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What's in a Question? Measuring Narrative Comprehension Using a Picture Story in Typically Developing Children Aged 4 – 8

By

Denyse Vowles Hayward 

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment of the requirements for the degree of Doctor of Philosophy

in

Rehabilitation Science

Faculty of Rehabilitation Medicine

Edmonton, Alberta
Fall 2003

Your file Votre référence
ISBN: 0-612-87987-9
Our file Notre référence
ISBN: 0-612-87987-9

University of Alberta

Library Release Form

Name of Author: Denyse Vowles Hayward

Title of Thesis: What's in a Question? Measuring Narrative Comprehension Using a Picture Story in Typically Developing Children Aged 4 – 8

Degree: Doctor of Philosophy

Year this Degree Granted: 2003

29 August 2003
Date

University of Alberta

Faculty of Graduate Studies and Research

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled *What's in a Question? Measuring Narrative Comprehension Using a Picture Story in Typically Developing Children Aged 4 – 8* submitted by *Denyse Vowles Hayward* in partial fulfillment of the requirements for the degree of *Doctor of Philosophy* in *Rehabilitation Science, Faculty of Rehabilitation Medicine.*

Sha

Marc Fey, External Examiner

29 August 2003
Date

DEDICATION

This thesis is dedicated to:

William Edward Vowles

Benjamen Gordon Reed Hayward

John de Ruiter

You have always seen me for who I truly am and what I am truly capably of in this life

The last five years represent a baby step toward my seeing and acceptance of becoming the woman the three of you already know

You all shine so brightly in my life, and inspire me to walk in this world as love, kindness, gentleness, and compassion

ABSTRACT

In the present study I explored developmental trends in comprehending a picture story using a questioning task with typically developing children aged 4, 5, 6 and 8. The questioning tasks were chosen as a measure of story comprehension based on theoretical models available in the research literature and were developed for use with an original three-episode picture story.

The first set of questions evaluated children's understanding of each part of the story from beginning to end. The second set of questions evaluated children's ability to select parts of the story that represented two central components, the Problem and the Resolution. The third set of questions asked children to make judgements about what were the two most important parts of the story. This study was situated within a larger project, the collecting of normative data for story narrations, which enabled comparisons across questioning and narration tasks.

Participants consisted of 50 typically developing English speaking children for each age grouping for a total of 200 participants. There were an equal number of boys and girls in each age group.

Results revealed some unexpected findings. For the first set of questions, which evaluated individual parts of the story, age-related differences were found only for the youngest children. By age 5, children demonstrated understanding of events that were depicted in the pictures (i.e., literal information), along with internal states and events that were not depicted (i.e., inferential information). Similarly, age-related differences were also found for the second set of questions regarding the Problem and Resolution but only for the two youngest age groups of children. The Importance Judgement questions revealed that all children considered story outcome categories to be the most important in the story. Comparisons between questioning and narration tasks showed that in the questioning task children revealed understanding of the story that had not been included in the narrations.

The results from this study support the importance of using convergent methodologies (questions and narrations) when evaluating young children's story comprehension abilities as each method provides a different perspective on children's knowledge of a story and their capabilities of demonstrating such knowledge.

ACKNOWLEDGEMENTS

To two of the loveliest men in my life, whose words of kindness and wisdom inspired me to keep walking toward the conclusion of this particular journey: William Edward Vowles and John de Ruiter.

To the person who saw that I should complete this degree before I ever seriously considered the possibility, and for her vigilance in uttering the combination of letters 'Ph.D.' for several years until I finally gave in to the pursuit of them—Elizabeth Webster.

To Phyllis Schneider, my advisor, who also saw that I was capable of this endeavour long before I was convinced of the same, and who nurtured my baby steps into research with much patience, repetition and humour. Also, for her continual regard for me as a colleague rather than as a student.

To the members of my Supervisory and Examining Committees: Sally Rice, Sharon Warren, Gay Bisanz and Connie Varnhagen—for challenging me to go beyond the confines of my own discipline in thinking about my research.

To my external examiner, Marc Fey—for being a genuinely nice guy in flying to the great white north, and for adjusting his teaching schedule to participate in my final examination.

To my most exemplary and honorary Examining Committee member, Joanne Volden, whose support and encouragement was beyond anything I could have possibly expected.

To Megan Hodge—for her excellent mentorship throughout the last five years.

To my friend, colleague, and O'Byrne's mate, Eleanor Stewart. Our 'Stats' solution began what has become an annual 'book burning' tradition for Ben and the neighbourhood children.

To the most amazing group of friends who supported me in a multitude of ways every step of this journey (even though they professed no knowledge as to what the heck I was doing); that is a sign of true friendship: Bobbie Garner (typist extraordinaire), Connie De Kramer, Pauline Poon, Heather Musslewhite, Sharon Bond-Moore and Teresa Booth.

To Boots Beaudry–who knew what this was really about and helped me see IT in the midst of the experience.

Finally, to Ben—the most amazing individual in my life—for always reminding me of what was real.

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CHAPTER 1: INTRODUCTION, REVIEW OF THE LITERATURE AND PURPOSE OF THE STUDY

INTRODUCTION

In this study, I attempted to discern evidence of developmental trends in comprehending a picture story using a questioning task with typically developing children aged 4, 5, 6 and 8. Understanding and telling stories are integral parts of thinking, socialization, and literacy instruction; thus, they have become an important topic of study (Gillam, Pena, & Miller, 1999). Oral narratives are considered to be a form of literate language which serves as a bridge between oral and written language styles (Westby, 1999). Narrative assessment has become a focus of attention in recent years because it offers a means of assessing language ability at an integrative level, using a natural mode of communication to identify children who may be at risk for poorly developing language and literacy skills.

Much of the research has focused on children's story narrations, such as retelling a story that has been heard or read, or formulating a story from a series of pictures. However, these types of story production tasks place high demands on children and may exceed the resources available to younger children and children with language learning difficulties. Children may have understood aspects of a story very well, but be unable to demonstrate their knowledge due to the demands of the task. Many researchers (Goldman, Varma, Sharp, & the Cognition and Technology Group at Vanderbilt, 1999; Stein & Glenn, 1979; Trabasso, van den Broek, & Liu, 1988) have emphasized the importance of using differing methods to evaluate narrative abilities in order to provide convergent perspectives of children's knowledge of stories. One

methodology that has been utilized in conjunction with asking children to narrate a story is a question-answering task.

Researchers have consistently found that both adults and children demonstrate knowledge about stories in questioning tasks that had not been evident when they had retold a story (e.g., Goldman, 1985; Goldman & Varnhagen, 1986; Graesser, Lang, & Roberts 1991). Studies that have evaluated story comprehension via questioning tasks have in general focused on particular aspects of story knowledge. These include: (a) understanding the relationships between specific story events, (b) judgements concerning the importance of particular story elements to the story as a whole, and (c) the ability to answer questions regarding information that was explicitly stated in the story versus information that was not stated and thus had to be inferred.

Further, the research studies conducted thus far have focussed on comparing distinct age groupings (e.g., 5 and 10 year olds). Although such studies have demonstrated age-related differences in children's understanding of stories, investigations regarding the developmental progression of such abilities have yet to be undertaken. Such an investigation would provide much needed data regarding how early children are able to demonstrate knowledge of a story.

In this study, three sets of questions were developed to discern at what age children are able to demonstrate knowledge of different aspects of a picture story. The question sets incorporated and extended the questioning methodologies applied in the existing research literature by (a) examining differences in children's abilities to answer questions about information explicitly stated in the story versus information that needed to be inferred, and (b) evaluating information children considered important in the story.

Two models of story comprehension (Story Grammar and Causal Network) provided the theoretical foundation for the questions. In the remainder of this chapter, I will describe the two models from which the questions for the present study were derived, followed by a discussion of studies that have utilized questioning tasks with children, and conclude with the specific research questions posed in this study.

Models of Story Comprehension

Comprehension of a story involves understanding the overall meaning of a story rather than just the meaning of individual words and sentences. Comprehension is considered successful if an individual constructs a coherent, meaningful, mental representation of a story, which can then be accessed in order to retell the story, answer questions, apply to real-life situations, and so on (van den Broek & Gustafson, 1999).

Many researchers have attempted to describe the cognitive processes that are used to comprehend stories. This body of research has been influenced by Bartlett's (1932) finding that individuals rarely retell stories exactly as they have heard them. Bartlett proposed that information individuals include when retelling a story is a function not only of the new incoming story information, but also of the mental operations and cognitive structures, referred to as 'schemas,' already acquired by the individual. It is believed that story schema knowledge is acquired in part by exposure to a wide variety of different stories (Kintsch, 1994; Stein & Glenn, 1979), and although there may be individual differences in the acquisition of story schema knowledge, some

common type of schematic representation is believed to be acquired by all who listen to and tell stories (Stein & Glenn, 1979).

Since human working memory capacity is limited an individual can only attend to a subset of all the possible information heard or read within a story. As a consequence, successful comprehension depends in part on an individual's ability to allocate working memory resources judiciously to the most relevant pieces of information within the story so that he or she can be successful in constructing a coherent, meaningful representation of the story. It is proposed that schema knowledge serves dual roles, both as a guide for the allocation of working memory resources (Kintsch, 1977; van Dijk & Kintsch, 1983) and as cognitive cueing structure to aid an individual in organizing story information into component parts that can then be accessed at a later time to narrate a story, answering questions and so on (van den Broek & Kremer, 2000). In addition to story schema knowledge, an individual's comprehension of a story also depends upon his or her general world knowledge about objects, actions and social situations, knowledge about causation (Goldman et al., 1999; van den Broek & Gustafson, 1999), and an individual's personal goals, interests, and expectations when listening to or reading a story (Kintsch, 1977; van den Broek & Kremer, 2000).

The theoretical foundation for the present study is based on two complementary models of story comprehension: *Story Grammar* (Mandler & Johnson, 1977; Rumelhart, 1975; Stein & Glenn, 1979; Thorndyke, 1977) and *Causal Network* (Trabasso, Secco, & van den Broek, 1984; Trabasso & van den Broek, 1985; Trabasso, van den Broek & Suh, 1989). The general view of comprehension in these models is that the individual constructs a mental representation of a story using available schema knowledge, general world knowledge, and knowledge about causation. Additionally, the construction of a mental representation for

a particular story is also influenced by an individual's personal standards of coherence, that is, his or her goals, interests and expectations when listening to or reading a story. However, the two models focus on different aspects of knowledge, that is, an individual's understanding of the schematic organization of story events, actions and states (Story Grammar) or the ability to understand causal relationships that link story events, actions and states (Causal Network). In the following section an overview of these two models of comprehension is provided.

Story Grammar Model

The Story Grammar model describes the functional role of events, states and actions in stories and specifies the types of information that should ideally occur in stories. Although different researchers have posited somewhat different schematic organizations (Mandler and Johnson, 1977; Rumelhart, 1975; Stein & Glenn, 1979; Thorndyke, 1977), there is agreement on the basic components of the model. Stories consist of sets of sequentially related categories and each category refers to different types of information that serve specific functions in the story. Table 1 describes these categories and functions.

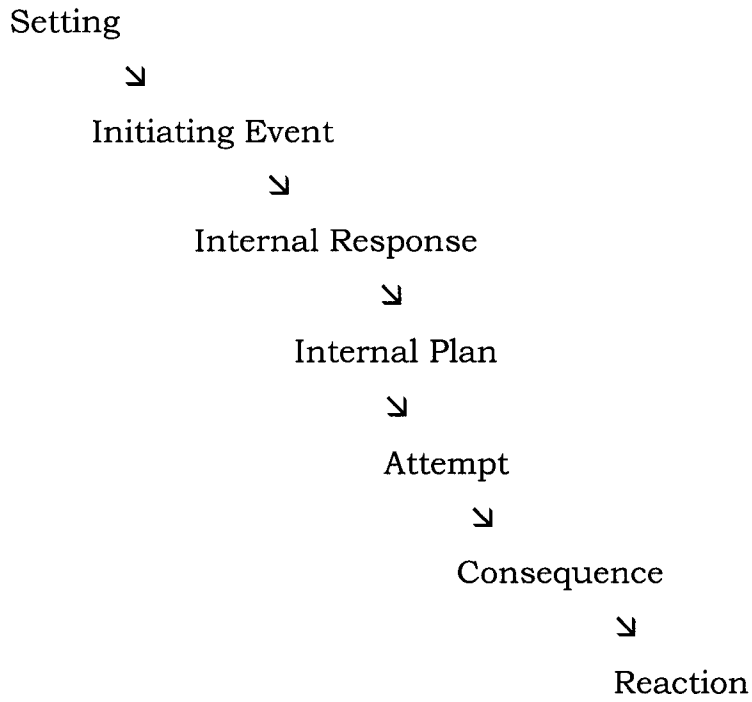
Table 1
Story Grammar Categories with a Description of the Specific Function of each Category.

Category	Description
Settings	Introduces characters and their habitual states; describes social, physical or temporal contexts of the story.
Initiating Events	Causes the main character to respond in some way. An Initiating Event can be an action, a change in the physical environment, or a character's internal perception of an event.
Internal Responses	Refers to a character's emotions, goals, desires, intentions, or thoughts in respect to an Initiating Event. The primary function of an Internal Response is to motivate the character to formulate a plan or to take action to achieve a goal.
Internal Plans	Directs the character's behaviour. It reveals a character's strategy for accomplishing change in a situation.
Attempts	Overt actions toward resolving a situation or achieving a goal.
Consequences	Represents the character's attainment or non-attainment of a goal, and other changes that occur as part of the Consequence, including natural occurrences or end states.
Reactions	Refer to how a character felt, thought or acted in response to the Consequence.

Note. Adapted from Mandler & Johnson (1977) and Stein & Glenn (1979).

Story Grammar categories are organized as an episode in which each category logically leads to the next category. The category and episodic structure represent an idealized schema used by individuals. The episode is thought of as a kind of working memory unit that organizes Story Grammar categories into a single psychological structure

for purposes of encoding, understanding, and retrieval (Chi, 1978; Black & Bower, 1980; Haberlandt, 1980). The surface structure of a particular story need not, and often does not, contain all of the parts of this idealized episodic structure. It is assumed that individuals will use their knowledge of the schema to supply missing story components in order to construct a coherent representation of a story (Mandler & Johnson, 1977; Stein & Glenn, 1979). This idealized episodic structure is shown in Figure 1.



Note. Adapted from (Stein & Glenn, 1979, p.61)

Figure 1. Story Grammar Episodic Structure.

Additionally, this model requires the inclusion of a central character motivated to carry out some type of goal-directed action. A story revolves around an attempt or attempts by the central character to

attain a goal and the story usually ends when the goal is successfully achieved.

Research has shown that after hearing stories corresponding to the Story Grammar (SG) episodic structure, children as young as four recall stories according to the idealized schema (Stein & Glenn, 1979). In addition, when children and adults are asked to retell stories that do not conform to the Story Grammar model they recall the story in a manner that conforms to the model anyway (Stein & Glenn, 1979). Further, Mandler and Johnson (1977) and Stein and Glenn (1979) found that when asked to retell stories in which specific categories were intentionally omitted, adults and children added information that corresponded to the omitted components in their narrations. Examination of stories retold by adults and children revealed that particular categories are more frequently included than others (e.g., Mandler & Johnson, 1977; Stein & Glenn, 1979). *Setting* information introducing or describing characters, *Initiating Events*, and *Consequences* are the most frequently included categories, followed by *Attempts* and *Internal Plans*, while *Internal Responses* and *Reactions* were not frequently included in story retellings. This was an unexpected finding, since the model predicted that all Story Grammar categories would be included in story narrations. Unfortunately the Story Grammar model does not adequately account for the greater frequency with which certain components are included when retelling a story. However, Stein and Glenn (1979) suggested that particular categories may be included more frequently than others because stories are basically goal-directed, and story information contained within the *Initiating Event* and *Consequence* categories may be most salient to the establishment and accomplishment of a goal.

Further evidence that the Story Grammar category and episodic structure is a valid representation of how individuals encode and retrieve story information comes from cross-cultural research. A study conducted with literate and non-literate adults and children from a non-Western culture revealed a similar pattern of story recall to that reported for children and adults from a literate Western culture (Mandler, Scribner, Cole & DeForest, 1980). Individuals aged 6 - 55 residing in Liberia was asked to retell four stories; three stories were taken from a study conducted with children and adults in the United States (see Mandler & Johnson, 1977), and one story was a traditional Liberian story. Not only did the participants judged all four stories to be representative of traditional Liberian stories but their retellings of all four stories were similar to that observed in the Mandler & Johnson (1977) study by children and adults from the United States. The literacy level of participants was not a significant factor in story retelling abilities. These researchers suggest that the Story Grammar categories and episodic structure may, therefore, reflect universal aspects in the way individuals encode, understand and recall stories regardless of culture or amount of schooling.

In general, the experimental evidence supports the distinctions among the categories and combinatorial rules of the model. Thus, the Story Grammar model appears to be a valid representation of how individuals organize story information in order to encode, understand and retrieve stories. Additionally, the acquisition of story schema knowledge appears to develop as a function of age with older children's stories approximating competency observed in adults. The categories and episodic structure proposed by Story Grammar theorists are integral parts of the Causal Network model, which will be described in the next section.

Causal Network Model

Trabasso and van den Broek (1985; also see Trabasso, Secco, & van den Broek, 1984; Trabasso, van den Broek & Suh, 1989) adopted Stein and Glenn's Story Grammar category and episodic taxonomy but focused on the causal relations linking events, actions, and states in stories. Causal Network theorists claim that what makes a story coherent are the relations between the story categories and episodes that an individual must infer. Although a story text may include several types of relations (e.g., referential, spatial, causal, temporal), causal relations have been found to be particularly important to the establishment of a coherent mental representation of the story (Omanson, 1982a; Trabasso & Sperry, 1985; Trabasso, van den Broek & Liu, 1988; van den Broek, 1994). Causal relations enable an individual to identify how different story events or states depend on each other (Goldman & Varnhagen, 1996; Trabasso & van den Broek, 1985; van den Broek & Kremer, 2000). The following example is offered to illustrate how causal relations must be inferred in order to understand the short passage.

'I was walking in the grass.
And stepped on something sharp.
I had to wait at the hospital for a long time.'

A brief examination of some of the causal inferences necessary to understand this passage might go as follows: first, one would infer that the person was walking barefoot since it would be unlikely to injure a foot if shoes were being worn. Additionally, one could infer that the event probably took place in the summer since one generally does not go

barefoot in the winter. Next, it could be inferred that the person did not see the object that was stepped on as presumably one would not step on a sharp object volitionally. Also, the item that was stepped on caused a wound severe enough to require a trip to the hospital. This would lead to an inference about the type of object that could cause such a injury (e.g., glass). Then one could infer that the individual was transported to the hospital since it is not likely that he or she would walk with a severe injury to the foot. Finally, knowledge of hospitals would allow one to infer that the person went to the Emergency department and that it was a busy time when they arrived since s/he waited a long time. Thus, it is the ability to identify causal relations between the three distinct events that support one's understanding of the passage.

The immediate and obvious difficulty revealed in the above example is: how does one reliably identify causal relations between story events? Causal Network theorists have developed a systematic method to identify and describe causal relations for a wide variety of narrative texts. As can be seen in the above example, causal relations are not necessarily explicitly marked in the text by syntactic markers, such as 'because' and 'so'; rather these relations are often inferred as an individual attempts to comprehend and relate events of a story. Thus, the criterion developed to identify causal relations by Causal Network theories captures both the explicit and implicit causal connections between story events (Varnhagen, 1991). A 1985 study by Trabasso and Sperry detail the development and application of these criteria, the first of which is a test of the *'necessity in the circumstances.'* A state, event or action *A* is considered necessary to cause an event, state, or action *B* if in the particular circumstances of a story the non-occurrence of *A* would prevent the occurrence of *B*. The second criterion is the determination of *'sufficiency in the circumstances'* in which event *A* is considered a

sufficient cause of event *B* in the circumstances of a story if, when *A* occurs, *B* naturally follows. Appendix A provides and extended description of these criteria with examples.

In conjunction with identifying causal relations, each relation is labelled according to a taxonomy developed by Shank (1975) and Warren, Nicholas and Trabasso (1979). This taxonomy is helpful since it specifies the types of information in a story that can be causally related. Four types of relations have been described: enabling, causal-psychological, causal-physical, and motivational. A description of each of these four relations is provided in Table 2.

Table 2.
Types of Causal Relations Connecting States, Events and Actions in Stories

Relation	Description
Enabling	Those where the conditions, or change in conditions, allow something to occur. They can set up the necessary conditions in which causal relations can be expressed or simply co-occur in the story (e.g., *The dog had a beautiful, shiny coat* and *He constantly wagged his tail*).
Causal-Psychological	Involuntary responses of the character (e.g., *Sam slammed his fist into the wall. He was really angry*).
Causal-Physical	Those actions and outcomes that occur in the physical world. This is a concrete state, action, or event that is a consequence to some antecedent event or action (e.g., *Jean slipped on the ice and sprained her wrist*).
Motivational	Voluntary, goal-directed events or actions initiated by a character (e.g., *Harry suddenly realized he was starving. He decided to make himself a hot fudge sundae*).

Note: Adapted from Trabasso & Rodkin (1994, p.89-91), and Varnhagen, (1991, p.401-402).

Since story texts are frequently parsed according to the Story Grammar categories and episodic structure, Trabasso and Rodkin (1994) have specified which of the four types of causal relations can occur among particular Story Grammar categories. These are described in Table 3.

Table 3.
Causal Relations that can occur among Story Grammar Categories

Story Grammar Category	Possible Relations Between Categories
Settings	Can *enable* all categories.
Initiating Events	Can *physically cause* other Initiating Events or *psychologically cause* Internal Responses or Goals.
Internal Responses	Can *psychologically cause* other Internal Responses or Goals.
Goals	Can *motivate* Goals or Attempts to achieve or avoid them.
Attempts	Can *enable* other Attempts or *physically cause* successful or unsuccessful Consequences.
Consequences	Can *physically cause* other Consequences or, like Initiating Events, can *psychologically cause* Internal Responses and Goals. Consequences can also *enable* Attempts.

