DOCUMENT RESUME

ED 291 100 CS 211 054

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TITLE	Stages in Story Telling: A Neo-Piagetian Analysis.
PUB DATE	Jul 87
NOTE	28p.; Paper presented at the Biennial Meeting of the Society for the Study of Behavioral Development (9th, Tokyo, Japan, July 12-16, 1987).
PUB TYPE	Speeches/Conference Papers (150) -- Reports - Research/Technical (143)
EDRS PRICE	MF01/PC02 Plus Postage.
DESCRIPTORS	*Cognitive Development; *Cognitive Processes; Educational Research; Elementary Education; Memory; Narration; *Story Telling; Structural Analysis (Linguistics)
IDENTIFIERS	Case (R); Narrative Text; *Oral Composing; Plot (Fiction); *Story Structure; Story Telling by Children

ABSTRACT

Using a neo-Piagetian structural analysis, two studies examined developmental differences in the oral narratives of children aged four to ten years. The first experiment, reporting on 20 children at each of the dimensional substages (mean ages of 4.8, 6.1, 8.5, and 10.6 years), showed that a qualitative shift occurred between four and six years when scripts were replaced by plots. At eight and ten years, the story structures showed a quantitative increase in the episodic complexity which correlated positively with working memory capacity. The second study, using four groups of 20 children (aged 4-, 6-, 8-, and 10-years old', demonstrated that the developmental progression was maintained when increasingly explicit structural cues were offered to a second group of similarly aged children and that the processing demand of the story structures showed no significant deviation from the hypothesized processing capacities, across age groups. Moreover, when task processing demand was adjusted to correspond to the capacity levels hypothesized for each age group, performance was altered. (Figures of Case's stages and substages (1985), prototypic stories for each age level, and scoring criteria are included, and 17 references are appended.) (MM)

Stages in Story Telling : A Neo-Piagetian Analysis

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Paper presented at the IX Biennial Meetings of the ISSBD, Tokyo, Japan. July, 1987.

This research was conducted while the author was a recepient of a SSHRC doctorial fellowship.

Running Head: Stages in Story Telling

Abstract

A neo-Piagetian structural analysis was used to identify developmental differences in the oral narratives of children aged 4 to 10 years. The first experiment showed that a qualitative shift occurred between 4 and 6 years when scripts were replaced by plots. At 8 and 10 years, the story structures showed a quantitative increase in the episodic complexity which correlated positively with assessed working memory capacity. The second study demonstrated that the developmental progression was maintained when increasingly explicit structural cues were offered to a second group of similarly aged children and that the processing demand of the story structures showed no significant deviation from the hypothesized processing capacities, across age groups. Moreover, when task processing demand was adjusted to correspond to the capacity levels hypothesized for each age group, performance was predictably altered. It was concluded that the structural progression identified in the current study was a robust developmental phenomenon which was interpretable within a neo-Piagetian framework.

Contemporary interest in discourse analysis can be traced to the work of Bartlett (1932), who noted that structurally familiar stories were better remembered than stylistically unfamiliar ones. Bartlett's notion that structural knowledge affected comprehension of content made little impact on North American psychology for a number of years. Behaviorism was then the order of the day, and within that paradigm, little or no attempt was made to address unobservable phenomenon such as Bartlett's internal "schemata." However, as Bruner (1962) introduced Vygotsky to North America and as Piaget became known through the efforts of Flavell(1963), interest in understanding complex cognitive processes grew. Concomitantly, the success of computer experts (Newell, Shaw & Simon, 1964) in building a problem solving machine sparked interest in the "invisible" workings of intelligent entities.

