poor narrative skill.

Footnotes 1. Cohesive ties can be grouped into two main types: anaphora, which includes coreference, substitution, ellipsis, and lexical ties, and conjunctions (Halliday & Hasan, 1976). Data on the use of anaphoric reference were not analysed for two reasons. First, narrative productions collected for an earlier study (findings unreported) revealed no group differences. Second, the purpose of the current study was to investigate the hypothesis that interclausal connectives play a central role in the global structuring of discourse (Peterson & McCabe, 1991; Segal & Duchan, 1997). 2. Because of the nature of the Neale test, the two older groups completed more stories during the assessment and were, therefore, asked more comprehension questions. Thus, the comprehension abilities of the younger comprehension-age match group may have been underestimated. The comprehension scores were re-analyzed excluding the scores obtained by older children on stories that had been too difficult for the younger children to read (see Cain, Oakhill & Bryant, 2000, for full details of this procedure). The two groups did not differ in the number of questions they answered correctly in this more stringent test, $t(24) = 1.36, p > .10$. Thus, we can be satisfied that, in this sample, the CAM group were at an equivalent comprehension level to the less-skilled comprehenders. When re-analyzed in a similar way, the skilled comprehenders' scores remained significantly better than those of the CAM group, $t(22) = 3.14, p < .01$, indicating that their superior comprehension skill was not simply due to their superior word reading skill. 3. There were a few instances where 'so' was not used in a causal manner to refer elements before or after it, but rather as a continuative connective. All instances were categorized by the two markers, who agreed in 90% of cases. The classification of the remaining items was resolved by discussion. 4. Prompt and Skill Group were not included as factors, because the purpose of this analysis was to explore the relation between coherence and cohesion.

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Table 1. Group characteristics (and standard deviations) •Less-skilled comprehenders (n=14)•Skilled comprehenders (n=12)•Comprehension -age match (n=12)•• Chronological age (years, months)• 7:7 (4.44)• 7:7 (4.04)• 6:6 (3.88)•• Reading accuracy (years, months)• 7;9 (5.17)• 7:11 (5.73)• 6:7 (4.98)•• Reading comprehension (years, months)• 6:7 (3.87)• 8:1 (5.14)• 6:8 (3.11)•• Listening comprehension (max. = 28)• 8.93 (3.85)• 16.67 (3.96)• 10.00 (2.17)•• Sight vocabulary (max. = 48)• 37.21 (4.00)• 37.42 (3.00)• 32.92 (2.91)•• Note. Where appropriate, ages are given as years : months (standard deviations in months). The reading accuracy and comprehension scores are the age-equivalent scores provided in the Neale test.

Table 2. Mean story structure scores (and standard deviations) as a function of Skill Group and Prompt. Maximum score possible for each prompt is 6

Prompt	Less-skilled comprehenders	Skilled comprehenders
Comprehension-age match	3.07 (1.27)	4.58 (1.17)
Topic	4.17 (.80)	4.61 (.96)
Directed	5.08 (1.08)	4.67 (1.23)
Picture	4.71 (1.14)	5.17 (.94)
	5.00 (.95)	

Table 3. Mean proportions of propositions (and standard deviations) linked by an interclausal connective as a function of Skill Group and Prompt

	Prompt	Less-skilled comprehenders	Skilled comprehenders	Comprehension -age
match	Topic	.531 (.111)	.697 (.114)	.660 (.134)
	Directed	.642 (.098)	.744 (.137)	.629 (.145)
	Picture	.650 (.104)	.696 (.122)	.655 (.135)

Table 4. Mean proportions (and standard deviations) of non-independent connectives signifying dependent relations as a function of Skill Group and Prompt

Prompt	Less-skilled comprehenders	Skilled comprehenders
Comprehension -age match	.165 (.110)	.400 (.105)
Directed	.362 (.304)	.365 (.242)
Picture	.387 (.164)	.357 (.180)
65	.364 (.187)	.361 (.226)

Table 5. Mean proportions (and standard deviations) of propositions connected by each type of interclausal connective as a function of Story Event Structure

Story Event Structure	Independent	Temporal	Dependent
Non-stories (n=11)	.356 (.224)	.055 (.102)	.052 (.150)
Intermediate stories (n=147)	.300 (.186)	.190 (.146)	.167 (.198)
Complete stories (n=184)	.266 (.140)	.182 (.108)	.211 (.140)

Appendix: Examples of narrative productions by event category Non-stories
Topic title prompt: "The Farm". "One day there was a man who had a big farm and there was lots of animals in it. The End." Intermediate stories Picture sequence prompt: "The Fishing Trip". "Once upon a time this little girl and her mum and her dad went fishing on a boat and the dad was fishing in the sea and then he saw some birds eating something and then he caught a fish." Complete stories Picture sequence prompt: "The Fishing Trip" "One day a family and their little girl decided to go fishing. They went down to the harbour and asked if they could borrow a boat so they could go fishing. Then the dad went fishing, but no fish came and he started to get a bit miserable. Then the little girl threw some bread into the water for some swans and the fish liked the bread and when the fish came up for the bread one of them went near the hook and then the dad caught a big fish and everyone was happy. The End." Text comprehension and narrative production, !! PAGE

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