Note. Adapted from Trabasso & Rodkin (1994, p.89-91),

Once these relations have been determined for a story a graphic representation of the causal relations of a story can be constructed. This produces a 'network' representation of the story rather than a 'linear' representation such as that posited by Story Grammar theorists. Researchers construct causal network representations of stories using either Story Grammar categories or syntactic elements (i.e., main clauses) and in some cases both. A sample story is provided to illustrate both the segmentation of a story text and the construction of a causal

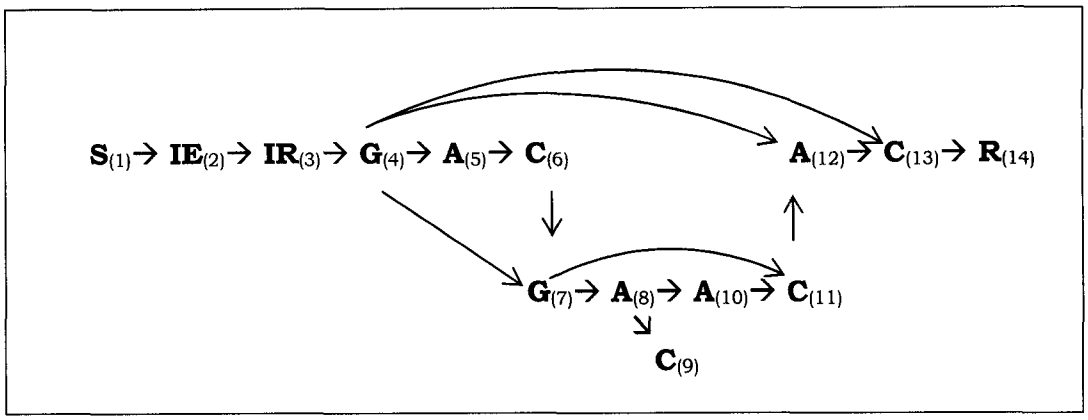
network representation of the story. Table 4 shows the story text segmented into both clauses and categories.

Table 4.
Story Transcript showing Main Clauses and Story Grammar Categories

Clause	Story Grammar Category
1. One day, Brian was looking through the newspaper.	(S) Setting
2. He saw an ad for some fancy CD players.	(IE) Initiating Event
3. He really liked that way they looked.	(IR) Internal Response
4. Brian decided he wanted to buy one.	(G) Goal
5. He called the story for the price of a nice model.	(A) Attempt
6. He did not have enough money.	(C) Consequence
7. He decided to work a paper route.	(G) Goal
8. For months he got up very early.	(A) Attempt
9. So he had his afternoons free.	(C) Consequence
10. And delivered the newspapers.	(A) Attempt
11. He quickly earned the $300 that he needed.	(C) Consequence
12. On his first day off he went to the store.	(A) Attempt
13. He bought the CD player that he had wanted for so long.	(C) Consequence
14. He was so happy he immediately organized a party	(R) Reaction

Note. Adapted from van den Broek (1994, p 543).

Figure 2 illustrates the causal network representation of the story text from Table 4. Each story event is displayed according to its corresponding Story Grammar category by letter (e.g., S, IE etc), while the ordinal numbers in parenthesis refer to the individual clauses from the text displayed in Table 4. The arrows between each category represent the causal relations between each of the story events.



Legend
Letters (S, IE etc) - Story Grammar categories from the story transcript
Numbers in parentheses (1, 2 etc) - main clauses from the story transcript
Arrows → - causal relations between categories

Note: Adapted from van den Broek (1994, p.554)

Figure 2. Causal Network Representation of a Simple Story

The causal network provides both a graphic representation of the entire story (categories, clauses, and connections), and a theoretical description of the mental representation believed to be constructed by individuals when encoding and retrieving a story from memory (Wolman, 1991). Researchers have successfully identified three text properties revealed by examining causal network representations of stories that have consistently predicted which story events people recall, include in story summaries and judge as important in stories. These factors are causal connectivity, causal chain events, and Story Grammar category (already described). Causal connectivity and causal chain events will be discussed in detail in the following section.

(a) Causal Connectivity

Causal connectivity refers to the fact that events in a story differ with respect to the number of causal connections they have to other events within the story. This is readily observable when a causal network has been constructed for a story. As can be seen in Figure 2 the first Goal, $G_{(4)}$, is causally connected to five other events whereas the Reaction, $R_{(14)}$, at the end of the story has only one such causal connection. Events with more causal connections have more causal antecedents and/or consequences than events with fewer connections and are thus considered more central in the story.

In fact, several empirical studies have demonstrated that when asked to retell a story that has been heard or read, individuals recall those events that have multiple causal links with other events more readily than events of the story with few causal connections (Graesser & Clark, 1985; Trabasso, Secco & van den Broek, 1994; Trabasso & Sperry, 1985; Trabasso & van den Broek, 1985; van den Broek, 1988; 1989; van den Broek & Trabasso, 1986). Events with more causal connections are also retrieved more quickly after a story is read than events with few causal links (O'Brien & Meyers, 1987) and are included more often in summaries and judged to be more important or essential parts of the story (Trabasso & Sperry, 1985; Trabasso & van den Broek, 1985; van den Broek, 1988; 1989a; van den Broek & Trabasso, 1986) in both experimentally constructed stories and naturally occurring literary stories (van den Broek, Rohleder & Narvaez, 1996). These findings have been observed even when the number of causal connections has been systematically varied between story events while story content was kept constant (van den Broek, 1988).

(b) Causal Chain Events

A central characteristic of a story is that some events sequentially and causally connect the beginning of the story to the end (Black & Bower, 1980; Omanson, 1982a; Shank, 1975; Trabasso & Sperry, 1985). Those events that are linked by successive causal relations are referred to as a *'causal chain'* and are believed to contribute to the coherence of a story. As a result, causal chain events are hypothesized to take a prominent status in a person's memory representation of the story. Thus, a story in which a higher percentage of events are identified as causal chain events is considered more cohesive than a story with a lower percentage of events identified on the causal chain.

A causal chain opens with the introduction of the story characters and the time and/or location of the story. The closing is defined by the attainment or non-attainment of the story characters' goal(s). Once the opening and closing events are identified any events which have causes and consequences leading to the closing are added to the causal chain. Events that are not on the causal chain are called *'dead-end'* events. Dead-end events have no antecedents and no further consequences in the story and in general are considered marginal to the plot (Black & Bower, 1980, Trabasso & Sperry, 1985; Trabasso & van den Broek, 1985). As such, dead-end events are believed to be of minor importance to the mental representation an individual constructs of a story. Figure 2 also shows the causal chain for the story in Table 4. As can be seen all the events of that story are a part of the causal chain with the exception of Consequence, $C_{(9)}$.

Empirical studies have confirmed that the amount of information people recall in stories increases when there are a higher percentage of events on the causal chain (Trabasso & Sperry, 1985; Trabasso & van

den Broek, 1985; van den Broek, 1994). Several investigators have also demonstrated that causal chain events are better recalled by adults and children in both immediate and delayed recall conditions, included more frequently in story summaries, and rated as more important than dead-end events (Omanson, 1982a; Trabasso, Secco & van den Broek, 1984; Trabasso & van den Broek, 1985; van den Broek & Trabasso, 1986).

Additionally, story events and episodes can be interrelated in different ways. They may follow each other temporally as displayed in Figure 1 forming a simple causal chain, or they may be hierarchically related. A hierarchical relationship occurs when the goals or outcomes of episodes are interdependent. In general, it is hypothesized that events at higher levels in the hierarchy tend to play a more important role in the mental representation of the story than do events at lower levels. Figure 2 displays such an hierarchical relationship. The episode concerning the paper route (i.e., $G_7 \rightarrow C_{11}$) is a lower level chain of events as it takes place in order to achieve the main goal of the story - to buy the CD player, which was established in the first episode ($S_1 \rightarrow C_6$) and achieved in the end ($A_{12} \rightarrow C_{13}$). Thus, the hierarchical relationship is also shown graphically in the causal network representation of the story.

Interestingly, the effects of hierarchical position of story events differ across comprehension tasks. The probability that individuals recall a particular event is affected both by hierarchical position and by causal chain status (Black & Bower, 1980; Goldman & Varnhagen, 1986). In contrast, the probability of an event being included in a summary is mostly determined by hierarchical position and only marginally by other causal properties. When asked to rate the importance of story events the reverse has been observed, causal connectivity strongly influenced how important a story event is judged

and position in the hierarchy had only a minor effect (van den Broek, 1988).

Given that each of these factors have been shown to influence the types and amount of information individuals include across a variety of narrative tasks, Trabasso and van den Broek (1985) examined the respective contributions of the three factors (Story Grammar category, causal connectivity, causal chain events) across three comprehension tasks: immediate and delayed recall of a story, summarizing a story, and judging the importance of story events to the story as a whole, by re-examining the corpuses of two studies, one conducted with adults (Omanson, 1982b) and one with children (Stein & Glenn, 1979). Regression analyses revealed that each factor contributed unique amounts of variance in predicting which parts of each story had been included across the comprehension tasks for both the adults and children. Goldman and Varnhagen (1986) reported similar findings to Trabasso and van den Broek when examining the contributions of the same three factors in story recall of two versions of an experimental story. In one version the events were temporally connected while in the second version events were causally connected; story content was held constant across both versions of the story. Again, regression analyses showed that each factor contributed uniquely to the story events that individuals included when retelling the stories.

In summary, the studies conducted by Story Grammar and Causal Network theorists indicate that interdependencies exist between categories, number of causal connections, and causal chain status in story texts. For example, categories recalled most frequently are also more often part of the causal chain and have more causal connections than categories that are not well recalled (Trabasso et al., 1984). Additionally, varying a particular story event's number of causal

connections changes how important it is considered within a story without altering its category (van den Broek, 1988). Further, the different types of causal relations, that is, enabling, psychological, physical, and motivational, tend to involve certain categories and not others, for example, motivational relations connect Goals to Attempts and so on. Thus, the type of causal relation depends in part on the category of the related events. Although many differences in recall of categories can be explained by causal properties, others cannot. Some Story Grammar categories, in particular outcomes, are shown to be recalled better than one would expect on the basis of causal connectivity or causal chain status (Trabasso & van den Broek, 1985). Thus, these various factors make both common and unique contributions to the coherence of the memory representation that individuals construct of a story. The possible dependencies and interactions between these factors are depicted graphically by including these properties of a story in the causal network representation (as shown in Figure 2). Thus, the Story Grammar and Causal Network models are complementary, and understanding how individuals understand and recall stories is enhanced when the contributions of both models are considered.

Turning now toward the focus of the present study, research has primarily focused on the analysis of stories that individuals have narrated; however, many researchers (Goldman et al., 1999; Graesser, Lang, & Roberts 1991; Stein & Glenn, 1979; Trabasso, van den Broek, & Liu, 1988) have emphasized the importance of using convergent methodologies to study story comprehension abilities. Such an approach provides different perspectives on individuals' understanding of a story since each task places different demands on a person. Goldman et al. (1999) point out that the resource demands involved in organizing and producing a sequentially and causally coherent story may exceed the resources available to younger children and children with language

learning difficulties. Such children may have understood many aspects of a particular story, but be unable to demonstrate their knowledge due to the demands of the task. Questioning tasks have often been used in conjunction with recall tasks to allow individuals an alternate means of demonstrating knowledge about a story.

Researchers advocate the inclusion of questioning task when evaluating children's knowledge of a story for a variety of reasons. Goldman et al. (1999), for instance, assert that questions provide a retrieval path that may aid children in accessing information that they had understood but could not generate appropriate retrieval cues for when asked to retell a story. Secondly, answering questions reduces the amount of information that needs to be held in working memory and organized for output. Finally, from a pragmatic viewpoint, questions make it clear what the examiner is interested in hearing about. Trabasso et al. (1988) add that questions are especially helpful if a child has not made causal inference connections between story elements spontaneously. Questions may make explicit the relations between story events that are otherwise implicit. These researchers also recommend that questions be ordered from the initial story events to the concluding events to preserve the temporal sequence in which the story unfolds. Such temporal sequencing of questions retains the causal order of the story and thus should help a child integrate story content and causal relations into a coherent representation (Beck, McKeown, McCaslin & Burkes, 1979).

Thus, the inclusion of a questioning task is beneficial particularly when evaluating children's understanding of stories for two reasons: first, questions reduce the task demands so that children are able to demonstrate story knowledge they possess but had not included when narrating the story (Goldman et al., 1999), and second, questions may

serve to focus children's attention on important story events and the causal connections between story events, thereby improving their understanding of the story (e.g., Trabasso et al., 1988).

The next section presents a review of studies in which questioning methodologies have been utilized. Since the present study concerns story comprehension abilities in children, the reviewed research focuses on studies with children. Three types of questions have been documented in the research literature. These include questions about: causal relationships among story events, importance ratings of story events, and literal and inferential story information. Each of these question types will be discussed separately in the next section.

Questioning Tasks

Causal Relationship Questions

Researchers have asked these types of questions as a means of discovering children's understanding about the causal relationships between story events, and whether such understanding was evidenced when they had previously narrated the story (e.g. Goldman, 1985; Goldman & Varnhagen, 1986; Stein & Glenn, 1979). These studies have consistently reported that when responding to questions, children demonstrate knowledge about causal relationships among story events that was not evident from their story narrations. For example, after children had recalled a story, Stein and Glenn (1979) asked 6-and 10-year-old children a series of questions about the causal relationships occurring in the story. When questioned, all children frequently attributed Internal Responses (i.e., a character's emotions, thoughts, or goals) as the cause of actions and outcomes in the story yet few children had included Internal Response information when retelling the story.

Goldman and Varnhagen (1986) reported a similar finding for slightly older children, 9 and 11 year olds. After retelling a story, the children were questioned about the causal relationships between Attempts and Consequences. The children frequently attributed the relationship between these two categories to the Goal category and, similarly to children in the Stein and Glenn study, had infrequently included such information in their story narrations.

Causal relationship questions have also been used to examine children's understanding of a story under reduced resource demands (Goldman et al., 1999). These researchers proposed that the demands of a story retell task might preclude young children from demonstrating knowledge they had understood in the story. In their study, after retelling a story, 6- and 9-year-old children were questioned about their understanding of causal relations between particular story events. The researchers found that the 6 year olds demonstrated understanding of story information and causal relations when answering questions that was not evident when they retold the story. However, this was not true of the 9 year olds; these children had, with few exceptions, included the information which they were questioned about in their narrations. Goldman et al. concluded that the higher resource demands of narrating a story appeared to have prevented the younger children from showing what they had understood in the story, but this was not true of the older children.

Comparisons of questioning and story retelling tasks in these studies reveal the value of using multiple measures in assessing children's understanding of stories. Children at differing ages demonstrated knowledge about the causal relations between story events when answering questions that had not been evident when they had recalled the story, although as demonstrated by Goldman et al. (1999)

these differences did decrease with age. However, none of these investigators addressed the difficulty in determining if the higher resource demands required to recall a story had prevented some children from demonstrating knowledge when narrating the story or whether the questions themselves may have caused the children to think about particular story elements and make causal inferences they had not made at the time they narrated the story. Without questions that require children to integrate the story as a whole or at least larger segments of the story, it is not possible to determine whether children's responses reflect knowledge they are able to demonstrate because of the reduced task demands or whether the questions induced inferencing on the part of the children. Further, causal relationships related to Settings, Initiating Events and Reaction categories were not investigated; therefore, children's understanding of these relationships in questioning versus narration tasks is, as yet, not well understood.

Importance Judgement Questions

When listening to or reading a story, the ability to distinguish the central plot is considered a major component of skilled comprehension (Baumann, 1984; Winograd, 1984). A questioning task that has been used to assess children's ability to identify central story elements is *Importance Judgements.* Causal Network theorists suggest that decisions individuals make about the importance of information in a story are dependent upon the number of causal relations that events have to other events in the story. Trabasso and van den Broek (1985) for example, showed empirically that the importance adults assigned to story events was a linear function of the number of causal relations that each event had to other events. Thus, researchers queried whether children also used causal relations as a basis for judging the importance of events in a story (Stein & Glenn, 1979; van den Broek, 1989).

Stein and Glenn asked children aged 6 and 10 what they considered to be the three most important parts of stories they had heard and retold. Results revealed significant differences in which parts of the story the two age groups of children considered important. The ten year olds considered the thoughts and goals of the story character (i.e., Internal Response category) the most important while the 6 year olds considered the story outcome (i.e., Consequence category) to be the most important. In a slightly different approach van den Broek (1989) examined Importance Judgements made by 8,- 11,- 14,- and 18-year-old children for stories they had read. The children were asked to rate the importance of events in the story when each event was presented to them singularly as a written statement. The older children (i.e., 11, 14, and 18 year olds) judged goals to be the most important while the younger children (i.e., 8 year olds) judged goals and successful outcomes most important. Results from both of these studies reveal that the most frequently chosen parts of the story were those that had higher numbers of causal connections to other events in the stories. Further, as age increased the children focussed on the goal category, which was in fact the category found to have the most causal connections to other events in stories.

Rather than investigating events children considered important to the story as whole, Bourg and Stephenson (1997) investigated which story events 11-year-old children judged important for causing a story character's emotions in a story when the emotion was not explicitly stated and therefore needed to be inferred. The children judged goals, successful/unsuccessful outcomes, and reactions to be important in determining the cause of the character's emotions. Bourg and Stephenson had not expected reactions to be considered important since as a category Reactions have few causal connections to other events.

Bourg and Stephenson argued for the possibility that Reactions could be considered a specific type of outcome rather than a distinct category in its own right.

Finally, in a study in which information children considered important was compared to information that was most frequently included in the children's narrations, a high degree of overlap was found, 76% for 6 year olds and 66% for 10 year olds (Stein & Glenn, 1979). There were, however, differences observed across the two tasks for three categories (i. e., Internal Responses, Settings and Initiating Events). Similarly to results for Causal Relationship questions discussed earlier, although children considered the story character's Internal Responses important, few children included such information when retelling the story. Conversely, Setting and Initiating Event information was almost always included when retelling the story but rarely included in Importance Judgements.

Thus, similarly to the studies conducted with adults, children do appear to make Importance Judgements based on causal connectivity properties; similarly to the findings from causal relationship questions children clearly demonstrated knowledge of elements in stories when answering Importance Judgement questions that was not often directly evident from their story narrations (i.e., knowledge of a story character's thoughts, goals and emotions). Children also may ascribe a causal role to 'Reaction' information within stories which adults do not typically do; this finding lends support for the need to investigate children's understanding of all categories in questioning versus narration tasks.

Literal and Inferential Questions

This questioning task targets understanding of information in a story that is either *Literal* - that is, explicitly stated in the text or depicted in the illustrations, or *Inferential* - not stated in the text or illustrations and therefore needed to be inferred. Researchers have also queried whether children's understanding of inferred story information poses a greater problem for them than understanding literal information, and if such a difficulty exists whether it is restricted to stories presented orally or is also apparent in stories presented pictorially. This type of questioning task has been primarily utilized to identify differences in story comprehension abilities between children developing typically and children exhibiting language, learning, or reading impairments.

In a study of 9-11 year-old children with and without language impairment, Merritt and Liles (1987) asked a series of questions about factual details concerning story characters and story events (i.e., Literal questions), and information Merritt and Liles referred to as 'Story Grammar' questions, which were in fact evaluating information that was not stated in the story text (i.e., Inferential questions). Results indicated no differences between the groups when answering Literal questions; however, typically developing children performed significantly better than children with language impairment on Inferential questions. Although the children in this study had also retold the stories comparisons of possible task performance differences across questioning and recall tasks were not reported.

Crais and Chapman (1987) conducted a study that involved a group of 9-and 10-year-old children with learning disabilities, a group of same-aged typically developing peers, and a group of younger children (i.e., 7 year olds) who performed similarly to the children with learning

disabilities on a test of receptive vocabulary. The children heard and retold stories, and answered a series of questions about the stories. Questions investigated the children's understanding of causal relationships among Setting, Initiating Event and Consequence categories. These categories were chosen as they were the most frequently recalled categories in children's story narrations reported in Stein and Glenn's 1979 study. Children with learning disabilities did poorly answering questions relative to same-aged peers, but they did not differ from the younger children. Although comprehension was impaired for both Literal and Inferential questions, those Inferential questions requiring integration of information within the story were the most difficult for both the younger children and children with learning disabilities. Thus, even for story events reported to be frequently included in children's story narrations, both young children and children with learning disabilities experienced difficulty answering questions about relationships among these events. This study showed a more generalized impairment when answering questions for children with learning disabilities and younger children, while the Merritt and Liles study had showed a differential pattern of success for the two question types.

A similar result to that reported by Crais and Chapman was found by Bishop and Adams (1992). These investigators examined a slightly wider range of ages, 8 - 12-year-old typically developing children and children with language impairments. Stories in this study were presented to the children as either a series of pictures without an oral account or orally without pictures. Following presentation of the stories children were asked Literal and Inferential questions about each story. Results indicated that all children answered fewer Inferential questions than Literal questions correctly. Additionally, children with language impairments answered fewer questions overall (i.e., Literal and

Inferential) than their typically developing peers. However, there was no effect for story presentation mode (pictures versus oral) in their study.

Additionally, some researchers have investigated differences in story comprehension abilities by comparing children who differ in their comprehension abilities rather than by a global diagnosis such as 'language impairment.' For example, Oakhill (1984) divided 7–8-year-old children with language impairments into 'less skilled' and 'skilled' comprehender groups based on a test of reading comprehension. The children were then read four stories (two with pictures, two without) and were asked a series of Literal and Inferential questions about the stories. When pictures were available, overall comprehension of the story, as measured by the questions, was better for both groups of children. The groups did not differ in their ability to answer Literal questions in either condition; however, the 'less skilled' comprehenders had more difficulty answering Inferential questions in either condition, that is, with or without pictures. Similar to the Merritt and Liles (1987) study the children only evidenced difficulty answering Inferential questions.

One of the problems noted in reviewing the literature where story comprehension was evaluated via Literal and Inferential questions is that it was difficult to interpret just what aspects of story knowledge were being evaluated within and across studies. With the exception of Crais and Chapman (1987) and Merritt and Liles (1987) there is no account provided as to how decisions were made as to which specific components of the story were evaluated. The following examples are illustrative of this problem. In reviewing the questions within studies, no consistency was found in the types of Literal or Inferential questions that were asked across the stories. For example, an Inferential question in one story might ask children to predict an event beyond the story, yet a similar question was not asked across the remaining stories in the study; the

same was true for Literal questions also. Further, some questions that were designated as Literal were, in fact, Inferential as the information was not available in the story illustrations or text.