Out of these efforts in the 1960's, a science of cognition was born and with it, new methods to investigate discourse comprehension and production. The analyses attempted by cognitive scientists can be divided into three categories: (a) those of the story gammarians which reflected the notion that story syntax guides comprehension and generation (Mandler, 1982; Rumelhart, 1975; Stein & Glenn, 1979), (b) those of the artificial intelligence proponents which were based on the idea that understanding a story depends on general knowledge about the content of stories (e.g., how the protagonist's goals determine action) (Botvin & Sutton-Smith, 1979; Bower, Black & Turner, 1979; Schank & Abelson, 1977; and Wilensky, 1983), and (c) those more general models of text processing which integrated both the structure and content extremes (de Beaugrande, 1982; Bereiter, 1983; van Dijk & Kintsch, 1983 Peterson & McCabe, 1983; Rosenblatt, Gardner, & Winner, 1985).

Although the above groups of theoreticians characterized the knowledge required to understand and produce a story differently, they generally agreed that an age-related increase in some sort of knowledge exists. Scardamalia & Bereiter (1984) suggested that age-related increases in processing capacity was implicated in the development of children's discourse knowledge. The purpose of the current studies was to spell cut this relationship.

Contemporary neo-Piagetian perspective offers a good theoretical framework for accomplishing this objective as it integrates the developmental theory of Jean Piaget (1970) with the information processing concept of limited processing capacity. One neo-Piagetian theorist is Case (1985), who, following Piaget, identified 4 qualitatively different types of thought: (a) motoric thought during the sensory motor stage (1 - 18 months), (b) global reasoning in terms of first-order relations during the relational stage (1½ - 4½ years), (c) dimensional or categorical thinking in terms of second-order relations during the dimensional stage (4½ - 10 years), and (d) abstract thought during the vectorial stage (10 - 18 years). Qualitative shifts in thinking are effected when 2 qualitatively different schemes are coordinated. For example, when determining which way a balance beam will tip, dimensional thinkers use a counting scheme as a means to making a judgement concerning the relative amount of weight on either side of the fulcrum, whereas relational thinkers reason in terms of polar opposites, such as alot versus a little weight when determining relative amount. In other words, although 4-year-olds possess a consolidated counting scheme (Gelman & Gallistel, 1978), they do not use it when determining relative amount. An increase in working memory capacity, caused by maturation and experience, is hypothesized to make the change in strategy possible, as it permits the 6-year-old to focus on and integrate an additional chunk of information into his or her problem solving procedure. Because a working memory capacity of 2 is deemed necessary to coordinate 2 schemes (both of which could be used singly during the previous stage), the transition from a working memory capacity of 1 to 2 units is thought to be a prerequisite for a stage shift.

Within each stage, children progress through a series of 3 substages, each of which is marked by a quantitative increase in problem solving structure. Movement from substage 1 to substage 2 entails focussing on and integrating 1 additional scheme. In the balance beam example, this takes the form of quantifying distance from the fulcrum as well as quantifying weights when determining relative amount. Consequently, a third working memory unit is required. Finally, in the third substage an elaborated problem solving structure is evident (on the balance beam task, children can compensate for differences in weight and distance, concomitantly) and a fourth working memory unit is assumed to be required. The stages and substages are diagrammed in Figure 1.

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Insert Figure 1 about here

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According to Case's theory, the qualitative and quantitative shifts in thinking that take place at specified ages are governed by system wide changes in the children's cognitive capabilities, not by domain specific changes in their knowledge base. To test this notion, as well as the notion that working memory plays a role in these changes, 3 predictions were made concerning children's narrative compositions: (a) that structural changes would be found in the stories of children between the ages of 4 and 10 years which correspond to those hypothesized by the theory (Experiment 1), (b) that alterations in the amount and type of information about what should be included in a story would not alter the structure of the stories (Experiment 2a), and (c) that structural patterns in narrative would be altered by manipulations which changed the working memory demand of the task (Experiment 2b).

Experiment 1: Structural Analysis of Narrative Plots

The major purpose of the first experiment was to answer the following question: Could a developmental progression be identified in the children's story structures which was analogous to that stipulated by Case? A second objective was to determine if children's story structures be related to performance on 2 measures of working memory capacity.

Method

Subjects. Twenty children at each of the dimensional substages (mean ages of 4.8, 6.1, 8.5, and 10.6 years) were selected according to a 2 step procedure. First, teachers identified average to high average achievers; second, the Peabody Picture Vocabulary Test - Form B was individually administered to confirm the selection.

Procedure. Three characters that frequently appear in children's literature were selected (i.e., a happy little girl, a kind old horse, and a cute little lamb). Four-year-olds were asked to tell stories about 1 and 2 characters, whereas 6, 8, and 10-year-olds were invited to produce 3 stories about 1, 2, and 3 characters. To control for the effect of particular characters, a random block design with further randomization within each block was used.

Next, two working memory measures were administered:

(a) The Mr. Cucumber Working Memory Measure. Subjects were presented with a cartoon figure on which stickers were affixed, and then presented with a stickerless figure and asked to point to the former position of the stickers. The test increased in difficulty across 5 levels, as the number of stickers to be remembered increased from 1 to 5. Three trials were offered at each level. Administration commenced at level 1 for all subjects and continued until all 3 trials were failed at any level. Scores were obtained by averaging performance across levels.

(b) The Opposite Test. Subjects were told to listen as familiar sets one-syllable words were recited and to respond by furnishing the opposite of each word. The test increased in difficulty across 5 levels, as the number of words in each set grew from 1 to 5. Five trials were offered at each level. Administration and scoring procedures followed those described above.

Results

A structural analysis of the story plots revealed that 4 year-olds typically generated an event sequence or episode comprised of 4 interrelated elements dealing with different types of events: (a) a setting, (b) an initiating event, (c) a response, and (d) an outcome. However, the compositions were more like "happily ever after" scripts than stories, in that there was no "point to the telling."

A story-like quality did emerge at 6 years when two event sequences were coordinated. The second episode retained the "happily ever after" orientation but now there was a point to producing it, that is, to resolve the problem articulated in the first episode. From 4 to 6 years, then, stories altered in two ways. rst, about twice the number of story elements were generated and second, the stories used a different organizational scheme -- one which was based on a problem - resolution format. Thus, the shift can be seen as an increase from 1 to 2 event sequence, rather than from 4 to 8 story elements.

The addition of a "complicating event" sequence or episode at 8 years produced a less dramatic but none-the-less significant change -- one which can be described as quantitative rather than qualitative. Again, at 10 years, an expansion in story structure was evidenced by the inclusion of one additional event sequence

Stories were assigned scores of 1, 2, 3, or 4. Prototypic stories at each level are presented in Table 1. The reliability of the scheme was tested by having a second independent rater analyze the stories ($r=.92$).

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Insert Table 1 about here

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A repeated measures ANOVA conducted on the 4 and 6 year old groups revealed that there was a significant age effect, $F(1,23) = 5.30$, $p < .01$, but no significant task or task X age interaction effect. Similarly, a significant age effect, was found for the 6, 8, & 10 year olds, $F(2,48) = 7.70$, $p < .001$. No significant task or task X group interaction effect was revealed.

When assessed processing levels were measured by the Mr. Cucumber Working Memory Measure and the Opposites Test, a positive correlation emerged with structural complexity levels (r = 0.39, p .01 and r = 0.46, $p < .01$, respectively).

Discussion

The main objective of Experiment 1 was to relate developmental changes in s.ory structure to those identified by Case (1985). Viewed from a neo-Piagetian perspective, the script-like 4-year-old story structure is comprised of a complex system of first-order relations among the 4 story elements which form an integrated event sequence. This relational structure consolidates and serves as the basic building block of the next major stage.

The movement from scripts to plots at approximately 6 years marks Cases's hypothesized quantitative shift which is brought about by the coordination of 2 relational structures. Of course, 6-year-old plots are simple ones, comprised of only a problem (or goal) and its immediate resolution. Nevertheless, both problem and resolution are comprised of the 4 story elements and so represent the coordination of 2 relational event sequences and the shift to second-order relational thought.