Another factor making interpretations across studies difficult is that response demands differed widely across the studies reviewed. Children were able to answer with one-word responses in some studies, with yes/no responses often considered adequate; other studies required longer utterances. Further, of all the studies reviewed, only two (i.e., Crais & Chapman, 1987; Merritt & Liles, 1987) specifically identified the theoretical basis for the questions. The seemingly discrepant findings in these studies are difficult to interpret given the extent of these and other methodological divergences. However, despite such constraints results from this group of studies have consistently found that young children and children with language, learning, or reading impairments experienced difficulty understanding relationships between story events, particularly if those relationships must be inferred. Finally, unlike the studies in which children were asked about the Causal Relationships or to make Importance Judgements, only two of these studies included a narration task, and for the two that did (Crais & Chapman, 1987; Merritt & Liles, 1986), performance across tasks was not reported.

The research literature reviewed on questioning tasks provides substantial evidence that a different perspective is gained concerning children's understanding of stories when they are questioned about specific aspects of a story. *Causal Relationships* and *Importance Judgement* questions revealed information about children's knowledge of stories that was not evident when the children narrated the story. *Literal* and *Inferential* questions revealed differences in children's ability to demonstrate knowledge about relationships among story events as a function of age and language status.

It is also noteworthy that the *Causal Relationships* and *Importance Judgement* questions provide indirect evidence that children have knowledge about the causal relations in the stories. When asked a question about the causal relationships for particular story events researchers inspect children's responses and determine which specific category the response matches, thus providing only indirect evidence for children's understanding of relationships within the stories. On the other hand, *Literal* and *Inferential* questions specifically target events, states, actions, and relationships among the components of a story and are evaluated using a correct versus incorrect response scoring system, thus yielding more direct evidence of a child's knowledge about the particular story components evaluated.

SUMMARY

This chapter summarized research children's understanding of stories they have heard or read and discussed methods used to investigate the issue. The two models of story comprehension (Story Grammar and Causal Network) provide a useful framework from which to develop questions to evaluate children's knowledge of stories. There is substantial empirical and correlational evidence across story recall, story summary accounts, and questioning task studies that provide converging evidence for the significant contribution that category, causal relations, and causal chain status factors have on memory representations of stories. Thus, questioning children about story events and the relationships among events in a story should provide useful information regarding their ability to access information from their memory

representation or, alternatively, may support their construction of coherent and meaningful representations of stories.

Much of the research conducted with children has focused on story narrations, such as retelling a story that has been heard or read or formulating a story from a series of pictures. However, such tasks place high demands on children and may exceed the resources available to younger children and children with language learning difficulties. As discussed by Goldman et al. (1999) children may have understood aspects of a story, but be unable to demonstrate their knowledge due to the demands of the task. Because of this, several investigators stress the importance of assessing children's understanding of stories with differing methodologies. Questioning has been recommended as an appropriate adjunct methodology since questions provide a retrieval guide that may support children in accessing information they had understood but could not generate spontaneously, and answering questions reduced demands on working memory. Additionally, questions may clarify the relationships between story events that might not have been obvious to children when they narrated the story.

When children have been questioned about stories, different types of questioning tasks have revealed different perspectives of their story knowledge. The studies reviewed in this chapter evaluated causal relationships between particular story events, information children considered important in the story, and children's understanding of the literal and inferential components of stories. *Causal Relationship* and *Importance Judgement* questions consistently revealed that children demonstrated knowledge of story information that had not been obvious in their narrations, particularly younger children. *Literal* and *Inferential* questions showed that younger typically developing children and children with language, learning, and reading impairments had difficulty

answering both question types, although questions which required them to infer information from the story generally posed a greater difficulty.

Questions in the studies reviewed generally focussed on examining a few components of stories; therefore, children's understanding of relationships among all components of stories is not well understood. As shown by Bourg and Stephenson (1997) children unexpectedly attributed causal relationships between the Reaction category and other story events, which would not have been apparent had they not examined this particular story element. This finding is of interest since like the Goal category, children demonstrated understanding of the relationship Reaction information had to other events, yet Reaction information is infrequently included in children's story narrations. Another finding of interest was the result reported by Crais & Chapman (1987) for story events reported to be frequently included in children's story narrations. Both typically developing children and children with learning disabilities were found to experience difficulty answering questions about the relationships between such events. Thus, it cannot be routinely assumed that by including information in a story a child has understood the relationships between these events. Therefore, when questioning children about their understanding of stories it would be beneficial to evaluate all aspects of a story. Without a comprehensive set of questions evaluating story elements from the beginning to the end of the story, it is not possible to determine the extent and scope of possible developmental differences in children's knowledge about the components of a story.

PURPOSE OF THE STUDY

The present study was conducted to discern the developmental pattern of young children's understanding of a three-episode picture story using a questioning task. Previous investigations have focused on comparing distinct age groupings (e.g., 5 and 10 year olds). Although such studies have demonstrated age-related differences in children's understanding of stories, investigations regarding the developmental progression of such abilities have yet to be undertaken, particularly with young children. In order to ascertain how early children exhibit such ability, children aged 4,5, 6, and 8 were selected to participate in the study.

Three questioning tasks were constructed for this study. The questions were derived from the two models of comprehension, Story Grammar and Causal Network, along with knowledge gained from results reported in the existing research literature. The first set of questions evaluated children's understanding of the events, actions and states from the beginning of the story to its conclusion; thus, questions followed the temporal-causal sequence of the story. These questions were matched to Story Grammar categories and then designated as Literal or Inferential based on whether story information was depicted in the illustrations or not. The decisions to ask questions about the entire story was based on the finding that children showed understanding of parts of stories which were infrequently included in their story narrations (e.g., Goldman & Varnhagen, 1986; Stein & Glenn, 1979), and conversely that children did not answer questions about parts of the story reported to be frequently included in story narrations (e.g., Crais & Chapman, 1986). Further, some studies had also shown that younger typically developing children (i.e., 7 year olds) and children with language learning difficulties experienced difficulty answering both Literal and Inferential questions.

Since many of the children participating in this study were younger than seven it was expected that these children might also have difficulty answering both Literal and Inferential questions.

The second set of questions were designed to evaluate children's abilities to integrate the whole story and select two of the central components, the *Problem* and the *Resolution.* This type of question was considered important to include in the present study for several reasons. First, Crais and Chapman (1987) found that questions in which children were required to integrate information within stories were poorly answered by 7-year-old typically developing children and children with learning disabilities. Secondly, Baumann (1984) and Winograd (1984) suggest that understanding of the central elements of a story is a key component of successful comprehension of a story. Finally, these types of questions are commonly utilized as part of clinical (e.g., Hoggan & Strong, 1994; Westby, 1999) and educational (e.g., Dimino, Taylor & Gersten, 1995) story comprehension and story narration teaching strategies. Thus, information regarding children's ability to answer such questions would be useful in clinical and educational settings.

The third set of questions asked children to judge which two parts of the story they considered to be the most important in the story. Again, this task requires children to integrate the story as a whole. Research evidence has shown that the most frequently chosen parts of the story in this type of task were events that had several causal connections to other events in the story. Further, younger children in these studies, that is, 6 year olds (Stein & Glenn, 1979) and 8 year olds (van den Broek, 1989), frequently chose story outcomes (i.e., Consequence category) as the most important event in stories. Thus, for the present study it was of interest to determine if the children would demonstrate a similar response

pattern when judging the importance of events presented in a picture story.

The Set 2 questions (Problem-Resolution) and Set 3 questions (Importance Judgements) require children to integrate the story as whole, whereas the Set 1 questions (Literal and Inferential) guide children through the story by focusing on one part of the story at a time, and thus should be easier for all children to answer correctly. Taken together the three tasks may provide converging evidence concerning the children's understanding of the story.

The question task will be described in depth in the following chapter; however, Table 5 provides a brief overview of the three tasks.

Table 5.
Questioning Tasks Developed for the Present Study

Task	Designation	Information Evaluated and Question Type
Set 1 Guided	**Literal** Events depicted in the picture scenes	Settings Initiating Events Attempts Consequences Reactions
	Inferential Events not depicted in the picture scenes	Internal Responses/Goals Explanations of story character reactions
Set 2 Integrative Inferential	**Problem Resolution**	Part of story where Problem identified Successful outcome of the story
Set 3 Integrative Inferential	**Importance Judgements**	Event, action or state children considered most important in the story Event, action or state children considered the second most important in the story

This research was situated within a larger study, the Edmonton Narrative Norms Project (Schneider, Dubé & Hayward, 2002), in which children are asked to narrate the story shown in an original three-episode picture story. The questioning task was completed after the story narration component of the Project was conducted. As a result it was also possible to compare children's abilities across questioning and narration tasks.

Research Questions

Development of the questioning tasks led to the following nine research questions.

(1) Are there developmental trends for Set 1-Literal questions?
It was hypothesized that the ability to answer these questions correctly increases with age.

(2) Are some kinds of Literal questions answered more successfully than others?
No hypothesis was posited regarding possible differences in children's responses to the specific question types (*Settings, Initiating Events, Attempts, Consequences* and *Reactions*) as it was not possible to predict from the available research literature whether such differences existed.

(3) Are there developmental trends for Set 1-Inferential questions?
It was hypothesized that the ability to answer these questions correctly also increases with age.

(4) Are some kinds of Inferential questions answered more successfully than others?

It was hypothesized that children would answer questions about *Internal Responses* with greater success than *Explanation* questions since the information needed to answer these questions could be inferred from the previous story event. In order to answer the Explanation questions information must be inferred from events occurring two-three positions prior to when the question is asked.

(5) Are there differences in the percentage of children answering Set 1-Literal and Inferential questions and the percentage of children including equivalent information in story narrations across the four age groups?

It was hypothesized that the younger age groups of children would obtain a higher score in the questioning task than in the narration task but that this difference would decrease with age.

(6) Are there developmental trends for Set 2 Problem–Resolution questions?

It was again hypothesized that the ability to answer these questions correctly increases with age.

(7) Are there differences across the four age groups for percentage of children answering Set 1 Literal and Inferential questions correctly compared to the percentage of children who answer the Set 2 Integrative Inferential questions correctly?

Since the Set 1 questions guide the children by asking about one part of the story at a time these questions should be easier to answer than the Set 2 integrative inferential questions where the children were required to infer information from the story as a

whole. It is therefore hypothesized that the younger children will receive a higher score in the Set 1 questions than the Set 2 questions and the discrepancy between these scores will decrease with age. To test this hypothesis the following three comparisons were made:

(a) Set 1 - Inferential questions and Set 2 - Integrative Inferential questions,

(b) Set 1 - Consequence, Episode 1 question and Set 2 - Problem question,

(c) Set 1 - Attempt/Consequence, Episode 3 questions and Set 2 - Resolution question.

(8) Are there differences in information judged to be important in the story across the four age groups?

(9) Are there differences in the percentage of children who judge story information important and the percentage of children including equivalent information in story narrations across the four age groups?

Since it was reported that younger children frequently judged story outcomes as important and this information was frequently included in story narrations, it was hypothesized that the information children considered important would also be included in story narrations.

Along with a discussion of the design and methodological sequence of the present study a detailed presentation of the three questioning tasks will be presented in the next chapter.

CHAPTER 2: METHODOLOGY

This chapter presents the design of the study by first providing an overview of the picture story for which the questions were developed. This follows a detailed description of the three questioning tasks, including the rationale for question selections. The remainder of the chapter describes the participants, procedures and treatment of the data.

Development of the Picture Story

The questioning tasks in this study were developed for use in conjunction with an original three-episode picture story designed to collect story narrations from children aged 4-9, the Edmonton Narrative Norms Project (Schneider, Dubé & Hayward, 2002). In the Schneider et al. study children were presented a series of picture sets and asked to generate a story for each of the picture sets. This method was chosen as a means of eliciting narratives from children since the pictures provided support in formulating the narratives with respect to content and length but also allowed children to generate stories in their own words. Formulating a story from a picture set provides a greater opportunity to evaluate children's own lexical, morpho-syntactic, and story element selections than when children are asked to retell a story they have just heard. However, one aspect of formulating a story from pictures that is similar to a story retell task is that children narrate the same set of events, thus allowing the examination of elements of the story that children include in their narrations as a function of age. Further, the presentation of stories as a sets of pictures that children may view while they generate the story reduces the demands of the task. This was an important consideration in eliciting narratives from young children in the Schneider et al. study.

The story pictures were developed by Dubé (2000) for her doctoral thesis, which investigated narrative language skills of Deaf children. In Dubé's study picture stories provided a context in which the same stimuli could be used to evaluate narrative abilities with children who used American Sign Language or English without concern for providing language models that were linguistically equivalent in content and structural complexity.

Development of the picture stories was completed in two parts. First Dubé developed written scripts for six stories which served as models for creating the story pictures. The scripts were written to incorporate Story Grammar categories and episodic structure as per Stein and Glenn's (1979) taxonomy. A panel of narrative experts was then asked to review the scripts and judge them for conformity to the Story Grammar model (i.e., categories and episodic structure). The panel members, consisting of eight professors or instructors in Communication Disorders departments at universities in Canada and the United States, all had clinical and/or research experience in the area of narratives. Changes were made to the stories based on the feedback provided from each panel member. Next, the revised narratives were then sent to a professional cartoonist who created black-and-white cartoon picture sequences for each story. The picture sequences were then returned to the members of the panel who were asked to judge the adequacy of the pictures sequences for eliciting Story Grammar components and episodic structure. Dubé established a pre-set criterion of 80% agreement between panel members for depiction of Story Grammar elements and episodic structure for a story to be considered acceptable for use in her study. The agreement by panel members for the story used in the present study, 'The Airplane,' was 98.2%. The story script is provided in Appendix B. This picture story is provided in Appendix C.

The three-episode picture story 'The Airplane' was chosen for use in the present study so that children's narrative skills could be examined in a complex story. Table 6 summarizes the complexity of the story depicted in the story illustrations. Complexity in this story is based on story length (i.e., three episodes) and by the addition of a new character in each subsequent episode of the story and an additional object in the final episode.

Table 6
Structural and Content Parameters of the Three-Episode Story 'The Airplane'

Context	Number of Characters and Objects	Description of Characters and Objects
Episode 1 Swimming pool	2 characters 1 object	Young male giraffe Young female elephant Toy airplane
Episode 2 Swimming pool	3 characters 1 object	Young male giraffe Young female elephant Adult male elephant Toy airplane
Episode 3 Swimming pool	4 characters 2 objects	Young male giraffe Young female elephant Adult male elephant Adult female elephant Toy airplane Scoop net

Development of Questioning Tasks

Information from the two theoretical models and research literature described in the previous chapter were used to develop the questioning tasks for the present study. The next section will provide the rationale for selection of the three types of questions, specific question formulations and the scoring criteria applied to children's responses to each of the questions.

(a) Set 1 – Guided Questions (Literal and Inferential)

Set 1 questions were designated as either Literal or Inferential, and evaluated children's knowledge of the story from the beginning to the end. These questions guided children through the story by focusing on one part of the story at a time. The questions were primary matched to the category components of Stein and Glenn's (1979) taxonomy described in Table 1, evaluating both the category and causal relations between categories. The Literal questions could be answered by observing details shown in the pictures. The Inferential questions asked about elements not depicted in the pictures. This resulted in a total of 20 Literal questions and 9 Inferential questions addressed to the children in this question set.

This type of questioning task was chosen for several reasons. First, the researchers who examined stories from the perspective of Literal versus Inferential information found that the younger typically developing children (i.e., 7 year olds) and children with language impairments, learning disabilities, or reading comprehension difficulties had problems answering such questions, although the Inferential questions posed the greatest difficulty for these children. Given that in the present study the majority of the children were younger than seven, it was expected that a similar finding might be observed. Thus, the Literal and Inferential questioning tasks in this study would extend the results found in earlier studies. Additionally, the questioning tasks in previous studies occurred after children had heard or read a story. This study will provide information regarding children's understanding of a picture story.

Secondly, several investigators found that when questioned, children demonstrated knowledge of parts of the story that had not been included in their narrations (e.g., Goldman & Varnhagen, 1986; Stein & Glenn, 1979) while other researchers found that children had difficulty answering questions about story elements that are frequently part to their narrations (e.g., Crais & Chapman, 1986). However, none of these studies evaluated all elements of the stories in the questioning task. This was considered important since similar findings may be evident for other story elements. Thus, the Set 1 Literal and Inferential questions in this study were designed to examine all story elements and the causal relations among these elements.

(b) Set 2 – Integrative Inferential Questions (Problem and Resolution)

These questions asked children to select two of the central components of the story, the Problem and the Resolution. In general the 'Problem' of a story is created in the first episode by Initiating Event information. In the 'The Airplane' story this would be Picture 2 (see Appendix C); however, in this story the Problem is created at the end of the first episode in Picture 4, when the plane lands in the water, and the remainder of the story involves attempts to retrieve the plane for the giraffe. The 'Resolution' refers to the successful outcome of the story and this is depicted in Picture 12 when the giraffe has his toy plane returned to him.

To answer the Problem and Resolution questions, children must presumably integrate the whole story, and therefore these questions were designated Integrative Inferential questions. As pointed out in the last chapter, the inclusion of this type of question was based on several factors. First, Baumann (1984) and Winograd (1984) suggest that understanding the central elements of a story is a key component of

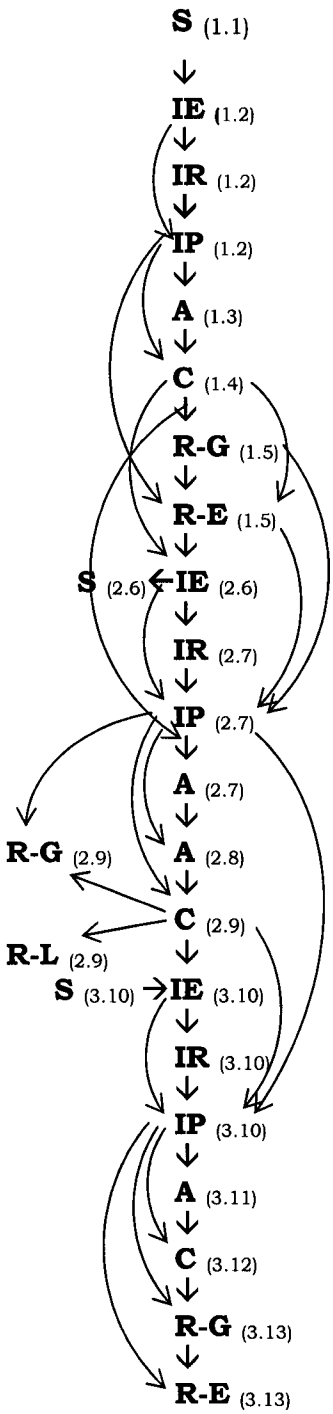
successful comprehension of stories; thus answering these questions allows an examiner to determine if a child can demonstrate knowledge of these central story elements. Another reason for including these types of questions is that they are frequently included as a means of teaching or monitoring children's comprehension of stories in both clinical (e.g., Hoggan & Strong, 1994; Westby, 1999) and educational (e.g., Dimino, Taylor & Gersten, 1995) milieus. Thus, information regarding children's ability to answer such questions may provide useful clinical and educational information.

Next, Crais and Chapman (1986) reported that inferential questions in which children were required to integrate information within stories were correctly answered less often than inferential questions that enquired about a specific relationship within the story. This finding by Crais and Chapman led to the hypothesis that children would answer Inferential questions from the Set 1 questioning task with greater success than the Set 2 task. Both tasks require the children to infer relationships; however, the Set 2 task requires integration of a larger amount of information in order to answer the questions correctly. Children are also questioned about story information relevant to the Problem and Resolution questions as part of the Set 1 Literal questions. Again, the children should answer these questions correctly more frequently than the Set 2 questions since the Set 1 questions guide children's attention to these components of the story and require only local understanding of story connections. If this hypothesis is confirmed then this study would extend Crais and Chapman's findings to younger children.

(c) Set 3 – Integrative Inferential Questions (Importance Judgements)

Set 3 questions asked children to judge which two parts of the story they considered to be the most important. Similar to the Set 2 questions, this task required children to integrate the story as a whole to make such judgements and thus these questions were also designated as Integrative Inferential questions. Research evidence has shown that the most frequently chosen parts of a story when making Importance Judgements for stories heard or read were events that had several causal connections to other events in the story (Trabasso & Sperry, 1985; Trabasso & van den Broek, 1985; van den Broek, 1988; 1989a; van den Broek & Trabasso, 1986). For older children and adults the main goal of the story was chosen (Trabasso and van den Broek, 1985), while for younger children in these studies, that is, 6 year olds (Stein & Glenn, 1979) and 8 year olds (van den Broek, 1989), story outcomes were more frequently chosen (i.e., Consequence category). Thus, a goal of the present study was to determine whether children of similar and younger ages to children in earlier studies demonstrate a similar response pattern when judging the importance of events presented in a picture story. In order to test this hypothesis a causal network representation of the 'The Airplane' story was constructed so that the number of causal connections between elements was available to compare with the children's Importance Judgements. The causal network was derived from the story script for this story (Appendix B) and the picture illustrations (Appendix C). Figure 3 graphically displays the relationships between events, actions and states in the story pictures according to Story Grammar categories (i.e., Setting, Initiating Event, Attempt, etc). The first number in parentheses refers to the episode of the story and the second number refers to the picture number from the story as shown in Appendix B. Hence, $IE_{(1.2)}$ refers to the Initiating Event from Episode 1 shown in Picture 2, while $A_{(2.8)}$ corresponds to the

Attempt in Episode 2 shown in Picture 8 and so on. The arrows between categories represent the causal relations among each of the events, actions, and states.



Note. Letters = Story Grammar categories; S= Setting, IE= Initiating Event, IR= Internal Response; IP= Internal Plan, A= Attempt, C= Consequence,
R-G= Reaction of giraffe, R-E= Reaction of girl elephant,
R-L= Reaction of lifeguard
Numbers = (Story Episode.Story Picture) e.g. (1.1 = Episode 1.Picture1)
Arrows → = causal relations between categories

Figure 3. Causal Network Representation of 'The Airplane' Picture Story

The questioning tasks utilized in previous studies did not address how content of the individual questions was determined. For instance, a 'What happened?' question would be asked about a goal in one episode of the story while in the next episode a 'Why?' question was asked. This same inconsistency was also observed across stories in studies where more than one story was evaluated. Additionally, the types of elements questioned were not consistent within or across stories. For example, a question would be asked about the outcome of the first episode but not the outcomes of any subsequent episodes, while in the same study an outcome question for another story would be asked about the last episode only. Further, in many studies the questions were not derived from models of story comprehension but were derived from the specific story content. Thus, in the present study equivalent *'wh'* question forms were used when asking about particular elements of the story to support comparisons across episodes and tasks. In addition, the questions were specifically formulated to be 'generic.' This was done for several reasons: (a) to ascertain how young children are able to match specific local story content when provided with slot-filling question forms that were mapped to the cognitive schema, (b), to support the comparison of children's responses across episodes and tasks, and (c) to allow for replication of the questioning protocol in novel stories in future research and in clinical or educational settings. Table 7 provides a summary of the questioning tasks, story elements and relationships evaluated along with the *'wh'* question forms used for each of the story elements examined.