The plots of 8-year-olds' stories included a third event sequence, one which dealt with an incident which complicated matters for the protagonist. This block to immediate resolution can be seen as a quantitative rather than qualitative change in that it does not introduce a dramatically different type of event sequence, but instead, gives the problem situation a dual focus. The developments at 8 years corresponds to the hypothesized growth in working memory capacity from 2 to 3 units by 8 years of age. Further qualitative elaboration in plot structure at 10 years can be accounted for by an increase in working memory capacity from 3 to 4 units.

In this analysis, the relation between story structure and working memory is hypothetical. However, when story scores and working memory scores were correlated, a positive relation was found. Although these findings were promising, they raised 2 questions which were addressed in Experiment 2: (a) If changes in story structure were, as Case hypothesized, due to system wide changes in problem solving strategy brought about by maturation and increase in working memory capacity (and not due to domain specific knowledge) then shouldn't the age-related stories structures be maintained even if explicit direction was given as to what to include in a story? and conversely; (b) Could the structure patterns in the narratives be changed by manipulations which altered the working memory demand of the task?

Experiment 2

(a) Analysis of Structural Patterns Across Story Tasks.

The purpose of the first set of tasks was to test the notion that structural patterns in narrative composition are a function of developmental processing limitations, not an absence of knowledge concerning what is expected or what form a finished story should assume. On this assumption, it was predicted that the structural patterns identified in Experiment 1 would be maintained across a range of story telling tasks in which more explicit directions were presented. Two types of tasks were presented: (a) the problem - resolution story telling task and, (b) the cued story telling task.

Method

Subjects. Four groups of twenty children (aged 4-, 6-, 8-, and 10 years) were selected according to a two step procedure. First, teachers identified average to high average achievers. Second, the vocabulary subtest of the WISC-R was used to screen out erroneously selected candidates. In addition, a working memory test, Mr. Cucumber was used to ensure that subjects fell within the hypothesized levels.

Procedure. First, subjects were told:

> "Tell me a story about someone - about your age - who has a problem they want to solve - you know - make all better. It can be a real problem but it doesn't have to be - just about someone who has a problem they want to solve".

Stories were again recorded on an audio cassette and transcribed. Next, the 4-, 6-, and 8-year-olds were given cues which explicitly informed them about the components of the story structure one level beyond their age-typical production and were invited to produce a story of this sort. For example, 6-year-olds were presented with a line drawing of a boy and told:

> "Here's Joe. Joe wanted something really badly. But then something happened so that he couldn't get it. Tell me what he wanted, what got in the way, and what he finally did to get what he wanted."

If children were unable to comply, the item corresponding to the preceding level was presented.

Results

The results of the structural analysis showed that 4-year-olds generated several events depicting a problem but failed to resolve it. At 6 years, children did represent a resolution and so the stories appeared qualitatively different; they had a plot. The changes in narrative structure between 6 and 10 years were less pronounced. Eight-year-olds concatenated a series of failed attempts to resolve a problem until one fortuitously succeeded, whereas in 10-year-olds' stories a second problem arose out of the ashes of the failed attempts.

Both the initial and secondary problems were compensated for in a planned resolution.

To test the hypothesis that the stories followed the previously identified pattern, stories were assigned scores of 1, 2, 3, 4, or 5 based on the scoring criteria outlined in Figure 2. The reliability of the classification scheme was tested by having the stories scored by an independent rater (Chronbach's alpha = .95). Next, a one way ANOVA was performed which yielded a significant group effect, $F(3, 71) = 138.72$, $p < .001$. Apriori nonorthogonal contrasts were computed as tests of adjacent means ($p < .01$). Results demonstrated that group 1 < group 2 < group 3 < group 4. Furthermore, a trend analysis showed that the linear component was significant ($p < .001$) and accounted for 85% of the variance (non-linear = 0%).

To show that there is a significant change in children's story structures with age is one thing. To show that this takes place in the fashion predicted by neo-Piagetian theory is another. As a preliminary test of this hypothesis, a predicted line was set by assuming that the average score for each age group should be that specified by Case's theory as the amount of available processing capacity (i.e., 4-year-olds = 1, 6-year-olds = 2, etc.). The actual mean scores for each age group were then plotted against these values and the deviation of each subject's composition score from that predicted for his or her age group was computed. An ANOVA performed on the deviation scores revealed that there was no significant difference among the mean deviation scores of the four groups, $F(3, 71) = 0.57$, $p > .05$; nor was the grand mean effect significant, $F(1, 71) = 0.07$, $p > .05$. Finally, ω^2 showed that the model accounted for 85% of the variance.