Table 7
Description of the Three Questioning Tasks

Questions	Question Type	Number of Questions	Story Elements Evaluated	*'Wh'* question form
Set 1 Guided	**Literal** Events in the pictures	20	Setting Initiating Event Attempt Consequence Reaction	Who?/Where? What – happen? What – do? What – happen? How?
	Inferential Events not in the pictures	9	Internal Response Explanations of story characters' reactions	What – thinking? Why?
Set 2 Integrative Inferential	**Problem Resolution**	2	Main problem to be solved Successful outcome of story	What – problem? How?
Set 3 Integrative Inferential	**Importance Judgements**	2	Information considered most important in the story Information considered the second most important in the story	What – important? What – important?

Pilot Testing

Prior to commencement of the study, the questions were piloted for wording to ensure that children would understand what was being asked. This was accomplished by asking the series of questions to five typically developing children from three of the age groupings -- 4, 6, and 8 year olds -- for a total of 15 children. These children were known to the researcher as children of friends and work colleagues. Child responses were judged only for the elicitation of information related to

the question content, not for accuracy of the response. Four modifications were made to the questions as a result of pilot testing. The first pertained to Set 1 questions. Originally questions were included regarding the Internal Plan Story Grammar component described in Table 1. However, responses to these questions were found to be identical to responses given to questions asked before (Internal Responses) or after (Attempts) the Internal Plan questions. As a result the Internal Plan questions were not included in the final protocol. It was noted that children occasionally provided explanations for characters' reactions before they were asked for an explanation, for example,

Reaction question – *How did (story character) feel?*

Child response – *Sad because his plane was in the pool.*

The last part of this response *'because his plane was in the pool'*, answers the Explanation question. Consequently the protocol was modified so that such a response could be scored as a response to both the Reaction and Explanation question.

The next modification pertained to all three question sets, six questions from Set 1, and one each from Question Sets 2 and 3. In this circumstance whenever one question was a follow-up to another, for example

Reaction question – *How did story character feel?*

Explanation question – *Why did (story character) feel that way?*

If the response to the first question was *'I don't now"* the second question was not asked.

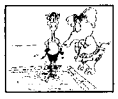
The final modification also related to the Importance Judgement questions. Some children provided responses that were unrelated to the

story (e.g., *they have no money)*, others provided several pieces of story information in their response (e.g., *the giraffe got his plane and he was happy)*, and in others it was difficult to determine to which part of the story the child was referring (e.g., *he was sad).* Since it was difficult to ascertain if such responses were the result of children not understanding the question, a series of prompts were developed to help children focus on selecting information from the story if their initial answers fell into these types of categories. The prompts are outlined in Appendix D along with example responses.

Following these modifications two additional children from each of the three age groupings were questioned; their responses were judged to be related to the questions asked. In addition, responses given by the first five children in each of the age groups (i.e., 4, 5, 6, and 8 year olds) who participated in the study were examined to determine whether their responses were related to the story content queried and that all possible exceptions were adequately addressed. The author and another judge, one of the co-investigators from the Schneider et al. (2002) study, discussed any ambiguous response until agreement was reached. Table 8 provides the questioning protocol used in the study with Story Grammar categories, question designations, and administration exceptions.

Table 8.

Questioning Tasks, Story Illustrations, Story Grammar Categories, Question Designations and Administration Exceptions

Set 1 Questions – Guided (Literal and Inferential)			
Picture	Question	SG Categories	Designation
Episode 1 	**Q1. *Who is in this story?***	Setting–Ch. 1 & 2	Literal
	Q2. *Where are the animals?*	Setting–Location	Literal
	**Q3. *What happens first in the story?***	Initiating Event	Literal
	Q4. *What was the elephant thinking?*	Internal Response	Inferential
	**Q5. *What did she do?***	Attempt	Literal
	**Q6. *What happened when she did that?***	Consequence	Literal
	**Q7. *How did the giraffe feel?*** (Q8 not asked if child did not respond or answered 'don't know')	Reaction Ch. 1	Literal
	Q8. *Why did he feel that way?* (Not asked if child provided response in Q7)	Explanation for Reaction	Inferential
	Q9. *How did the elephant feel?* (Q10 not asked if child did not respond or answered 'don't know')	Reaction Ch. 2	Literal
	Q10. *Why did she feel that way?* (Not asked if child provided response in Q9)	Explanation for Reaction	Inferential
Episode 2 	**Q11. *What happens next?***	Setting–Ch. 3 Initiating Event	Literal
	**Q12. *What was the lifeguard thinking?***	Internal Response	Inferential
	**Q13. *What did he do?***	Attempt	Literal
	**Q14. *What happened when he did that?***	Consequence	Literal
	Q15. *How did the giraffe feel?* (Q16 not asked if child did not respond or answered 'don't know')	Reaction Ch. 1	Literal
	Q16. *Why did he feel that way?* (Not asked if child provided response in Q 15)	Explanation for Reaction	Inferential
	Q17. *How did the lifeguard feel?* (Q18 not asked if child did not respond or answered 'don't know.)	Reaction Ch. 3	Literal
	Q18. *Why did he feel that way?* (Not asked if child provided response in Q17)	Explanation for Reaction	Inferential

Picture	Question	SG Categories	Designation
Episode 3 	**Q19. *What happens next?***	Setting–Ch. 4 Initiating Event	Literal
	Q20. *What was the lady elephant thinking?*	Internal Response	Inferential
	**Q21. *What did she do?***	Attempt	Literal
	**Q22. *What happened when she did that?***	Consequence	Literal
	**Q23. *How did the giraffe feel?*** (Q24 not asked if child did not respond or answered 'don't know')	Reaction Ch. 1	Literal
	Q24. *Why did he feel that way?* (Not asked if child provided response in Q23)	Explanation for Reaction	Inferential
	Q25. *How does the little elephant feel?* (Q26 not asked if child did not respond or answered don't know')	Reaction Ch. 2	Literal
	Q26. *Why did she feel that way?* (Not asked if child provided response in Q25)	Explanation for Reaction	Inferential
Set 2 Questions – Integrative Inferential (Problem-Resolution)			
	Q1. *What was the problem in this story?*	Main problem to be solved	Problem
	Q2. *How did that problem get fixed in the story?* (Q2 not asked if child did not respond or answered don't know')	Successful outcome of story	Resolution
Set 3 Questions – Integrative Inferential (Importance Judgements)			
	Q1. *What do you think was the most Important thing that happened in this story?*	Information considered most important	1st Importance Judgement
	Q2. *What do you think was the second most Important thing that happened in the story?* (Q2 not asked if child did not respond or answered 'don't know')	Information considered next most important	2nd Importance Judgement

Note: Ch. 1 = giraffe, Ch. 2 = girl elephant, Ch. 3 = male elephant; Ch. 4 = female elephant

Participants

To ensure that the children participating in this study were representative of the population and demographics of the city of Edmonton, Alberta, Canada, a geographic random sampling method was employed. This was accomplished in two parts. First, an equal number of schools, preschools and daycares were randomly chosen from all four

quadrants of the city. Secondly, demographic information was collected on the families of participating children (i.e., socio-economic status and ethnic background) to enable description of the sampled group.

Study participants consisted of fifty typically developing, English-speaking children for each age grouping (4, 5, 6, and 8 year olds) for a total of 200 participants. There were an equal number of boys and girls in each age group. This sample size was chosen since this study was part of a larger project, the Edmonton Narrative Norms Project (Schneider et al., 2002), in which story narrations were collected to develop local narrative norms for the city of Edmonton. While the preferred number of participants for normative purposes is 100 per age group, Harris (1993) and Toronto and Merrill (1983) suggest that for the purposes of developing local norms 50 participants per age group is sufficient. Data were collected for 7 and 9 year olds in case questions also proved to be promising for normative purposes; preliminary analyses indicated that for the proposes of this developmental study 4 age groups were sufficient to show any age differences across the tasks.

The 4-and 5-year-old children were located within preschools and daycare centres in the Edmonton area. Children aged 5-8 years attended Kindergarten through Grade 3 in the Edmonton Public School and Edmonton Catholic School Systems. In all, 24 schools and 13 daycares, preschools and independent kindergarten programs were visited to collect the data. Table 9 presents the Age demographics across the four groups for children participating in the study.

Table 9
Means, (Standard Deviations), and Range for Age of Participants across the Four Age Groups

Age	4 yr olds	5 yr olds	6 yr olds	8 yr olds
Mean	4;6	5;6	6;6	8;6
SD[a]	(.24)	(.26)	(.28)	(.27)
Range	(4;0 - 4;11)	(5;0 - 5;11)	(6;0 - 6;11)	(8;0 - 8;11)

Note. Age is expressed in years;months
[a] standard deviations expressed as a fraction of one year

Socio-economic information was gathered for all participants based on parent occupations, which were then assigned values according to the Blishen Scale (Blishen, Carroll, & Moore, 1987). This scale is based on Canadian census information and a list of numerical values for occupations were developed that are equally weighted for education and income. Values on the Blishen Scale range from 17.81 (newspaper carriers and vendors) to 101.74 (dentists) with a mean of 42.74 (SD = 13.28). Table 10 displays the means, standard deviations, and range of values for children's parents based on occupations reported on the consent forms and matched to values on the Blishen Scale.

Table 10
Means, (Standard Deviations), and Range for Socio-Economic Status of Participants Parents across the Four Age Groups

Age	4 yr olds	5 yr olds	6 yr olds	8 yr olds
Mean	47.38	46.63	48.31	45.04
SD	(13.57)	(12.11)	(14.75)	(11.54)
Range	(23.7-82.9)	(24.1-73.2)	(25.5-101.5)	(23.7-75.9)

Note. Values represent weighted components for education and income form occupation from the Blishen Scale - mean = 42.74, (SD = 13.28).

In order to determine if the socio-economic representation was similar among the groups, an analysis of variance was completed with

the dependent variable socio-economic status (SES) obtained from values for parent occupations using the Blishen Scale. The univariate ANOVA (SES X Age) revealed that the age groups did not differ [F (3,192) = .544, p = .65]. Further, the mean values across the four age groups as shown in Table 9 were within one standard deviation of the mean reported by Blishen, Carroll and Moore (1987), indicating that the make-up of the group in this study was similar to the Canadian population. Ethnicity was left to vary and was representative of a midsize Western Canadian city.

Procedures

(a) Preschools and Daycares

Preschool and daycare supervisors were first contacted by a research assistant. The entire project (questioning and narration tasks) was described and, if the supervisor gave permission for the study to be conducted in the centre, the research assistant then met with the supervisor in person to describe the sampling procedure. Supervisors were asked to send information/consent letters to parents of children aged 4-5 attending the centre if English was the primary language spoken in the home and if the children had no known history of vision or hearing impairments, cognitive delay or emotional problems, or speech and language delays. Consent forms were returned to the daycare or preschool. The research assistant was contacted by the daycare/preschool staff when consents had been returned and appointments were then scheduled to conduct the study.

(b) Schools

Principals within Edmonton Public and Edmonton Catholic Schools were contacted by a research assistant. If the principal gave permission for the project to be carried out in the school, the research assistant met with individual teachers to describe the study and sampling procedure. Teachers were asked to send information/consent letters home with 6 children in their class, 3 boys and 3 girls (1 boy and 1 girl performing academically in the lower third of the class; 1 boy and 1 girl performing in the middle third; and 1 boy and 1 girl performing in the top third). Similar to the criteria for preschool children, teachers were specifically asked not to include any child if English was not the primary language spoken in the home or if the child was known to have a history of visual or hearing impairments, cognitive delay or emotional problems. Additionally any child who was receiving or whom a teacher was referring for speech and language, educational, or cognitive assessment was also excluded as a participant. Information/consent letters were sent home to families by the classroom teacher. Parents returned the consent forms to the child's school. The research assistant was contacted by the school when consents had been returned, after which appointments were scheduled to conduct the study.

Each child was seen individually at the child's preschool, daycare or school for two or three testing sessions. In these sessions the story narrations were collected first, followed by the administration of the questioning tasks and 2 subtests from standardized tests of language. Each of these procedures will be described in the next section.

Story Narrations

The first session was conducted by one of two female research assistants who administered the story narration tasks for the Schneider et al. (2002) study. The child was first given a training story. For this story, the examiner was permitted to provide help in the form of questions if the child had difficulty with the task. Instructions and allowable questions for the training story are provided in Appendix H. The child then viewed the pictures of the test story to become familiar with the story as a whole. The examiner returned to the beginning of the story and the child was asked to tell the story to the examiner. Throughout this process, the examiner held the story binder in such a way as to ensure that she could not see the pictures when the child viewed or told the story. This was done in order to obtain as complete an account of the story as possible from the children because previous research indicates that children tell less complete stories if they believe a listener has knowledge of the story (Kail & Hickman, 1992). It would be less likely for children to make such an assumption if the research assistant did not view the pictures while the child was narrating the story. Instructions and allowable questions for the test story are provided in Appendix I. Appendix J provides sample transcripts that are representative of typical narrations of children across the four age groupings.

Questioning Tasks

After completing the story narrations the children were seen by the author to administer the questioning tasks and subtests from a standardized test of language. This testing was undertaken within three weeks of each child completing the story narration task. Testing sessions were held in a quiet room within each school, preschool or

daycare. The child was introduced to the examiner by either a supervising adult (daycare/preschool) or teacher (school). Prior to asking the questions, the story pictures were previewed by the child and the examiner together. The examiner opened the cover of the book and slowly turned each page showing the child each picture of the story until the end of the story had been reached. General instructions are provided in Appendix K. Afterwards, the examiner returned to the beginning of the story to commence asking the questions. The story pictures were visible to both the child and the examiner for this task. Once the child had answered the questions related to the first page of the story, the examiner turned the page and asked the next question. The examiner asked the questions in the sequence shown in Table 7, that is, Set 1, followed by Set 2 and Set 3. No time limitations were imposed for answering the questions; however, questions were repeated if requested by the child or if the child had not responded within 15 seconds. Additionally, unforseen interruptions occurred while administering the questioning protocol (e.g., teachers or other children entering the testing room, announcements given over the school PA system). In these circumstances, questions were repeated once the interruption had ceased.

Language Testing

Subtests from one of two tests of language were administered either right after the questioning tasks or in an additional session depending on the child's preference. All children were asked if they would like to complete the language testing after the completion of the questioning tasks; however, some children preferred to complete the testing at a later time for reasons such as 'tiredness' or not wanting to miss a particular class subject. In these cases the examiner returned to the school within a week to complete the testing. Language testing was

conducted to describe the groups in terms of language ability and to ensure that groups were similar in language abilities. The Linguistic Concepts (receptive language task) and the Recalling Sentences in Contexts (expressive language task) subtests from the Clinical Evaluation of Language Fundamentals –Preschool (CELF-P; Wiig, Secord & Semel, , 1995) were given to children aged 4 and 5. The Concepts and Directions (receptive language task) and Recalling Sentences (expressive language task) subtests from the Clinical Evaluation of Language Fundamentals - 3 (CELF-3; Semel, Wiig & Secord, 1995) were administered to children aged 6 and 8. These two tests were utilized since there was no well recognized single standardized test of language available to measure language skills across the entire range of ages for children in this study. The two tests were chosen as they were constructed by the same authors and designed to measure the same language abilities. The subtests chosen are considered parallel subtests of the same skills by the authors. Table 11 provides the means and standard deviations for the CELF-P and CELF-3 subtest scores for each age group.

Table 11
Means and (Standard Deviations) of Subtest Scores on Standardized Tests of Language for each Age Group

Test	CELF-P		CELF-3	
Subtest	LC	RS	CD	RS
4 yr olds	10.36 (3.8)	9.56 (2.7)		
5 yr olds	9.71 (3.4)	9.16 (3.4)		
6 yr olds			11.65 (3.0)	11.71 (3.3)
8 yr olds			12.1 (3.0)	10.7 (2.7)

Note. CELF-P = Clinical Evaluation of Language Fundamentals – Preschool, CELF-3 = Clinical Evaluation of Language Fundamentals – 3, LC = Linguistic Concepts, RS = Recalling Sentences, CD = Concepts and Directions.

In order to determine if groups were in fact similar in language ability, univariate tests were completed comparing receptive language and expressive language abilities as measured by standard scores on the two language subtests for adjacent age groups. The univariate ANOVA results are displayed in Table 12.

Table 12.
Comparisons of Language Ability Across Subtests of Standardized Tests of Language for the Four Age Groups

Age Comparisons	Receptive Language Linguistic Concepts /Concepts & Directions	Expressive Language Recalling Sentences
4 & 5	F (1,99)=.739 p = .392[a]	F (1,99)=.523 p = .471
6 & 8	F (1,99)=.951 p = .332[b]	F (1,99)=2.289 p = .133

Note. [a] Linguistic Concepts (CELF-P); [b] Concepts & Directions (CELF-3)

Data were collected over two school years. Care was taken to collect the data for each age grouping throughout both school years so that no one age group was sampled at a different point in the year.

Children's responses to questions were audio recorded using a JVC portable minidisk recorder. The responses were then transcribed in full along with any examiner prompts or comments. Response codes for scoring individual questions were added to each transcript for analysis using the Systematic Analysis of Language Transcripts program (SALT; Miller & Chapman, 1998).

Transcription Reliability

Thirty-two audio recordings (sixteen percent), consisting of eight randomly selected transcripts from each age group, were independently transcribed by a second trained transcriber who was blind to the ages of the children and the purpose of study. Transcription ratings were based on point-by-point reliability between the author and second transcriber for each word transcribed. Agreement between raters was based on the number of exact agreements for transcribed words in each transcript, divided by the number of possible agreements. A high agreement rate of 97.2% was achieved, with identification of maze components being the only area of disagreement. These included marking word repetitions in parentheses (e.g., *(the) the plane doctor came by)* along with revisions made by the child within a response (e.g., *First they come to the pool (and they pla) and Timmy brings his little toy plane).* These were minor disagreements that did not impact scoring of child responses. Since no measures were included in the study that would affect the scoring of children's responses related to mazes, boundaries identified by the author were applied for any disagreements.

Scoring Criteria

Specific criteria were established for scoring children's responses to the questions. Question Set 1 (Literal and Inferential) and Set 2 (Problem-Resolution) were scored on a three-point scale ranging from 0 - 2. It was originally intended that responses to these questions would be scored correct/incorrect, but similar to response patterns reported by Bishop and Adams (1992) some children gave answers that, while not incorrect, omitted important details necessary to receive full credit. Therefore, a 3 point scoring system was adopted; two points were given for answers that included the most salient information required to answer the question with respect to the event, action, or state evaluated, one point was given for answers that were partially correct, and zero points were given for answers that failed to meet the above criteria or were of *'I don't know'* or non-responses.

Child responses to Set 3 questions (Importance Judgements) were matched to Story Grammar categories using the scoring guidelines from Set 1 questions. Additional codes were developed since some responses were not classifiable within these categories. For example, some children's responses represented a moral of the story *(*e.g., *you should never bring toys to the pool)*; therefore a category for 'Morals' was created. Other children's responses did not relate to the story at all *(*e.g., *they can't colour on the deck)*; such responses were coded as 'NSG' – No Story Grammar category. While scoring the children's responses (pilot testing and main study) the investigator conferred with one of the co-investigators involved in the Schneider at al. study on all ambiguous answers until agreement was reached. Appendix E provides the scoring criteria along with example responses for the individual questions in

each task. In addition, examples of typical responses to the three questioning tasks for each of the age groups is provided in Appendix F.

Scoring Reliability

Sixteen percent of the investigator's scored transcripts, consisting of eight randomly selected transcripts from each age group, were independently scored by a second person. This individual was a speech-language pathology masters level student who had previous experience in Story Grammar coding. A training session was completed for the student to learn to use the scoring protocol presented in Appendix E. Inter-rater agreement was calculated using the Cohen's kappa statistic, κ, since it provides a chance-corrected measure of agreement between raters. For Set 1 questions (Literal and Inferential) $\kappa = .90$, Set 2 questions (Problem – Resolution) $\kappa = .86$, and Set 3 questions (Importance Judgements) $\kappa = .87$, indicating very high agreement across all three sets of questions between the two judges.

Validity

Of concern in this study was the content validity of the questions and tasks. Content validation involves demonstrating that the content of a measure such as the questioning tasks is consistent with the construct it is being used to measure (McCauley, 2001). McCauley adds that ensuring components of a particular measure provide sufficient coverage of various aspects of the construct while avoiding unrelated content ensures the relevance of the content of the measure. Since the questioning tasks developed for this study were based on the Story Grammar and Causal Network models and the specific questions evaluate aspects considered important and relevant in these models (i.e.

Story Grammar categories and causal relations) the questions are thus believed to be relevant to the content described within these theoretical models.

Design

A descriptive, cross-sectional research design was used to explore children's understanding of the picture story via the questioning tasks. The dependent variables consisted of children's responses to questions from the three questioning tasks: *Literal and Inferential, Problem-Resolution,* and *Importance Judgments* as well as from the narration task. The independent variable was Age Group. The dependent variables and independent variable are summarized in Table 13 along with the scoring methods used for individual questions and the reporting methods for each variable.

Table 13
Dependent and Independent Variables, Scoring Criteria for Individual Questions and Reporting Method

Variable		Scoring Method Individual Questions	Reporting Method for Question Type
Dependent	Set 1 – Guided questions		
	Literal	2 – 1 – 0[a]	Percent correct[b]
	Inferential	2 – 1 – 0[a]	Percent correct[b]
	Set 2 – Integrative Inferential		
	Problem – Resolution	2 – 1 – 0[a]	Percent correct[b]
	Set 3 – Integrative Inferential		
	Importance Judgements	matched to Story Grammar category	Percentage of children choosing each category in each age group
Independent	Age Group	Calculated in years and months at time of testing	Years

Note.
[a] 2 - fully acceptable response, 1 - partially acceptable response, 0 - not acceptable response
[b] raw scores were converted to percentage correct (i.e., percentage of maximum possible points) to allow for comparisons across question types and tasks

Data Analysis

Statistical analyses were computed using SPSS for Windows 11.0.1 (2001). Analyses of variance were calculated to determine main effects and interactions among variables. Tukey's Honestly Significant Difference test was used for post hoc testing to determine which individual group means are significantly different from one another.