In the analysis of the cued stories, scores were assigned on the same basis as the non-cued stories. An ANOVA yielded a significant group effect $F(2,57) = 63.90$, $p < .01$. An ANOVA performed on the 2 sets of deviation scores showed that there was no significant task, $F(1, 56) = 0.73$, $p > .05$, and no task X group interaction effect, $F(2, 56) = 0.21$, $p > .05$.

Discussion

The set of tasks presented in the second experiment offered children more explicit information as to what should be included in a story. The predictions that the age-related story structures identified in Experiment 1 would be maintained (a) when structured components (i.e., problem and solution) were stipulated, and (b) when directions included developmentally adjacent structural and content cues, was supported. Four-year-olds remained locked in on one event sequence and were unable to utilize cues which suggested that they change the course of events by generating a different type of event sequence. In other words, they related event to event not event sequence to event sequence, as instructed. Similarly, 6-, 8-, and 10-year-olds failed to include stipulated event categories beyond those produced under Experiment 1 conditions. Thus, explicitly telling children which structural components to include had no impact on the story structures they actually generated.

Recall that the theory predicts that an increase in processing capacity (not domain specific knowledge) is responsible for developmental change. Whereas these findings demonstrated that offering information concerning what to include in a story did not result in more complex story structures, the tasks did not directly address the relationship between children's hypothesized processing capacity and the structural complexity of their stories. That was the purpose of the following set of tasks.

(b) Structural Complexity and Processing Capacity.

The relationship between story structure and processing capacity was explored by investigating the effect of reducing the tasks' processing demand in the same group of children. The assumption was that children were prevented from generating more complexly structured stories because they lacked the processing space required to entertain and coordinate further event categories. The processing demand of story telling was reduced in three ways: (a) by partitioning the cued task such that 1 event category was eliminated (partitioned task), (b) by offering children an easily understandable conceptual representation of the developmentally adjacent structure while providing working memory support (instruction task), (c) by changing the task from composition to recall, thereby altering the type of thought required from categorical to relational such that it would correspond to that hypothetically available to children prior to the age of 5 (recall task).

Method

Procedure. First, the partitioned task was presented. Major components of a story were split into two parts (problem and resolution), and children were asked to tell a story about each part, separately. For example, 6-year-olds were given an outline of a problem and sub-problem, accompanied by a line drawing of a girl and told:

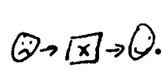
> "Here's Peggy. She was lonely and then something happened that made her really cry alot. Tell me why she was lonely and what happened next to make her cry alot."

Following this they were asked to produce a solution to a two-pronged problem:

> "Here's Janie. Today is her mom's birthday. Janie really wants to get her mom a birthday present but she has no money. Janie went into the family room to think. Then she saw the big mess she and her brother made when they had a pillow fight last night. Boy, would her mom be mad! What can Janie do about getting a present for her mom and about the messy family room."

By segmenting the story structure into 2 parts, the task requirements were reduced by 1 event sequence from those of the cued task. In other words, a reduction in the processing demand of the task was effected and so children were expected perform 1 level higher on the developmental scale (i.e., "X+1").

The next step was to attempt to teach subjects to handle the developmentally adjacent structure, without partitioning or cueing. A series of instructional procedures was designed and presented to a subgroup of 6-year-olds whose original story structures were typical of their age group. Subjects were presented with the following tasks which were designed to bridge the gap between the 6-year-old structure (i.e., problem and resolution) and the next level in the developmental hierarchy (i.e., problem, failed attempt and resolution) by lightening the working memory load.