Ethical Considerations

Approval for conducting this study was obtained through the Health Research Ethics Board at the University of Alberta. In addition, approval to conduct the study in Edmonton Public and Edmonton Catholic Schools was obtained through the Co-operative Activities Program (CAP), Faculty of Education, University of Alberta. CAP oversees and approves all research projects involving school-aged children in Edmonton. Parental consent and child assent was obtained via a consent form. In addition parental occupation and ethnic background information were collected (see Appendix G for information/consent letter). Furthermore, child assent was confirmed with each child at the beginning of each testing session. Participation in the study was voluntary and consent forms contained assurances of confidentiality and the right of parents and children to withdraw from the study at any time. In the event that a child appeared to exhibit speech or language difficulties, the investigator (a certified Speech-Language Pathologist) informed the parents (preschool-aged children) or school principal (school-aged children).

In the next chapter, the results will be presented regarding children's responses to the three questioning tasks as they relate to the nine research questions.

CHAPTER 3: RESULTS

In this chapter I will present the results for each of the research questions. It should be noted that data for Literal, Inferential, and Problem-Resolution questions were not normally distributed across ages and therefore violated assumptions for univariate and multivariate analysis of variance. Data transformation using the arcsine transformation did not result in a normal distribution; thus, all data were first analyzed using the Kruskal-Wallis non-parametric test. Results were identical to those obtained using univariate and multivariate analysis of variance; therefore, only univariate and multivariate analyses will be reported. Along with main effects, effect size ($Eta^2 = \eta^2$) will be reported. Effect size provides information about the actual strength of the relationship between the dependent variable(s) and the population under investigation. As it is applied in this study effect size describes how much of the variability in the dependent variables is associated with variability in the independent variable, and is reported in values that range from 0-1. Effect sizes for Eta^2 that are 0.10 or less are considered small effects, 0.25 medium effects and 0.40 and greater, large effects (Cohen, 1988).

Question 1: Are There Developmental Trends for Literal Questions?

It was hypothesized that the ability to answer these questions correctly increases with age. A univariate analysis of variance was conducted with the dependent variable (Literal Questions) measured as the percentage of questions designated Literal that were answered correctly; the independent variable was Age Group. Results revealed a main effect for Age, $F(3,196) = 41.48$, $p < .001$, with a moderate effect size of $\eta^2 = .39$. Post hoc tests for the directional hypothesis revealed

that 4 year olds answered fewer literal questions correctly than all other age groups. However, 5, 6 and 8 year olds did not differ significantly from each other. Figure 4 displays the means and standard deviations for each age group.

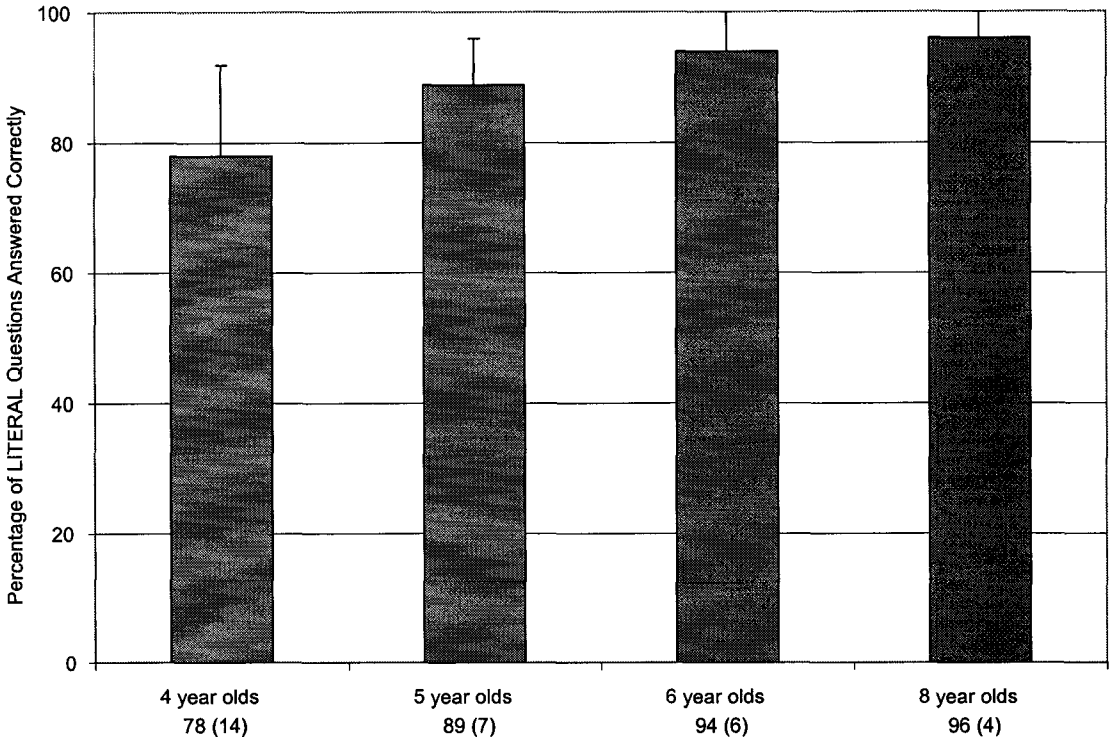


Figure 4. Means and (Standard Deviations) for Percentage of Literal Questions Answered Correctly Across the Four Age Groups.

The results show an increase in means with age and that the rate of increase is greatest between the 4-and 5-year-old children. Although means do increase with age it can also be seen that many 6 and 8 year olds were answering these questions with 100% success resulting in a ceiling effect. Thus, the hypothesis was not confirmed across all age groups for Literal questions.

Question 2: Are Some Kinds of Literal Questions Answered More Successfully Than Others?

The second research question related to Literal questions examined the possibility that different types of Literal questions may be answered correctly more often than others.

Since the overall multivariate analyses [F (15, 530.43) = 8.18, p < .001] duplicates the main effect for Age from the previous analysis for Question 1 it will not be discussed further. Subsequent ANOVAs (Table 14) yielded main effects for Setting and Initiating Event question types and Age. Post hoc patterns of significance are shown in Table 14 along with means and standard deviations for each age group. Results indicated that 4 year olds did not answer as many Setting or Initiating Event questions correctly as the older children. For Attempt, Consequence and Reaction question types there was no statistically significant difference among the four age groups.

Table 14
Means and (Standard Deviations) for Percentage of Each Type of Literal Question Answered Correctly Across Age Groups

Percentage Correct for Each Question Type	Age 4	5	6	8	*F* (3,196)
Settings	74[a] (27)	89[b] (15)	96[b] (9)	99[b] (3)	23.51*
Initiating Events	69[a] (30)	92[b] (16)	98[b] (8)	99[b] (5)	30.50*
Attempts	88 (21)	93 (15)	99 (5)	99 (5)	8.34
Consequences	67 (29)	74 (22)	82 (17)	88 (18)	8.28
Reactions	87 (14)	93 (12)	93 (10)	95 (9)	4.28

Note. Different superscript letters indicate a significant difference among means.
* significant at $p < .001$

Examination of error response patterns for Setting questions showed that many 4 year olds failed to mention the giraffe (Character 1, Episode 1) and frequently used a pronoun (i.e., *she* or *he*) to refer to the lady elephant (Character 4, episode 3), without regard for the fact that two other elephants appeared in the picture scene (see Appendix B, pictures 1 and 10).

Examination of error responses for Initiating Event questions revealed that the 4-year-old children either labelled the characters or described the characters' feelings rather than focussing on the events

depicted in the picture scene which caused a story character to respond in a particular manner to the event,

Question - *What happens first in the story?*

Child Response example (a) - *a giraffe and a elephant and a plane.*

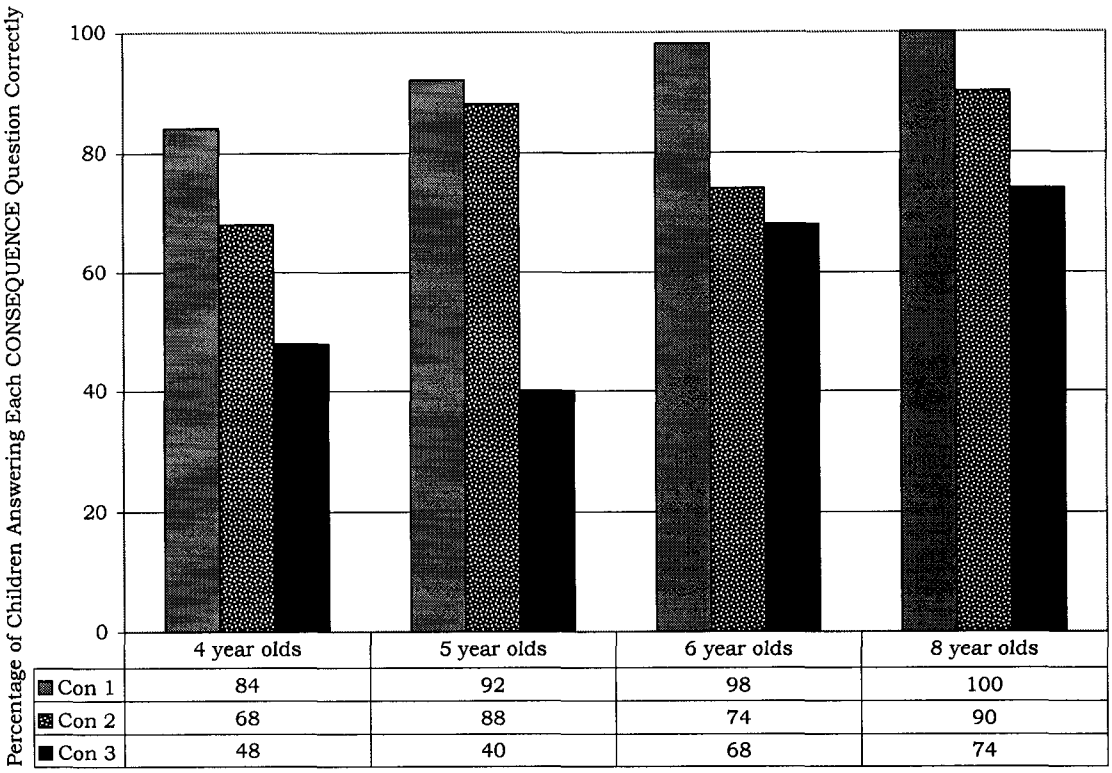
Child Response example (b) - *a giraffe and elephant are happy.*

Next, within-age group comparisons of Literal question types were obtained via examination of confidence intervals and are shown in Table 15. Information is ordered from question types that were least well answered to question types that were answered most successfully within each of the age groups. Confidence interval data is provided in Appendix L.

Table 15
Within Age Group Comparisons of Literal Question Types from Least Well Answered to Most Well Answered

4 year olds	**Setting = Initiating Event = Consequence** < Attempt = Reaction
5 year olds	**Consequence** < Setting = Initiating Event = Attempt = Reaction
6 year olds	**Consequence** < Setting = Initiating Event = Attempt = Reaction
8 year olds	**Consequence** < Setting = Initiating Event = Attempt = Reaction

In addition to the findings for Setting and Initiating Event questions already identified for the 4 year olds, this analysis revealed that Consequence questions were least well answered within each of the age groups. Given this finding these questions were further examined to determine if response patterns were different across the individual Consequence questions. Figure 5 shows the percentage of children within each age group who answered each of the three Consequence questions correctly.



Note. Con 1 = Consequence question Episode 1, Con 2 = Consequence question Episode 2, Con 3 = Consequence question Episode 3.

Figure 5. Percentage of Children in Each Age Group Answering Each Consequence Question Correctly.

With exception of the 5 year olds a similar pattern of responding was evident for these questions, that is, fewer children answered the question about the successful outcome of the story (Consequence 3) correctly than the consequence questions about the failed outcome of playing with the plane (Consequence 1) and the failed outcome of retrieving the plane (Consequence 2) respectively. For the 5 year olds there was only a differential response pattern for the third Consequence question.

For the third Consequence question the expected response was information related to the plane being returned to the giraffe. Examination of error patterns for this question showed that for the 4, 5

and 6 year olds, the most frequent error response was simply repeating information given for the Attempt question (*the lady elephant got the plane*), while for the 8 year olds, the most frequent error response was stating that the *'giraffe was happy'* (Reaction information).

Finally, the percentage of children in each age group who successfully answered each Literal question was summarized and visually inspected to examine patterns of responding that may not have been evident in the statistical analyses (this data is displayed in Appendix M). An 80% cut-off criterion was applied in determining if individual questions were successfully answered. Inspection of individual questions revealed that even though only the 4 year olds were identified as answering fewer Setting questions correctly than the older children the Setting question about the story location was answered by fewer than 80% of the 5-year-old children whereas almost all of the 6 and 8 year olds answered this question successfully. Additionally, the Reaction question related to the Lifeguard (Episode 2) was less often answered correctly compared to other Reaction questions across all age groups.

Summary of Findings for Literal Questions

Results showed that means for the percentage of Literal questions answered correctly by children did increase with age; however a significant difference was observed only between the two younger groups of children. In terms of the strength of the relationship between Age and children answering Literal questions correctly, effect size (Eta^2), showed that Age accounted for a moderate amount of the variance, 39%. Ceiling effects accounted for the lack of difference between the three older age groups of children.

Comparisons for specific Literal question types showed different patterns of success. The 4 year olds answered fewer Setting and Initiating Events questions correctly than any of the older children. For Attempt, Consequence, and Reaction question types there was no statistically significant difference between groups. Within age group comparisons showed that Consequence questions were less often correctly answered across all four age groups. In particular, fewer children within each of the age group answered the third Consequence question correctly than the first and second Consequence questions. Inspection of individual questions revealed different response patterns for the Setting – Location and Reaction questions that were not evident in the statistical analyses.

Question 3: Are There Developmental Trends for Inferential Questions?

It was hypothesized that the ability to answer these questions correctly also increases with age. A univariate analysis of variance for the dependent variable (Inferential Questions) which was measured as the percentage of questions children answered correctly and the independent variable (Age Group) revealed a main effect for Age, $F(3,196) = 20.93$, $p < .001$, with a small effect size, $\eta^2 = .24$. Post-hoc tests for the directional hypothesis revealed that 4 year olds answered fewer Inferential questions correctly than all other age groups. The 5, 6 and 8 year olds did not significantly differ from each other and again this was the result of ceiling effects for these questions. Figure 6 displays the means and standard deviations for each age group, showing the increase in Inferential question means with age and that the increase is greatest between the 4 and 5 year old children.

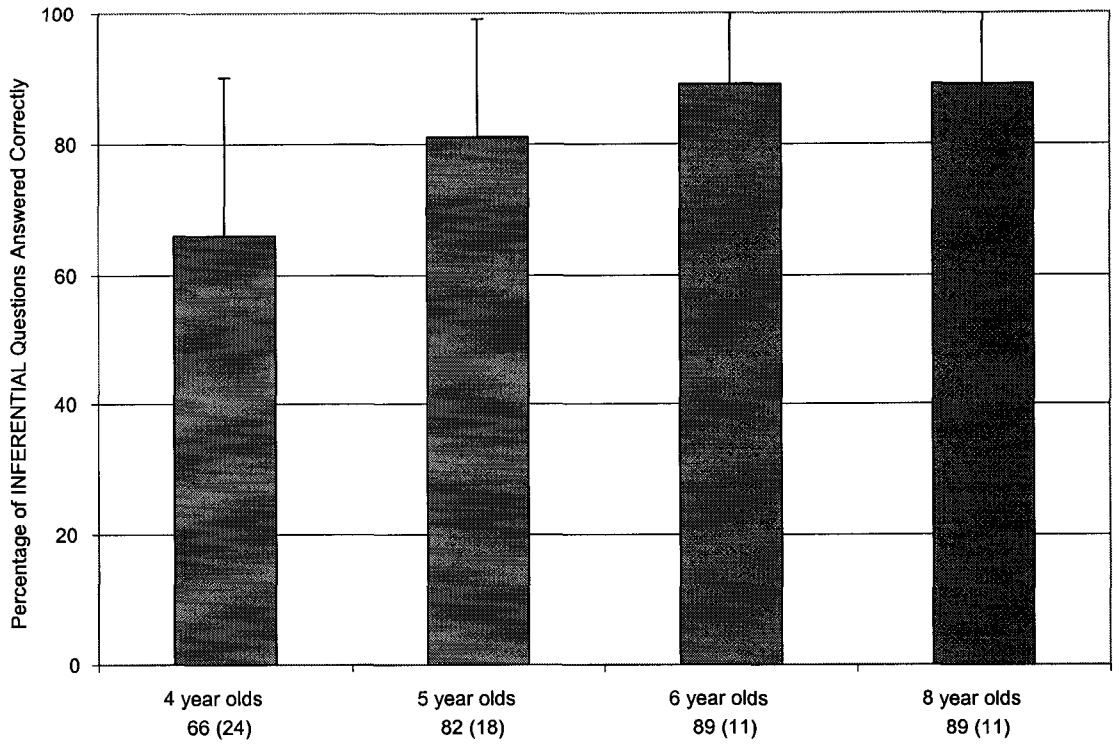


Figure 6. Means and (Standard Deviations) for Percentage of Inferential Questions Answered Correctly Across the Four Age Groups.

Question 4: Are Some Kinds of Inferential Questions Answered More Successfully Than Others?

The second research question related to Inferential questions examined the possibility that some types of Inferential questions may be answered correctly more often than others.

Since the overall multivariate analyses [$F(6,390) = 10.50$, $p < .001$] duplicates the main effect for Age from the previous analysis in Question 3 it will not be discussed further. Subsequent ANOVAs (Table 16) yielded main effects for each question type (i.e., percentage of Internal Response and Explanation questions answered correctly). Post hoc patterns of significance are also shown in Table 16 along with means and standard

deviations for each age group. It can be seen from these results that 4 years olds did not answer either Inferential question correctly as often as the older children, while the 5-, 6-, and 8-year-old children did not significantly differ from each other as a result of ceiling effects.

Table 16
Means and (Standard Deviations) for the Percentage of Each Type of Inferential Question Answered Correctly Across Age Groups with Patterns of Significance

	Age				
Question Type	4	5	6	8	$F(3,196)$
Internal Responses	66[a] (30)	85[b] (20)	88[b] (20)	91[b] (16)	12.63*
Explanations	66[a] (30)	80[b] (22)	90[b] (10)	87[b] (15)	14.07*

Note. The superscript letter indicates a significant difference between means.
* significant at $p < .001$

Next, within age group comparisons for Inferential question types were made via examination of confidence intervals, which revealed no difference within each of the age groups among question types. That is, confidence intervals overlapped (confidence interval data are displayed in Appendix N).

Finally, the percentage of children in each age group who successfully answered each of the Inferential questions was summarized and visually inspected to determine patterns of responding that were not evident in the statistical analyses (see Appendix O). Inspection of individual questions revealed that only two of the nine Inferential questions were answered by 80% or more of the 4-year-old children. These questions were the Internal Response for the fourth character (lady

elephant), and the Explanation question about the giraffe in the first episode.

Summary of Findings for Inferential Questions

Results only partially supported the research hypothesis for Inferential questions and Age with the increase being greatest between the two younger groups of children. In terms of practical significance, Age accounted for a small amount for the variance, 24%. The 4 year olds answered fewer of the Inferential questions correctly while 5-, 6-, and 8-year-old children did not significantly differ from each other in answering these two questions. Again, ceiling effects accounted for the lack of difference between the three older age groups. Inspection of individual questions showed a different response pattern for the Internal Response question in the third episode and the Explanation question for the giraffe in the first episode for the 4 year olds that were not evident in the statistical analyses.

Question 5: Are there differences in the percentage of children answering Set 1-Literal and Inferential questions and the percentage of children including equivalent information in story narrations across the four age groups?

It was hypothesized that the younger age groups of children would obtain a higher score in the questioning task than in the narration task but that this difference would decrease with age. To answer these questions two comparisons were examined: the first compared story components designated as 'Literal' in Question Set 1 and equivalent story components included in story narrations across the 4 age groups; the second compared story components designated as 'Inferential' in

Question Set 1 and equivalent story components included in the children's story narrations. These will be reported separately.

(a) Comparisons of Set 1-Literal Questions and Equivalent Information Included in Story Narrations.

A repeated measures ANOVA conducted for the independent variables, Task (percentage of Literal questions answered correctly and percentage of equivalent information in story narrations) and Age revealed a main effect for Age, $F(3,196) = 64.90$, $p < .001$, with a large effect size, $\eta^2 = .50$, and an interaction between Task and Age, $F(3,196) = 8.54$, $p < .001$. Post hoc tests for the directional hypothesis showed that 4 year olds provided less information overall than all other age groups, 5 year olds provided less information than the 6 and 8 year olds, and 6 year olds provided less information than 8 year olds. The interaction was accounted for by the 4-year-old children's greater success in the questioning task than the narration task, with this difference gradually decreasing with age.

Figure 7 shows the means and standard deviations for the two tasks across the 4 age groups.