In the first session, the component parts of children's original stories were highlighted and represented symbolically as  (for the problem) and  (for the resolution). Children were told that if they wanted to tell stories like those of older children they simply had to insert "something else that went wrong." The experimenter modeled this by inserting a failed attempt in the original stories. The new story structure was represented as . In subsequent sessions, children generated content as the experimenter pointed to each symbol. First, triads of children composed the story and, after several sessions, each child did so singly. Finally, to test the effectiveness of the procedure, each child was asked to compose a story without the aid of the cueing symbols.

A final task that was presented was a recall task. A typical 10-year-old story was read to the subjects who were then asked to retell it as accurately as possible. A clausal analysis (i.e., verb phrase + noun phrases) of the recall protocols was performed and clauses corresponding to gist elements were identified. The prediction was that 4-year-old children would be able to recall and retell the gist of a typically structured 10-year-old story. The rational for this prediction was that although generating such a story requires that event sequences be classified as belonging to such higher order categories as "problems" or "solutions", retelling a story requires only that 4 events be causally and temporally related -- a task 4-year-olds typically can perform, as indicated in the first study.

Results

As before, scores of 0 to 5 were assigned to children's productions. On the partial-component task, the results of 2 one-way ANOVAs showed a significant group effect for the problem, $F(2, 57) = 82.08$, $p < .01$ and the resolution, $F(2, 57) = 25.53$, $p < .01$. ANOVAs performed on the deviation scores showed that, for the problem portion, all groups performed similarly, $F(2, 57) = 1.01$, $p > .05$ and that, when alpha was set at .01, the grand mean showed no significant vertical displacement, $F(1, 57) = 6.84$, $p > .05$. In effect, then, children described a problem that was 1 unit beyond their capacity, as predicted according to this model. However, for the resolution portion, the groups did not perform similarly, $F(2, 57) = 9.61$, $p > .001$. The ω^2 calculation indicated that the "X+1" model accounted for 69% and 27% of the variance, respectively.

To examine the effect of the instruction procedures, the structure of stories composed pre- and post-instruction was analyzed, again using the scoring criteria outlined in Figure 2. The results showed that the general structure of all stories increased by 1 substage. This was in line with the prediction that had been made, that is, that the instruction would decrease the processing demands of narrative composition.

Finally, the prediction for the recall task was tested. To determine if the 4-year-olds could recall 4 gist elements, a count was taken of the number of gist items recalled. Four-year-olds recalled an average of 3.7.

Discussion

As predicted, when the cued story telling task was divided into 2 parts, the majority of children were able to produce the developmentally adjacent structure. By reducing the processing demand of the task through the elimination of 1 event sequence, it was made to correspond to that of the preceding age group. Thus, children at the preceding age level performed successfully. Splitting the composition task into two parts enabled children to formulate a problem that was equivalent to that previously produced by children 1 substage beyond. While the majority of the subjects performed as predicted on the resolution portion of the task, the statistical analysis failed to support the prediction. Possible explanations include a ceiling effect for the

8-year-olds or an unequal loading of processing demand between the problem and resolution segments.

The attempt to teach 6-year-olds to tell stories which have the general structure of 8-year-old stories was clearly successful. It is suggested that the structural change occurred because the instruction procedures first, decreased the working memory demand of the task by breaking the story structure into 3 parts, and second, provided a conceptual bridge which (a) helped children conceptualize the goal toward which they were working, (b) provided temporary structural cues and working memory support while the components of the structure were being consolidated, and (c) gradually allowed the newly chunked or retagged representation that was developed in long term memory to take over control of the process, such that the working memory demand of the task remained within capacity: that is, did not require more than 2 story elements to be considered at one time.

As predicted, 4-year-olds were able to retell the gist of a 10-year-old story. One plausible explanation for this finding is as follows: When 4-year-olds tell stories they typically move the protagonist from 1 state to another via a series of 4 events. The recall task also required only that the children report events leading the protagonist from 1 state to another. Thus, it is reasonable that a "relational" story scheme was sufficient to successfully recall the story's gist, although generating such a story requires classification of event sequences into categories.