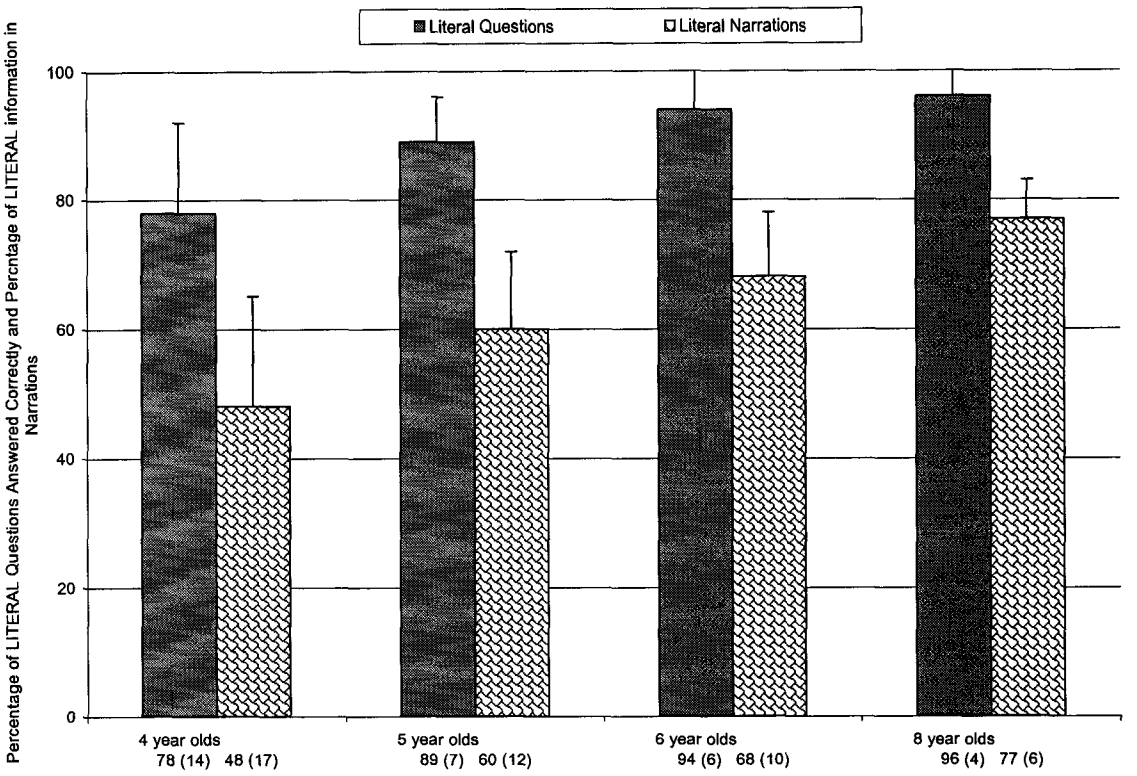


Figure 7. Means and (Standard Deviations) for Percentage of Literal Questions Answered Correctly Compared to Percentage of Equivalent Story Elements Included in Narrations for the Four Age Groups.

Within age group comparisons revealed a main effect for Task, F (1,196) = 963.81, $p < .001$, and a large effect size, $\eta^2 = .83$. Examination of the 95% confidence intervals showed that across all age groups, children obtained higher percentage scores on the questioning task than on the narration task for Literal story information. Table 17 displays the confidence interval data.

Table 17
Means and (Confidence Intervals) for Percentage of Literal Questions Answered Correctly and Percentage of Equivalent Information Included in Story Narration Across the Four Age Groups

	Age							
	4		5		6		8	
Task	mean	(95%CI)	mean	(95%CI)	mean	(95%CI)	mean	(95%CI)
Questions	78	(76 -81)	89	(86 -91)	94	(91 -96)	96	(94 -99)
Narrations	48	(44 -51)	60	(57 -63)	67	(64 -71)	77	(73 -80)

Note. CI = Confidence Interval, means and confidence interval data are expressed as percentages.

(b) Comparisons of Set 1-Inferential Questions and Equivalent Information Included in Story Narrations.

For this comparison, questions regarding Explanations and story narration counts for Internal Plans were not included in the analysis as there were no equivalent counterparts across tasks; thus, only the Internal Response category was examined.

The repeated measures ANOVA using the independent variables Task (percentage of Internal Response questions answered correctly and the percentage of equivalent information included in story narrations) and Age revealed a main effect for Age, $F(3,196) = 10.47$, $p < .001$, with a small effect size, $\eta^2 = 0.14$, and an interaction between Task and Age, $F(3,196) = 5.67$, $p = .001$. Post hoc tests for the directional hypothesis shown in Figure 8 reveal that 4 year olds provided less information overall than the older age groups of children. There were no significant differences among the 5, 6 and 8 year olds. The interaction was accounted for by the 4 year olds answering fewer questions correctly compared with the older children while there was no difference between

the groups for the inclusion of Internal Response information in story narrations.

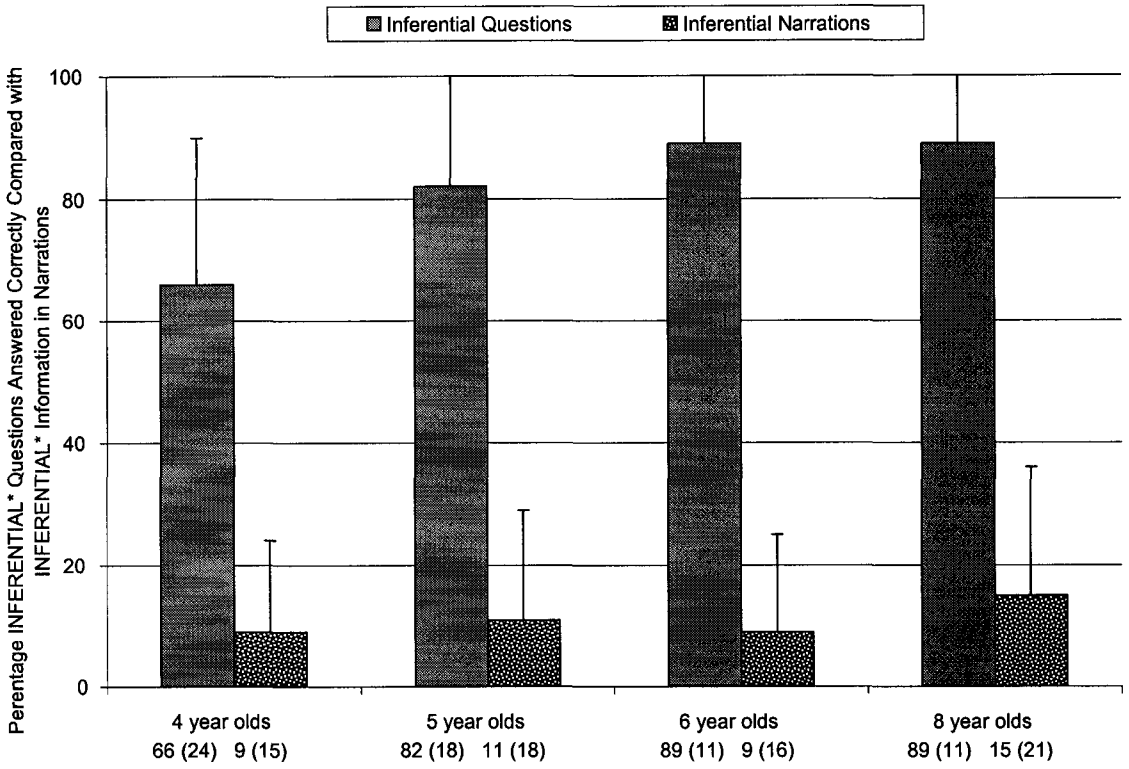


Figure 8. Means and (Standard Deviations) for the Percentage of Internal Response Questions Answered Correctly and the Percentage of Equivalent Information Included in Story Narrations Across the Four Age Groups.
* INFERENTIAL refers to Internal Response information

Within age group comparisons revealed a main effect for Task, F (1,196) = 1242.23, $p < .001$, with a large effect size, $\eta^2 = .86$. Examination of the 95% confidence intervals again showed that all children provided more information in response to the questioning task than in the narration task for inferential story information. Table 18 displays the confidence interval data.

Table 18
Means and (Confidence Intervals) for Percentage of Inferential Questions Answered Correctly and Percentage of Equivalent Information Included in Story Narrations Across the Four Age Groups

	Age							
	4		5		6		8	
Task	mean	(95%CI)	mean	(95%CI)	mean	(95%CI)	mean	(95%CI)
Questions	66	(60 -72)	85	(78 -91)	88	(81 -94)	91	(85 -97)
Narrations	9	(4 -14)	11	(6 - 16)	9	(4 - 14)	15	(10 -20)

Note. CI = Confidence Interval, means and confidence interval data are expressed as percentages.

Finally, the percentage of children in each age group who successfully answered each of the questions (Literal and Inferential) and the percentage of children who included equivalent information in their story narrations were summarized and visually inspected to look for patterns of responding that were not evident in the statistical analyses (see Appendix P). Inspection of this data confirms that children across all age groups provided more information in the questioning task than in the narration task. There were very few instances where more children included information in story narrations than the questioning task. These included the Setting–Location for the 4 and 5 year olds, Attempt, Episode 1 for the 8 year olds, Attempt ,Episode 2 for the 5 year olds, Consequence, Episode 1 for the 4, 5, and 6 yr olds, and Consequence Episode 3 for all age groups; however, some of these differences were negligible.

Summary of Findings for Comparisons Between Questioning and Narration Tasks

Comparisons of the two tasks (questions and narrations) for both Literal and Inferential story information showed significant differences in the amount of information provided in the questioning versus narrations

tasks. For Literal story information, the task accounted for a large amount of the variance, 83%. All children demonstrated knowledge of the story in the questioning task that was not evident in the story narrations, and this difference gradually decreased with age, thus supporting the research hypothesis. For Inferential information the task also accounted for a large amount of the variance, 86%. All children demonstrated knowledge about the information evaluated in the questioning task that was not included in the story narrations. There was, however, children infrequently included Internal Response information at any age; thus, the research hypothesis was not supported.

Question 6: Are there developmental trends for Problem – Resolution questions?

It was hypothesized that the ability to answer these questions correctly increases with age. A repeated measures ANOVA conducted with the independent variables Question (percentage of Problem and Resolution questions answered correctly) and Age revealed a main effect for Age, $F(3,196) = 42.01$, $p < .001$, with a large effect size $\eta^2 = .40$ and an interaction between Question and Age, $F(3,196) = 4.93$, $p = .003$. Post hoc tests for the directional hypothesis showed that 4 year olds answered fewer questions correctly than the older children, and 5 year olds answered fewer questions correctly than the 6 and 8 year olds. However, the 6 and 8 year olds did not differ significantly from each other again due to a ceiling effect, the majority of these children answered the two questions successfully. The interaction was accounted for by the two younger age groups of children answering the Resolution question with greater success than the Problem question while there was no appreciable difference in answering these questions for the 6 and 8 year olds. Figure 9 displays the means and standard deviations for each age

group showing the increase in means with age and that the rate of increase is greater for the 4 and 5 year olds.

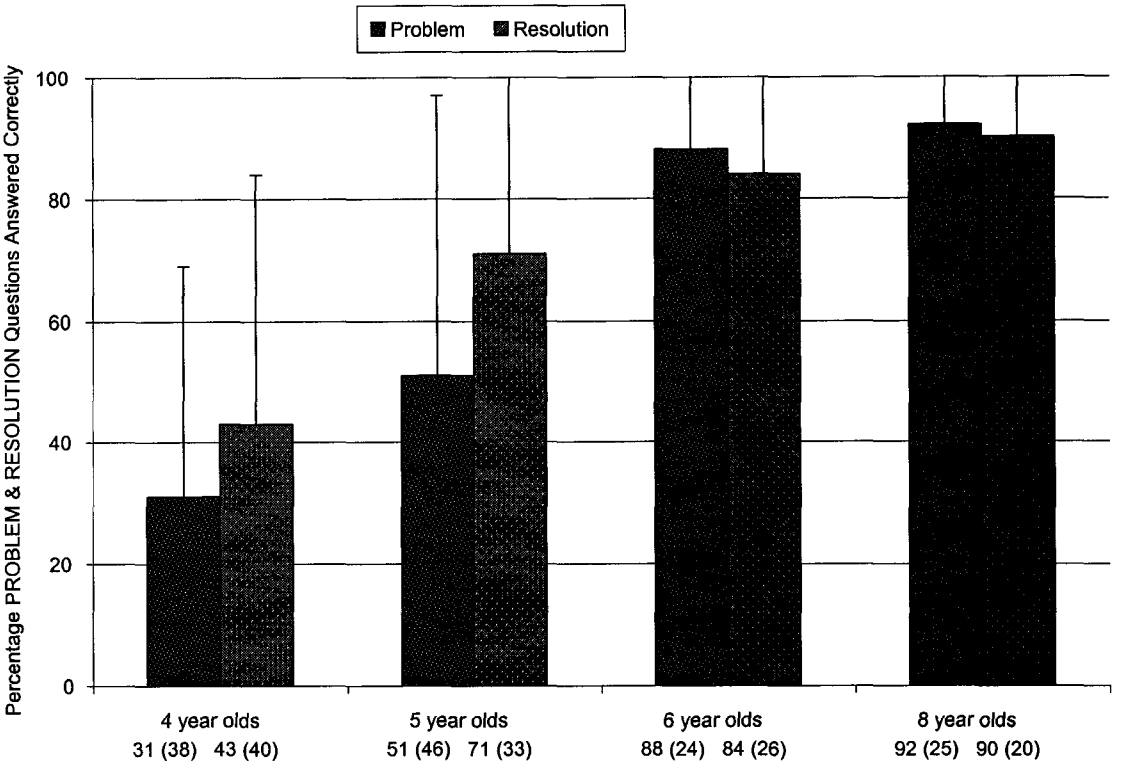


Figure 9. Means with (Standard Deviations) for Percentage of Problem and Resolution Questions Answered Correctly Across the Four Age Groups.

Within group comparisons revealed a main effect for Question, F (1,196) = 6.41, p =.012. Examination of 95% confidence intervals (CI) showed that only the 5 year olds answered the Problem and Resolution question differently [Problem mean = 51, CI (41 – 60), Resolution mean = 71, CI (62 – 80)]. Although 4 year olds also answered the Resolution question with greater success than the Problem question, the greater variability in responses within this age group produced overlapping confidence intervals (Appendix Q provides confidence interval data).

These results only partially supported the research hypothesis with the younger age groups of children performing lower than the oldern children. Again, ceiling effects accounted for the lack of difference between the two older age groups.

Question 7: Are there differences across the four age groups for percentage of children answering Set 1 Literal and Inferential questions correctly compared to the percentage of children who answer the Set 2 Integrative Inferential questions correctly?

Since the Set 1 questions guide the children by asking about one part of the story at a time these questions should be easier to answer than the Set 2 integrative inferential questions where the children were required to infer information from the story as a whole. It is therefore hypothesized that a higher percentage of the younger children would answer the Set 1 questions correctly than the Set 2 questions and that this discrepancy would decrease with age. To test this hypothesis the following three comparisons were made:

(a) Set 1 - Inferential questions and Set 2 - Integrative Inferential questions,

(b) Set 1 - Consequence, Episode 1 question and Set 2 - Problem question,

(c) Set 1 - Attempt/Consequence, Episode 3 questions and Set 2 - Resolution question.

The next section describes three comparisons between Set 1 and Set 2 questions:

(a) Set 1 - Inferential questions and Set 2 - Integrative Inferential questions

Children had answered inferential questions in Set 1 that focused on one part of the story at a time, which then allowed comparisons to Set 2 Inferential questions in which children were required to infer information from the story as a whole in order to choose one part of the story as their response. A repeated measures ANOVA comparing the independent variables Question Type (percentage of Inferential questions – Set 1 and Set 2 answered correctly) and Age revealed a main effect for Age, $F(3,196) = 48.98$, $p < .001$, with a large effect size, $\eta^2 = .43$, and an interaction between Question and Age, $F(3,196) = 14.1$, $p < .001$. Post hoc tests showed that 4 year olds answered fewer questions correctly than the older children, and 5 year olds answered fewer questions correctly than the 6 and 8 year olds; however, the 6 and 8 year olds did not differ significantly from each other. The interaction was accounted for by the two younger age groups of children answering the Set 1 questions with greater success than the Set 2 questions while there was no appreciable difference in answering these question types for the 6 and 8 year olds. As already reported the lack of difference between the 6 and 8 year olds was a result of the ceiling effect. Figure 10 displays the means and standard deviations across age groups with mean scores increasing with age and variability decreasing.

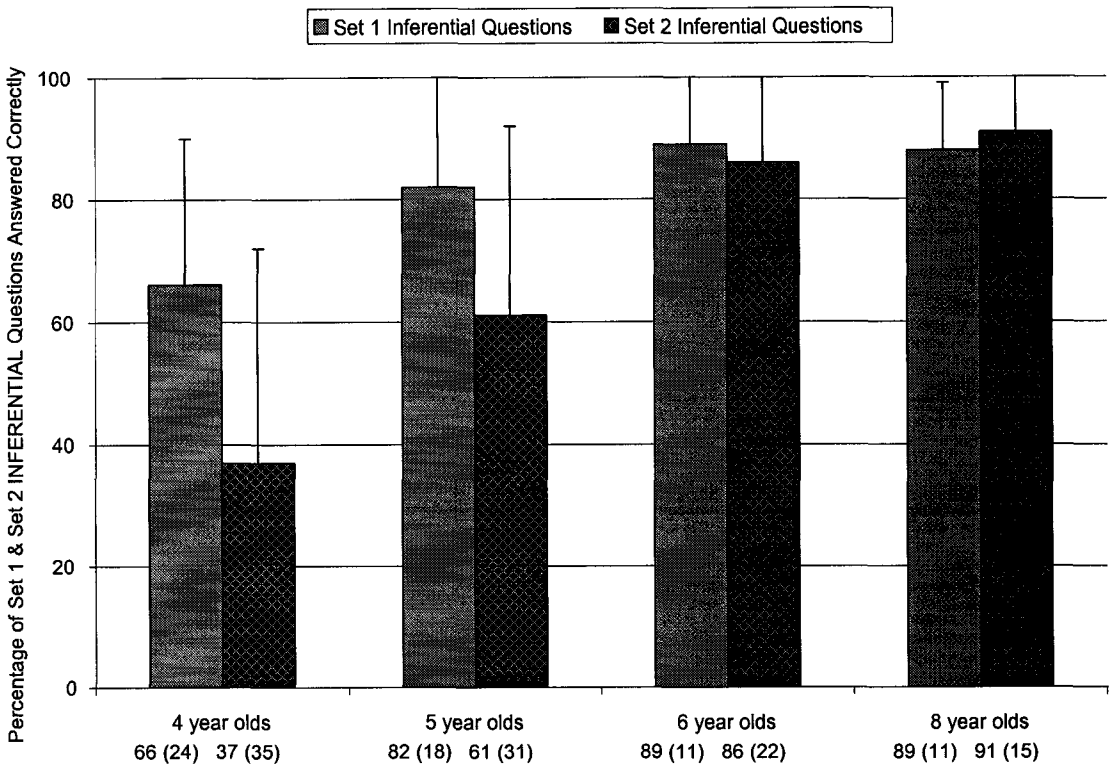


Figure 10. Means and (Standard Deviations) for Percentage of Set 1 and Set 2 Inferential Questions Answered Correctly Across the Four Age Groups.

Within group comparisons revealed a main effect for Question, F (1,196) = 43.15, $p < .001$. Examination of 95% confidence intervals showed that both the 4 and 5 year olds answered the Set 1 and Set 2 Inferential questions differently [4 year olds: Set 1 questions mean = 66, CI (61 – 71), Set 2 questions mean = 37, CI (29 – 45); and 5 year olds: Set 1 questions mean = 82, CI (77 – 86), Set 2 questions mean = 61, CI (53 – 69)]. There were no significant within group differences for the 6 and 8 year olds.

(b) Set 1 - Consequence, Episode 1 question and Set 2 - Problem question

Children answered a question in Set 1 focussing on the story problem (Consequence, Episode 1) which then allowed comparisons to the Set 2 Problem question where children were required to infer this information from the story as a whole.

A repeated measures ANOVA comparing the independent variables Problem-related questions (percentage of Consequence, Episode 1 and Problem questions answered correctly) and Age revealed a main effect for Age, $F(3,196) = 40.65$, $p < .001$, with a moderate effect size $\eta^2 = .38$ and an interaction between Question and Age, $F(3,196) = 16.56$, $p < .001$. Post hoc tests showed that 4 year olds answered fewer questions correctly than all other age groups, and 5 year olds answered fewer questions correctly than the 6 and 8 year old age groups; however, the 6 and 8 year olds did not differ significantly from each other. The interaction was accounted for by the 2 younger age groups of children answering the Set 1 question with greater success than the Set 2 question while there were no differences within the two older age groups. Figure 11 displays the means and standard deviations across age groups.

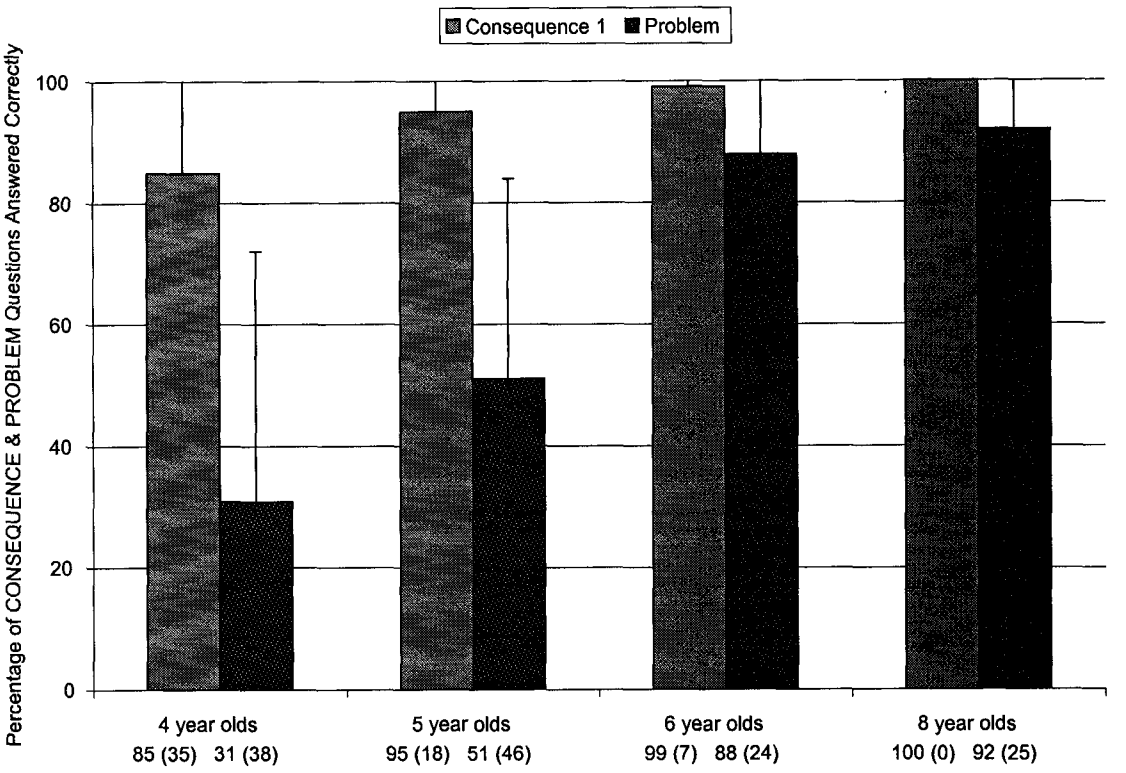


Figure 11. Means and (Standard Deviations) for Percentage of Set 1 - Consequence Episode 1 and Set 2 - Problem Questions Answered Correctly Across the Four Age Groups.

Within age group comparisons revealed a main effect for Question, $F(1,196) = 103.55$, $p < .001$. Examination of the 95% confidence intervals showed that both 4 year olds and 5 year olds answered these questions differently [4 yr olds: Set 1 question mean = 85, CI (79 – 90), Set 2 question mean = 31, CI (21 – 40); 5 yr olds: Set 1 question mean = 95, CI (89 – 100), Set 2 question mean = 51, CI (41 – 61)]. There were no significant within group differences for the 6 and 8 year olds, again because of the ceiling effect.

(c) Set 1 - Attempt/Consequence, Episode 3 questions and Set 2 - Resolution question

Children had answered questions in Set 1 focussing on the story outcome which then allowed comparisons to Set 2 Integrative Inferential

question in which children were required to respond with this same story unit as the story resolution when required to think about the story as a whole. It should be noted that the terms 'consequence' and 'outcome' are used interchangeably but the term 'Resolution' is used to refer specifically to the final story outcome/consequence. Data from the Attempt and Consequence Episode 3 questions (Set 1) were combined for this comparison as both provided information related to the successful outcome of the story and hence the Resolution question.

A repeated measures ANOVA using the independent variables Resolution-related questions (percentage of Attempt/Consequence, Episode 3 and Resolution questions answered correctly) and Age revealed a main effect for Age, $F(3,196) = 24.19$, $p < .001$, with a moderate effect size, $\eta^2 = .27$, and an interaction between Age and Question, $F(3,196) = 6.26$, $p < .001$. Post hoc tests showed that 4 year olds answered fewer questions correctly than all other age groups. The 5 year olds answered fewer questions correctly than 6 and 8 year olds. Thee 6 and 8 year olds did not differ significantly from each other again because of the existence of ceiling effects. The interaction was accounted for by the differential response of the 4 year olds to the Resolution question while there were no appreciable differences in the 5, 6 and 8 year olds answers to either question type. Figure 12 shows means and standard deviations across the 4 age groups for these question comparisons.

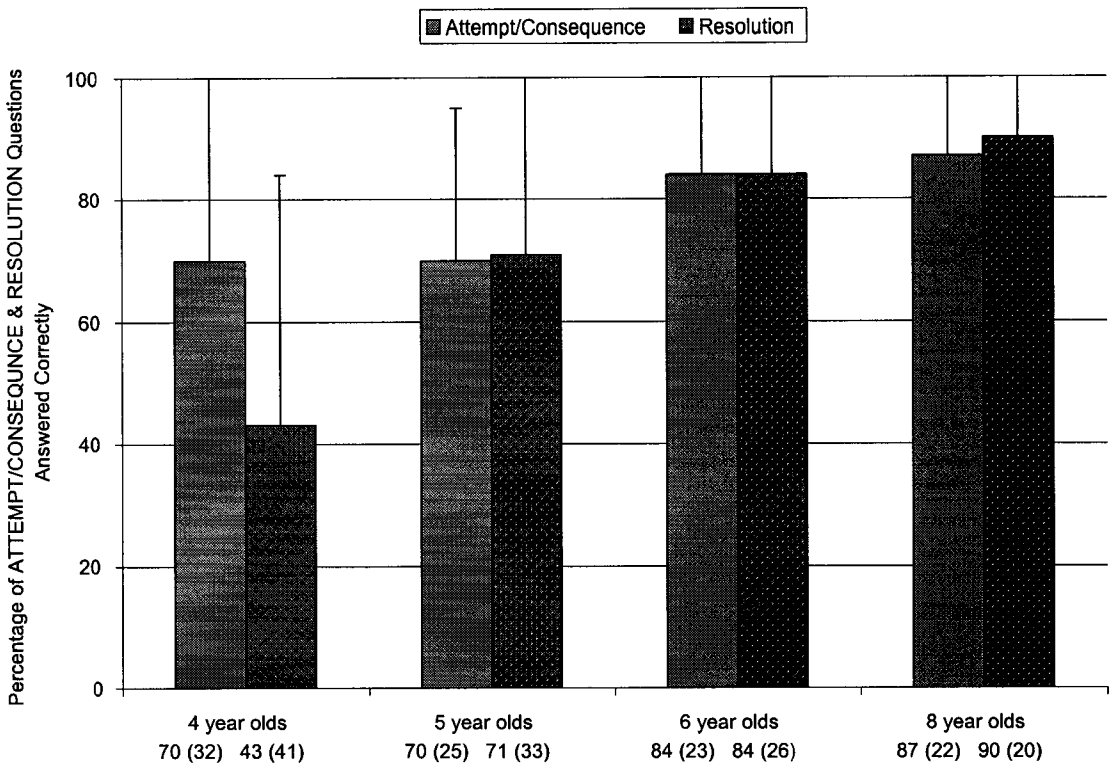


Figure 12. Means and (Standard Deviations) for Percentage of Set 1 - Attempt/Consequence, Episode 3 and Set 2 - Resolution Questions Across the Four Age Groups.

Within group comparisons revealed a main effect for Question, F (1,196) = 3.89, p = .05. Examination of the 95% confidence intervals showed that only 4 year olds answered these questions differently [Set 1 question mean = 70, CI (62 – 77), Set 2 question mean = 43, CI (35 – 52)]. Confidence intervals overlapped for 5, 6 or 8 year olds answers to these questions.

Summary of Findings for Comparison Questions

When required to infer information from the story as whole, both the 4 and 5 year olds answered fewer questions than questions that focussed on one part of the story at a time. There were no significant within- or between- group differences across any of the comparisons for

the 6 and 8 year olds because these children were answering both types of questions successfully.

Question 8: Are there differences in information judged to be important in the story across the four age groups?

These data were analyzed qualitatively since there were no right or wrong responses. Results are first presented for the percentage of children in each age group choosing each response category for the two Importance Judgement questions. The sum of percentages in each column of Table 19 can exceed 100 because some of the children's responses included information from two categories and both were counted.

Table 19
Percentage of Children in Each Age Group Choosing Each Response Category for the Two Importance Judgement Questions

	Task and Age							
	Most Important				2nd Most Important			
Response Category	4	5	6	8	4	5	6	8
Settings	4	4	2	2	4	2	4	
Initiating Events		10	6	12	8	18	8	12
Internal Responses				2				2
Attempts	20	43	50	36	36	42	30	36
Consequences	48	39	34	52	14	14	16	36
Reactions	12	12	8	6	24	14	36	30
Explanations			4		4		4	6
Morals		2	4		2		2	
Don't Know	10			2	12	14	6	4
No Code	10	4			6	6	6	

Note. Response category descriptions are included in Appendix D

The Initiating Event, Attempt, Consequence and Reaction categories were most frequently chosen across all age groups for both

questions. Since each of these categories includes several responses (e.g., Consequence Episode 1, 2 or 3; Reaction of story character 1 2, 3, and 4 etc.) individual response categories were inspected to determine if there were differences in response patterns. For this comparison only response categories chosen by more than 10% of children in each of the age group were examined. The results are shown in Table 20.

Table 20
Response Categories, Episode, and (Percentages of Children) Choosing Each Category for the Four Age Groups

Most Important

Age	Response Categories			Total% of children
4 yr olds	Con1 (30)	Att3 (20)	Con3 (18)	(68)
5 yr olds	Att3 (33)	Con3 (23)	Con1 (16)	(72)
6 yr olds	Att3 (48)	Con3 (28)		(76)
8 yr olds	Con3 (36)	Att3 (34)	Con1 (16)	(86)

2nd Most Important

Age	Response Categories			Total% of children
4 yr olds	Att3 (26)	DK (12)		(38)
5 yr olds	Att3 (22)	Att2 (12)		(34)
6 yr olds	React3 G (22)	Att3 (18)	Con3 (12)	(52)
8 yr olds	Con3 (32)	Att3 (20)	React3 G (12) Att2 (12)	(76)

Note. Con = Consequence, Att = Attempt, React G = Reaction of Giraffe, DK = Don't Know, 1 = Episode 1, 2 = Episode 2, 3 = Episode 3.

For the Most Importance Judgements all age groups focused on categories related to the retrieval and return of the plane to the giraffe, namely, Attempt Episode 3 (lady elephant retrieving the plane) and Consequence Episode 3 (lady elephant giving the plane to the giraffe). However, only the 8 year olds chose the specified outcome (lady elephant

giving the plane to the giraffe) as the most important more often than other categories. A substantial number of children in all but the 6-year-old group also chose the Consequence Episode 1 category (plane going in the pool) and this was the most frequent response category chosen in the 4-year-old group. The total percentage column shows that as age increases variability in category choice decreases.

For the Second Most Importance Judgement two additional categories were chosen beyond those given in the most Important Judgements, the Reaction Episode 3 (the giraffe felt happy) and the Attempt Episode 2 (lifeguard trying to get the plane). The total percentage column again shows a decrease in the variability with age; however, the total percentage scores are much lower overall, indicating a greater degree of variability in responses to the second question.

Question 9: Are there differences in the percentage of children who judge story information important and the percentage of children including equivalent information in story narrations across the four age groups?

It was hypothesized that the information children considered important would also be included in story narrations. Results are first presented comparing categories chosen in Importance Judgements to similar categories included in story narrations. Table 21 displays the percentage of children choosing specific categories for the 1st and 2nd Importance Judgements combined compared to the percentage of children in each age group who included information from that category in story narrations.

Table 21
Percentage of Children Choosing Categories in the Two Importance Judgement Questions Compared with Categories Included in Story Narrations by Age Group

	Age and Task							
	4		5		6		8	
Category	Imp	Nar	Imp	Nar	Imp	Nar	Imp	Nar
Setting	8	61	8	81	6	83	2	97
Initiating Event	8	46	28	54	14	84	24	94
Internal Response		9		11		9	4	15
Attempt	56	76	85	89	80	92	72	98
Consequence	62	72	53	79	50	86	86	95
Reaction	36	28	26	37	42	47	36	59

Note. Imp = Importance Judgement, Nar = Story Narration.

The Attempt and Consequence categories, which accounted for the majority of the Importance Judgement choices for the four age groups of children, were also categories that were included by many children in story narrations. The Internal Response category was chosen only by the 8 year olds in the Importance Judgements and was not frequently included in story narrations by any age group. The Setting and Initiating Event categories were more frequently included in story narrations than chosen in Importance Judgements. Comparisons between Importance Judgments and information included in story narrations showed that there was considerable overlap between choice of categories in the Importance Judgement task and their inclusion in the story narrations. Thus, the research hypothesis was supported.

Having presented the statistical analyses related to the nine research questions posed in the study, I will now proceed to discuss the significance of these findings in the next chapter.

CHAPTER 4: DISCUSSION

In the present study I explored developmental trends for comprehension of a three-episode picture story using questioning tasks with children aged 4, 5, 6 and 8. Three sets of questions were developed to extend the information presently available on children's knowledge and comprehension of stories, particularly young children who are in the process of acquiring such knowledge. The first set of questions evaluated children's understanding of each part of the story from beginning to end; and was primarily based on Stein and Glenn's (1979) Story Grammar taxonomy and included both Literal and Inferential questions. Since this study was situated within a larger project, the collecting of local normative data for story narrations of children aged 4-9, comparisons across the questioning and narration tasks for the four age groups of children was possible. The second set of questions evaluated children's ability to integrate the whole story and identify parts of the story that represented two central components, the Problem and the Resolution. Since children answered questions related to these two central components in the first set of questions, comparisons were possible between children's abilities when guided in retrieving story information (Set 1) and when they were required to infer the information from the story as a whole (Set 2). The third set of questions asked children to make judgements about what they considered to be the two most important parts of the story. This again required children to evaluate the story as a whole. Again, comparisons were also possible between information children considered important and whether that same information was also included in the story narrations.

In this chapter, I will focus on the discussion of findings for each question type (Literal and Inferential, Problem-Resolution, and Importance Judgements) as well as questioning and story narration task

comparisons. After that, the discussion will turn to limitations of the study and directions for future research.

Set 1-Guided Questions - Literal
(Research Questions 1 and 2)

The research hypothesis predicted that as age increased, children would answer more Literal questions correctly. Results only partially supported this hypothesis, revealing that only the 4 year olds answered fewer Literal questions correctly. Surprisingly, the 5, 6, and 8 year olds were not significantly different from one another. Examination of the data presented in Appendix M showed that only eleven of the twenty Literal questions were answered correctly by 80% or more of the 4-year-old children. A one-year increment in age was associated with a considerable increase in the number of questions answered correctly by 80% or more of the children, seventeen of the twenty. The 5-year-old children's response pattern was commensurate with the number of questions answered correctly by most 6 year olds. These results show that when story events are depicted in the picture scenes, children as young as 5 successfully demonstrate understanding of the particular events and relationships between story events when directly questioned. Possible explanations for these results will be presented throughout the remainder of the discussion of Literal questions.

No hypothesis was posited regarding possible differences in children's responses to the specific question types (Settings, Initiating Events, Attempts, Consequences and Reactions) as it was not known if such differences existed. However, given that the information needed to answer such questions was available in the picture scenes it was expected that answering Literal questions would pose the least difficulty for children of all questions presented in this study. The results

confirmed this expectation and further, statistically significant differences were found only for the Setting and Initiating Event questions, and only for the 4 year olds. No significant differences were observed between any of the age groups for Attempt, Consequence and Reaction questions. Appendix M reveals that, of the nine questions answered by less than 80% of the 4-year-old children, six were Setting or Initiating Event questions. Therefore, with the exception of Setting and Initiating Event questions, even the very youngest children revealed knowledge of the temporal and causal relationships between events in the story when those events were depicted in the pictures. In order to understand the nature of findings for these question types, the next section will discuss each question type separately with respect to response patterns and the possible existence of age, question and picture-related factors.

Specific Question Types

(a) Setting Questions

The significant finding that Setting questions are answered correctly less often by the 4 year olds is of particular interest. Setting information questions were seldom included in previous studies primarily because there is typically no causal connection to other story elements. However, Setting information can affect the listener's comprehension of a story, if the characters are not introduced a story can be quite confusing to the listener. Berman (2001), and Trabasso and Nickels (1992) suggest that knowing how to start a story constitutes an important feature in the development of both narrative comprehension and production, since providing adequate background information shows that children take into account listener needs. This study was able to reveal a statistically significant age-related difference for Setting

questions due to the inclusion of questions evaluating story elements from the beginning to the end of the story.

As described in the previous chapter, many 4 year olds failed to mention the giraffe (Character 1, Episode 1) and frequently used a pronoun (i.e., *she* or *he*) to refer to the lady elephant (Character 4, Episode 3), without regard for the fact that two other elephants appeared in the picture scene. Thus, the 4-year-old children were less likely than older children to focus on the introduction of the characters in a clear manner, even when directly questioned about this aspect of the story (i.e., *Who is in the story?*). A possible explanation for this finding may be due to assumptions regarding listener knowledge on the part of these young children. When a speaker and listener share mutual knowledge of a story, for example, when they can both see the pictures, it is possible for the speaker to presuppose knowledge on the part of the listener and provide less information (Kail & Hickmann, 1992).

Additionally, Appendix M shows that both 4 and 5 year olds answered fewer Setting-Location questions correctly than the older children. Frequent error responses to the question *'Where are the animals?'* consisted of pointing at the animals, or verbal pointing responses such as *'here'* or *'there.'* Again, this is likely explained by assumptions of listener knowledge. The issue of speaker and listener shared knowledge has not been discussed in the questioning literature. However, given that the examiner and child both viewed the story pictures while the questions were asked, the younger children may have presumed that physical or verbal pointing responses were sufficient responses to these questions. These types of responses were never observed in the 6-and 8-year-old corpora. Older children appear to understand that their responses needed to be understandable regardless

of the shared context. This may be partly explained by the effect of schooling, since they would have had experiences where they are required to answer questions for which the teacher already knows the answer. It may however, have been helpful to ask a follow-up question after such responses, such as:

Setting –Location Question – *Where are the animals?*

Children Response – *There*

Follow-up question – *Yes, but where are they? We're in school, where are they?*

Another frequent error response for the Setting–Location question was *'the zoo.'* Such responses indicate that the children may be relying on familiar background or script knowledge about the types of animals in the story being 'zoo' animals, rather than focussing on the story location and its relationship to the goal and story outcome.

Given that the older age groups of children correctly answered Setting questions it would appear that the picture scene and questions provided sufficient information to elicit the targeted responses. The younger children's difficulty then appeared to be primarily an age-related factor, connected to: (a) assumptions of shared knowledge since the picture scenes clearly depicted the information needed to answer the questions, or (b) a lack of knowledge needed to interpret the picture scene as it related to the 'story.'

(b) Initiating Event Questions

Initiating Event questions evaluated children's understanding of the three events intended to cause a story character to respond in a particular manner to the event. None of the Initiating Event questions were answered correctly by more than 80% of the 4 year olds, whereas all three Initiating Event questions were answered by the majority of the 5,

6, and 8 year olds. As shown in the previous chapter, examination of error responses revealed that the 4-year-old children either labelled the characters or described the characters' feelings. Trabasso and Nickels (1992) suggest that knowledge of goals is necessary to understand and interpret pictured events and, since this knowledge develops with age, the youngest children in this study may not have sufficient knowledge about intentional action to detect the goal based on Initiating Event picture scenes. Rather, they may try to describe or identify what they see based on familiar experiences. As a result, the descriptions of characters and events may not be related to the story goal.

Similar to the findings for Setting questions, the response patterns observed in the 4 year olds also appeared to be an age-related factor. That is, the children appeared to lack knowledge needed to interpret the Initiating Event picture scenes in relationship to the story when directly questioned. Difficulty interpreting or understanding Initiating Events presents a more significant problem than difficulty interpreting Settings, given that in most stories the Initiating Event is both temporally and causally related to the story goal(s) and outcome(s). Difficulty identifying and interpreting Initiating Events may impact a child's understanding of the story in general, whereas such a problem with Setting information is unlikely to have such a deleterious impact, since such information is generally not causally related to the goal(s) and outcome(s).

(c) Attempt Questions

Attempt questions evaluated understanding of the actions taken by a story character to achieve a goal. These questions were frequently answered correctly by children across all age groups. In fact, this was the only question type which was answered correctly by more than 80% of the 4 year olds.

A few interpretations of such results are possible. First, the questions may have been answered correctly by all age groups due to the saliency of 'action' information in the story pictures (see Appendix B, pictures 3, 8 and 11). Given the success in answering these questions, it seems that the picture scenes depicting the actions frequently elicited the expected response from the majority of children. Secondly, although the questions elicited the target response it is also possible that the questions themselves allowed children to describe the action in the picture scene without understanding the relevance of the action to the goal or outcome (*What did he/she do?*). For Attempt questions, then, there exists the possibility of question and/or picture-related factors. To investigate children's understanding of the relationship of the Attempt to the Goal a follow-up question such as *Why did the girl elephant take the plane?* may have been helpful.

(d) Consequence Questions

Consequence questions evaluated the children's understanding of the outcomes of story characters' actions, successful or unsuccessful. Examination of individual Consequence questions revealed that many children did not correctly answer the Consequence question about the third episode, in which the plane was returned to the giraffe. Such a response pattern was definitely not expected for this particular Consequence question because the return of the plane to the giraffe was a central element of the story. It was surprising that this particular question was not well answered because similar to the Attempt questions the information to answer this question correctly was clearly visible in the picture scene (see Appendix B picture 12). One possible explanation relates to the fact that goal attainment in the story was sequential and hierarchical, that is, the retrieval of the plane (Attempt) was necessary for

the return of the plane to the giraffe (Consequence), which was related back to the main goal of the story (the need to get the plane for the giraffe).

Examination of error patterns for this Consequence question showed that for the 4, 5 and 6 year olds, the most frequent error response was simply repeating the Attempt information, while for the 8 year olds, the most frequent error response was describing how the giraffe was feeling (Reaction information). The younger children, in repeating the retrieval of the plane from the pool, did not focus on the hierarchical nature of the outcome. In contrast, the 8-year-old response errors showed understanding of the hierarchical nature of the story outcome, since the giraffe's happiness was directly related to the return of his plane, which in turn, relates back to the main goal of the story, the need to get the giraffe's plane. However, since they failed to provide the required information in response to the Consequence question they were not credited with knowledge of this information as Consequence knowledge per se.

Additionally, a substantial percentage of children in each age group answered the subsequent Explanation question (the giraffe was happy *because he got his plane back*) successfully. Correct responses to this question also suggest that the children had understood the story outcome, even if they had not answered the Consequence question correctly.

For this question, the unusual result may be better explained as a question-related factor. That is, the question itself did not elicit the expected response, but failure to answer this question correctly could not be taken as an indication that the children had not understood the story outcome, given that children generally answered the surrounding

questions (Attempt, Reaction and Explanation) correctly and the picture scene itself provided adequate information to interpret the Consequence information. A follow-up question would be useful in making such a determination more directly. For example, following the Consequence question (*What happened when she did that?*), the children could then be asked *Why did the lady elephant get the plane?*

(e) Reaction Questions

Reaction questions evaluated children's understanding of how each story character felt about the outcome of each episode. With one exception, most children generally answered the Reaction questions correctly. The exception pertained to the reaction of the lifeguard to the failed outcome in Episode 2 (see picture 9, Appendix B). It is probable that this particular feeling was more difficult for the children to identify or interpret compared to feelings portrayed by other characters throughout the story (e.g., being happy, sad or angry). As can be seen in Appendix M, it was not until age 8 that more than 80% of children answered this question correctly. Thus, an age or picture-related factor could account for this finding. It would be necessary to modify the facial/body expression of the lifeguard in this particular picture scene to determine if, in fact, this was a picture-related factor.

In summary, statistically significant findings for Literal questions showed age-related differences for only the youngest children. By age 5, children who are developing typically appear to understand that the pictured events represented a 'story.' In contrast the 4 year olds may developmentally lack knowledge about 'goals' since they tended to describe the pictures, rather than interpret the picture scenes in relationship to the story goal(s) and outcome(s). Thus, this explanation

appears to be the most probable account of these findings, particularly since the picture scenes for questions that they did not answer correctly very clearly depicted the information needed in order to answer the question correctly (i.e., Appendix B: Setting pictures – 1, 6, 10; Initiating Event pictures – 2, 6, 10; Consequence, Episode 3 picture – 12). Examination of individual questions in Appendix M and error response patterns confirmed the age-related factors but also identified additional question and picture-related factors. These findings offer particularly useful insights regarding possible modification of the illustrations and expansion of the questioning task when further research is conducted.