In summary, reducing the processing demand quantitatively so that it was equivalent to that hypothesized for a given age group, enabled children to produce stories that were advanced by 1 developmental substage. Altering the processing demand qualitatively allowed a major stage shift.

General Discussion

As was noted in the introduction, there is general agreement among researchers that a structural progression exists in children's narrative composition. In the present study, however, a general theory of cognitive development was used to construct a specific model of when and why the observed developmental changes occur. Most North American theoreticians have suggested that experiences such as hearing stories read and entering school account for these changes. However, even before 5 or 6 years, most children have heard many stories. Furthermore, one would be hard pressed to identify what, in the first 6 months of the grade one curriculum, might account for the dramatic growth the data revealed. The theoretical point-of-view used in the present study provides an alternative explanation for the occurrence of the qualitative shift at 5 or 6 years (by hypothesizing the consolidation and coordination of thought structures) and for subsequent quantitative changes (by hypothesizing the reorganization of working memory space, thereby permitting the coordination of additional structures).

The findings also provide some potential insight into the nature of thought structures utilized at various ages. The stage between 18 months and 4 years has been termed relational, suggesting that children establish relations between units. In the case of narrative composition, these units are single occurrences -- states or events, which are strung together to form a causally and temporally related episode. By 6 years, dimensional or categorical thinking has emerged and is reflected in children's narratives by the categorization of episodes as problems or resolutions. Further categorization occurs at 8 with the addition of a "failed attempts" category and again at 10 years, as a second problem is produced.

In summary, the results of the study showed that the narratives told by 4-, 6-, 8- and 10-year-olds fit the general specifications proposed by Case (1985) and that the developmental pattern was maintained across a range of story tasks. Even when cued as to which components to include, the structural complexity of children's stories did not exceed their hypothesized working memory capacities. However, when the processing demand was decreased, either qualitatively (recall task) or quantitatively (task partitioning and instruction), children's performance could be enhanced by a predictable amount.

Figure 1. Case's Stages and Substages

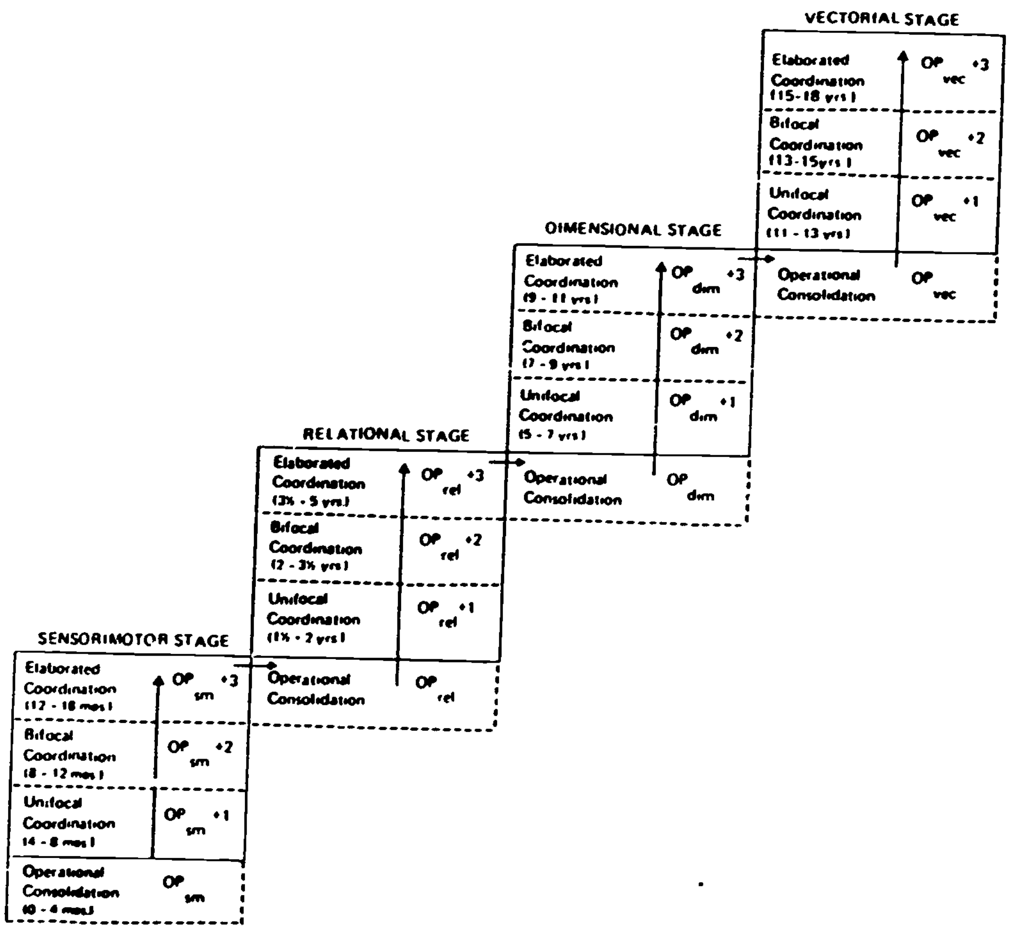


Table 1

Prototypic stories for 4-, 6-, 8-, and 10-year-olds.

Level	Prototypic Story
1 4 yrs.	Once there was a lamb and a girl walking down to get home. So they saw their mother's house and they went in and they saw their mother. That's where they lived and they lived happily ever after.
2 6 yrs.	A horse was walking along in a field and he saw a little lamb in one of the places of the barn and it was a fence and it was a little baby lamb and it was lonely. So the horse jumped in and then the lamb jumped onto the horse and then they got out. And then they went to a place where nobody lived except them and they picked blueberries and they ate them. And the horse found some hay and he liked the hay better than blueberries. And the lamb found some grass and he liked the grass better than blueberries. And then they went and lived happily ever after.
3 8 yrs.	Once there was a little girl who was walking in the woods and she saw a helpless little lamb. And then she took it to her father but her father said she can't keep it. So then she built a house for it there and brought food for it every day. And then her father and mother found out that she was keeping the lamb and so they told her they should send her to a place where lambs live.

Table 1 (cont'd)

Level	Prototypic Story
4 10 yrs.	Once upon a time there was a girl. She was very sad because she didn't have a pet. One day one of her father's...father's sheep had a little goat and it was going to die because she had lots of others and it couldn't get enough milk. She wanted it so badly. And then her father finally gave up and gave it to her. She was very happy. After that she always lived with it and was very happy with it. Then one day a ram came and he was..the little girl was inside eating her supper. The ram came along and killed the little goat and ate it. She... Finally she came out and she saw the little goat was dead...had been taken away. She was very sad. Her father went out and bought her another lamb and she lived happily ever after.

Figure 2. Scoring Criteria

Does the story have a problem?

NO = 0 YES

Is the problem resolved?

NO = 1 YES

Are there any failed attempts (or impediments) inserted before resolution?

NO = 2 YES

Is one impediment/attempt more significant than the others, with the ultimate resolution have a "well developed" or "carefully planned" feeling as a consequence?

NO =3 YES

* Is the protagonist's inner world (i.e. psychological state) developed throughout the story, as well as or, in addition to his outer world?

NO = 4 YES = 5

* The fifth level was identified in another study which focused on adolescents and was found in only a few cases in the present study. Case (1985) predicted a qualitative shift from dimensional (or categorial) thinking to vectorial (or abstract) thinking by 12 years of age. A vector is a quantity which has both direction and magnitude. On a scientific reasoning task, such as the balance beam task, 12-year-olds use simple ratio to determine the resting position of the beam, explaining, for example, that 4 times more weight pushing down on the left side of the fulcrum will overwhelm the distance force on the right side which is only 2 times greater in magnitude. Analogically, when composing stories, adolescents represent the protagonist's course (or direction) in the plot via events which occur in the "outer world", whereas the magnitude of the force pushing the protagonist is represented in the psychological dimension or "inner world".

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