Set 1-Guided Questions - Inferential
(Research Questions 3 and 4)

Similarly to the Literal questions the research hypothesis for Inferential questions predicted that the ability to answer these questions would increase with age. Again, the hypothesis was only partially supported; the only significant difference was between the 4 year olds and the other three groups. Inspection of the data in Appendix O shows that only two of the nine questions were answered correctly by 80% or more of the 4 year olds while the majority of the 5, 6, and 8-year-old children answered most of the nine questions correctly.

These findings were not surprising with respect to the 4-year-old children given that these children did not answer Initiating Event questions successfully even when the information was clearly depicted. The Inferential questions required children to infer information from that same picture stimulus.

It was again unexpected that there were no significant differences between the 5, 6, and 8-year-old age groups. Thus, even for questions

about story elements not depicted (thoughts, goals and explanations of story characters' feelings) the 5-year-old children successfully demonstrated knowledge of such elements when questioned.

No hypothesis was posited with respect to differential response patterns across the age groups for the question types (Internal Responses and Explanations). In the next section I will discuss findings of interest for these question types again, looking for possible age, question and picture-related factors.

Specific Question Types

(a) Internal Response Questions

Internal Response questions assessed children's understanding of the story characters' thoughts, emotions or goals as they related to the preceding Initiating Event. Inspection of individual Internal Response questions for the 4-year-old children showed that questions pertaining to Episode 1 and 2 (*What was the elephant thinking? / What was the lifeguard thinking?*) were only answered correctly by 56% of the children. Interestingly, 86% of the children successfully answered the Internal Response question for Episode 3 (*What was the lady elephant thinking?* Expected response – *She can get the plane with the net*). Since the net was central to achieving the goal in the third episode it is likely that the picture scene of the lady elephant holding the net provided more salient goal information for the children than the previous episodes (see Appendix B, pictures 2, 7, and 10, for the differences). Again, this was somewhat surprising as Trabasso and Rodkin (1994) had found that when narrating stories young children frequently included Internal Response/Goal information when the 'goal object' was visible in the

picture scenes. In this story the plane is the 'goal object' and it is visible in all picture scenes for which Internal Response questions were asked (see Appendix B pictures 2, 7, and 10), yet it was only when the net was introduced that the youngest children answered questions about the Internal Response/Goal of the story character correctly.

It was anticipated that an examination of error responses might reveal primarily *'I don't know'* answers to these questions but this was not the case. These young children did attempt to answer these questions even though they were often unable to do so correctly; however, no clear patterns of responding emerged. Some children responded to the questions (*What was the elephant thinking? / What was the lifeguard thinking?*) by simply described the character's actions *('she fell forward'* or *'she was looking at it').* Other responses were ambiguous *('not good')* or *('she was gonna do it')* and some children focused on retrieving the plane with the net when answering the Episode 2 question *('getting it with his net').* With the exception of this last response, which anticipated the Attempt of the third episode, these errors tended to be descriptions of actions or feelings represented in the picture scenes.

To answer these questions correctly children needed to understand the causal connection between the Initiating Event and the Internal Response. Given that the majority of 5, 6, and 8 year olds answered all three of the Internal Response questions correctly it appeared that they were able to infer and provide the targeted response; that is, the picture scenes appeared to provide sufficient contextual support to elicit the expected responses. Thus, the differences observed in the 4-year-olds' response patterns appear to be primarily an age-related factor. Since they had difficulty interpreting the Initiating Event from the picture scenes it was not therefore surprising that questions that required them

to infer the story character's thoughts or goals from the same picture would pose an even greater difficulty. The exceptional response success for the Internal Response question relevant to the third episode likely resulted from a picture related factor, whereby the illustration showing the lady elephant holding a net provided more salient goal information which supported the children's ability to infer the Internal Response from the Initiating Event picture.

(b) Explanation Questions

These questions assessed understanding of story characters' feelings about the unsuccessful and successful outcomes in each of the three episodes of the story. Inspection of individual Explanation questions in Appendix O confirms the age-related difference for the 4-year-old age group previously discussed. For the older age groups of children none of the individual questions appeared to pose particular difficulty. These findings also lend support to those of Bourg and Stephenson (1997). These researchers unexpectedly found that 11-year-old children identified relationships between the goals and outcomes of stories when questioned about story characters' emotions. Similarly, in this study when asked to explain the story characters' emotions, the children's responses related back to the goal or the successful/unsuccessful outcomes of the episode.

Examination of the 4-year-old response patterns in Appendix O showed that of the six questions asked only the question pertaining to how the giraffe felt about the outcome of the plane landing in the water was answered by 80% or more of the children. It is probable that responding to this particular question was easier as it portrayed an outcome that young children would likely have familiarity with, that is, losing a toy and not being able to get it back. Therefore familiar

background knowledge may have supported the children's ability to answer this question successfully.

Scrutiny of error responses showed that similar to the Internal Response questions, the children also made attempts to answer these questions. Error responses tended to fall into two categories; the first was simply repeating the feeling statement given in the previous Reaction question:

Reaction question – *How did the giraffe feel?*

Child response – *Sad.*

Explanation question – *Why did he feel that way?*

Child response - *Because he's sad.*

The second error pattern consisted of *'because'* responses:

Explanation question – *Why did he feel that way?*

Child response – *'Cause.*

Such responses show that the children did not appear to be making causal connections between the story characters' feelings and the goal and outcome. Again, this lends additional support to the premise that these young children are still acquiring schema knowledge and knowledge of causation that would allow them to infer connections between the pictured events.

In summary, the results for Inferential questions were also unexpected. It was anticipated that these questions would pose greater difficulty for all the children given that they were required to infer information not available in the picture scenes. Very young children, that is, the 5 year olds, clearly demonstrated knowledge of the story characters' internal cognitive states and the causal connections between these states and other story events. Also worthy of mention here is the fact that in this study children's responses to the Internal Response

question '*What did (story character) think?* could include either a thought (e.g., *that's a cool plane*) or goal statement (e.g., *I want that plane*). A secondary analysis of the data would be of interest to determine if there exists an age-related difference in such response choices, that is, do children's response patterns shift toward goal statements as a function of age when answering Internal Response questions?

The questions discussed thus far in the chapter (Literal and Inferential) make up the first set of questions investigated within this study. The discussion will now turn to general comparisons of children's performance across these questions followed by implications of these results.

Literal versus Inferential Questions

Of the two types of questions asked, Inferential questions were not answered correctly as frequently as Literal questions. The standard deviations were more than double for the Inferential questions across all age groups indicating much greater variability within each age group when answering these questions (see Figures 4 and 6). Examination of the 95% confidence intervals (see Appendices L and N) revealed that only the 4 and 5 year olds answered the questions differently. Literal questions were answered correctly more often than Inferential questions by both these age groups of children. The confidence intervals overlapped for the 6 and 8 year olds indicating no significant difference in answering either question which was the result of a ceiling effect for these older children. This finding is of interest, because although no statistically significant difference was observed between 5 year olds and the older two age groups in answering Literal or Inferential questions there does exist a within group difference and it is not until age 6 that such a difference was no longer evident.

Effect sizes provide information about the strength of the relationship between the questioning tasks and age. For Literal questions, 39% of the variance was a function of age, which is considered a moderate effect, while 24% of the variance for Inferential questions was a function of age, representing a small effect. The greater variability within each of the age groups in answering Inferential questions was a contributing factor to the smaller effect size for these questions.

The Set 1 questions (Literal and Inferential) clearly showed that significant age-related differences in answering these questions were evident only for the youngest children. Thus, the questioning task revealed that children as young as 5 demonstrated knowledge of both the external story elements depicted in the picture scenes and the internal elements that needed to be inferred. The fact that questions were presented in accordance with the temporal-causal sequence of the story as suggested by Trabasso, van den Broek and Liu (1988) may have enabled these young children to integrate story information and make inferences they might not have made without such support. On the other hand, the fact that the picture scenes provided a great deal of information about the story may have precluded observing differences for these young children that may have been evident for a picture story that contained less information or if the pictures were not available for the children to view while answering the questions. Since there were no significant differences between the three older age groups when answering any of the Literal and Inferential questions, it appeared that the particular question forms (i.e., Who, Where, What happened, Why etc.) did not influence children's ability to respond correctly.

Similar to previous research, this study showed that children have difficulty answering both Literal and Inferential questions but this was

only the case for the youngest children. The findings in this study are likely a result of the type of questions asked and the support that the pictures provided. As discussed in the Literature Review, differences found for Literal versus Inferential questions in earlier research were also likely the result of the specific type of questions asked and the amount of structural support available from the narrated story. The findings in the present study related to Settings and Initiating Events show a similar pattern to that found by Crais and Chapman (1987) for older children. Even though these two components are frequently included in story narrations (Stein & Glenn, 1979), questioning tasks in both studies revealed that children had not understood the temporal and/or causal connections between these elements of the particular stories that were evaluated. This was particularly surprising in this study given that the picture scenes and questions provided substantial information in order for the children to answer these questions correctly. Further, the differential pattern of success for individual questions within each of the question types would not have been evident if questions had not been asked about all story elements. Results from this study suggests the need to further investigate children's understanding of stories from the beginning to the end under differing task demands (e.g., no picture support when answering questions, answering questions before or after retelling a story that has been heard or read) to determine if similar results emerge.

The next section of the chapter discusses comparisons between the Literal and Inferential questioning task and the story narration task. This comparison was between story information children provided when answering the Set 1 Literal and Inferential questions and equivalent story information included in narrations.

Question – Narration Comparisons

(a) Set 1 Literal and Inferential Questions and Story Narration Comparisons
(Research Question 5)

The research hypothesis predicted that there would be within group differences between the questioning and narration tasks. That is, children would provide more information about the story elements when questioned about the story than when required to formulate the story from the pictures. The hypothesis was confirmed by statistically significant differences and large effect sizes for both Literal and Inferential story information. This finding provides corroborating evidence with Goldman, Varma, Sharp, and the Cognition and Technology Group at Vanderbilt (1999) and extends the finding to younger children. Similar to the finding by Goldman et al. the difference between story knowledge demonstrated across tasks decreased as age increased (see Figures 7 and 8). However, the 8 year olds in the present study did not include as much information in story narrations as in the questioning task, whereas Goldman et al. found negligible differences between tasks for the 9-year-old participants in their study. The inclusion of older children in the present study may have confirmed this possibility. Additionally, the differences observed between tasks were also expected to decrease as a function of age. This was confirmed for Literal story information but not for information designated as Inferential; however, it should be noted that only one inferential element (i.e., Internal Response) was compared.

In the next section I will discuss findings where distinctive age and question related factors were observed. These factors relate to the Setting, Internal Response, Consequence and Reaction categories.

(i) Setting Information

In stories, Setting information not only introduce the characters but also provides the context for the story. Story narration research conducted by Berman (2001) found differences for the types of Setting information children and adults included in their narrations. Young children (i.e., 3 and 4 year olds) tended to introduce characters most frequently, followed by the inclusion of information about the story location, and then at later ages (i.e., 9 year olds and adults) added the background motivations of the story characters. A similar result was observed in the present study for story characters and story location. As shown in Appendix P, children answered questions and included information in their story narrations about story characters more frequently than the location with both increasing as a function of age, thus showing a similar age-related trend to that reported by Berman (2001). Table 22 displays excerpts from Appendix E and I showing this trend across the questioning and narration tasks.

Table 22.
Example Responses to Setting Questions (Characters and Location) and Setting Information Included in Narrations for 4 and 5 Year Olds

	Setting - Characters		**Setting - Location**	
	Question	Narration	Question	Narration
4 year olds	*One, two*	*The giraffe talk with giraffe. √*	*There and there*	(no information included)
5 year olds	*a giraffe was that one and elephant √√*	*The cow and the elephant √√*	*Down at the zoo*	*They want to go in the water*

Note. √ = scored as correct

Evaluation of background motivations of the story characters was not investigated as part of this study. However, in subsequent questioning research, background motivations (e.g., why were the giraffe and elephant at the swimming pool) could be investigated to see if the age trend observed by Berman for the inclusion of this type of Setting information in story narrations would also be apparent in questions.

(ii) Internal Response Information

As described earlier, Internal Response information is related to a story characters' thoughts, emotions or goals. The differences between tasks for this particular category were dramatic as can be seen in Figure 8. However, as found in previous studies (e.g., Goldman & Varnhagen, 1986; Stein & Glenn, 1979), many children do not explicitly include Internal Response information when narrating a story, yet they attribute story outcomes to goals when asked about the causal relationships within the story, thus revealing their understanding of the goal. Similarly, in the present study, although the children did not typically include Internal Response information in their story narrations, they did demonstrate understanding of the characters' thoughts or goals when asked. Thus, as in previous research the inclusion of a questioning task revealed children's understanding of Internal Response information that was frequently not directly available from story narration data. This study extends this finding to younger children than have been studied thus far. This difference in responses to Internal Response questions and inclusion of equivalent information in narrations is displayed in Table 23 (excerpted from Appendix E and I). As can been seen in Table 23 rarely is Internal Response information included in story narrations across any of the age groups, yet the children demonstrate knowledge of this information when directly questioned about this story element.

Table 23.
Example Reponses to Internal Response Questions and Internal Response Information Included in Narrations Across the Four Age Groups

	Answers to Internal Response Questions	**Internal Response Information Included in Narrations**
4 year olds	E1: *He was thinking to go in the pool* E2: *He think it sunk* E3: *A net would be good [P]*	E1: no information E2: no information E3: no information
5 year olds	E1: *That's a cool plane I want it* √ E2: *If he could reach in there and get it* √ E3: *If she should get it with the net* √	E1: *The elephant wanted to see it* √ E2: no information E3: no information
6 year olds	E1: *Maybe I could play with it* √ E2: *Oh I feel sorry for that giraffe* √ E3: *I can get that with my net* √	E1: no information E2: no information E3: no information
8 year olds	E1: *Veronica was thinking ooow sweet* √ E2: *I better get that plane* √ E3: *She would get it back* √	E1: no information E2: no information E3: no information

Note. E1 = Episode 1; E2 = Episode 2; E3 = Episode 3
√ = Scored as correct; P = Scored as partially correct

(iii) Consequence Information

This category pertains to the outcomes of episodes within the story, and as discussed earlier in this chapter, a poor response success was found for children across all age groups to the question regarding the third Consequence question (the plane being returned to the giraffe). Therefore, the story narration data was examined to determine the frequency with which the children mentioned this part of story. Appendix P shows that with the exception of the 4-year-olds, this information was frequently included in the narrations. It was interesting that in this instance when asked about the Consequence of the third episode which was also the successful outcome of the story none of the children responded with the expected answer, even though the picture scene clearly depicted the lady elephant giving the plane to the giraffe (see Appendix C, picture 12) . Instead the 4, 5, and 6 year olds focused

on the lady elephant retrieving the plane (Attempt) which could in fact serve as the 'local' episodic Consequence while the 8 year olds focused on the giraffe's reaction to the plane being retrieved. These differences in children's responses to the questioning and narration task can be seen in Table 24 showing excerpts from the transcripts from Appendix E and I.

Table 24
Example Responses to Consequence Question (Episode 3) and Consequence Information Included in Narrations for the Four Age Groups

	Response to Consequence Question	**Consequence Information Included in Narrations**
4 year olds	*She got it out*	*He got it*
5 year olds	*She got it with her net*	*And then he gave it to the cow* √
6 year olds	*She took it out*	*Then she gives it to the giraffe.* √
8 year olds	*The giraffe was very happy*	*She got it and gave it to him.* √

Note. √ = scored as correct

(iv) Reaction Information

Reactions are the emotional responses of a story character regarding the story outcome(s). In the questioning task, Reaction questions were answered successfully by most children with the exception of one story character, the lifeguard. It was suggested earlier in the discussion that this could be either an age or picture-related factor. The story narration data was examined to determine the frequency with which children mentioned this story character's reaction in their narrations. As shown in Appendix P few 4-year-old children made mention of the lifeguard's reaction; however, it can also be seen that they infrequent included reactions for the girl or lady elephants. Instead, the children focused on the reactions of one story character, the giraffe, across all episodes. Table 25 displays these differences.

Table 25

Example Responses to Reaction Questions and Reaction Information Included in Narrations for the Four Age Groups

	Response to Reaction Questions	**Reaction Information Included in Narrations**
4 year olds	E1 [G] *He feeled angry* √ [E] *Sad* √ E2 [G] *sad* √ [L] *angry* E3 [G] *happy* √ [E] *happy too* √	E1 no information E2 [G] *that giraffe cry* √ E3 no information
5 year olds	E1 [G] *Angry* √ [E] *Bad* √ E2 [G] *bad* √ [L] *happy* E3 [G] *happy* √ [E] *good* √	E1 [G] *the cow was so mad at the elephant* √ E2 no information E3 [G] *then he was so proud* √
6 year olds	E1 [G] *angry* √ [E] sad √ E2 [G] *very sad* √ [L] *very very sad* √ E3 [G] *the giraffe was very happy* √ [E] *the elephant felt happy for him* √	E1 [G] *the giraffe gets angry* √ E2 [G] *so the giraffe starts crying* √ E3 [G] *giraffe is hugging the plane* √
8 year olds	E1 [G] *he felt mad at her* √ [E] *she felt sad for him* √ E2 [G] *Timmy was crying because he was sad* √ E3 [L] *he felt very sorry for Timmy* √ [G] *Timmy felt really good* √ [E] *she felt good for him* √	E1 [G] *giraffe got very mad at her* √ E2 no information E3 [G] *giraffe was very happy* √

Note. E1 = Episode 1; E2 = Episode 2; E3 = episode 3
[G] = reaction for giraffe; [E] = reaction for girl elephant;
[L] = reaction for lifeguard
√ = Scored as correct

The questioning task again revealed that although the children did not include Reaction information in their narrations, they were able to identify the feeling of the characters when asked. It is not possible to provide any additional evidence to support either the age or picture-

related explanation for the difference between the questioning data and the story narration data.

It would certainly not be necessary to include Reaction information for all the story characters in order to tell a well-formed story, and in general, the Reaction in children's or adult's story narrations is considered a non-essential story element. Further, narration of this three-episode story is a complex task; a child must keep track of all the characters, objects and events, along with the connections between all these elements as the story unfolded. For the ages of children participating in the present study this may have been beyond their capabilities. The exclusion of Reaction information for these characters may in fact represent an efficient use of limited cognitive resources by these young children as keeping track of all characters would likely exceed their capacities.

Another possible reason for the lower number of Reactions in children's narrations is an age effect related to perspective. Young children in everyday social situations often fail to take the perspective of others, and this is considered a later developing cognitive skill. Limited perspective could then also account for why they focused on a single character. The choice of the giraffe is logical for two reasons; first, the giraffe may have depicted the most emotionally compelling feelings for young children, and additionally, since it was the giraffe's plane that needed to be retrieved he was a focal character with respect the goal of the story. However, since the present study did not specifically investigate children's perspective taking abilities, these possibilities are offered only as speculations.

The comparisons between the questioning and the narration tasks corroborated earlier research showing that children, particularly young

children (preschoolers and kindergartners), demonstrate understanding of a story when asked questions that they do not include when telling the story from pictures. This is likely the result of the higher task demands of the narration task. That is children must keep the overall task in mind when deciding what to include when narrating a story; this is not so in the questioning task since they asked one question at a time. These results also support the importance of using converging methods to evaluate young children's story comprehension abilities as each method provides a different perspective on the child's story knowledge and capabilities of demonstrating such knowledge. Findings from the present study showed that the youngest children were less successful across both tasks while the older children were successful on the questioning task but included fewer story elements in the narration task. The Set 1 - Guided questions (Literal and Inferential) appear to have greatest utility with very young children since using this question set allows these young children to demonstrate understanding about the story that the task requirements of the story narration do not.

The discussion will now proceed to the second set of questions investigated within the study. These questions evaluated children's ability to integrate the story as a whole in order to identify two of the central components, the Problem and Resolution.

Set 2 – Integrative Inferential Questions - Problem-Resolution (Research Question 6)

As with the Set 1 questions the research hypothesis for the Problem and Resolution questions predicted that the ability to answer these questions correctly would increase as a function of age. Again, results only partially supported this hypothesis, revealing that the 4- and 5-year-old children answered fewer questions correctly than the older

children. The 6-and-8-year-old age groups were again not significantly different from one another. Age accounted for 40% of the variance in Problem-Resolution questions, representing a large effect size.

Several skills are necessary in order for a child to perform successfully on a questioning task such as this. The child must have the inferential and reasoning skills necessary to recognize and make meaningful connections between information in the story and relevant background knowledge. They must be able to form a mental 'picture' of the story, keeping track of story elements, including people, objects and places along with causal links that identify how different story events and states relate to each other (van den Broek & Kremer, 2000). Further, being able to construct a mental representation of the story also depends on properties of the story itself. If the story provides sufficient information and distracting components are reduced or eliminated, children, particularly young children, make inferences and connections between the story events more readily. In addition, working memory limitations mean that successful comprehension also depends on the child's ability to allocate attentional resources efficiently to the most relevant pieces of information within the story. Thus, as children gain background knowledge, are exposed to a wide variety of stories, and cognitively mature, they gradually develop inferential and reasoning abilities (van den Broek & Kremer, 2000). The results, therefore, are not surprising for the younger children. All age groups of children included in the present study would be in the process of acquiring such skills. It is likely that the substantial support available in the picture scenes allowed the 6-and-8-year-old children to integrate the story and identify the central components. It is also likely that answering the Set 1-Guided questions (Literal and Inferential) prior to these Integrative Inferential questions may have supported at least some of the children in making inferences they might not have made without the priming effect of these

questions. This particular issue will be addressed in more detail later in the Discussion chapter.

Results further revealed that of the two questions, both of the youngest groups of children correctly answered the Resolution question (i.e., successful story outcome) with greater frequency that the Problem question. This was, however, only a statistically significant difference for the 5 year olds. Scrutiny of error responses for the Problem question showed that the most frequent responses given by 4 year olds included *'I don't know'*, reference to the Attempt of the third episode *('The lady elephant got the plane out')*, and the feelings of giraffe at various points in the story. The 5 year olds also frequently mentioned the feelings of the giraffe but only in relationship to the outcome of the first episode when his plane went in the water. They also referred to the Consequence, Episode 3 *('He got his plane back')*, or they provided a moral *('Never play or bring a plane to the pool')*. The 4 year olds' error patterns suggest that they did not appear to understand the part of the story representing the Problem. The 5-year-old responses, however, did reveal some amount of understanding since mentioning the giraffe's feelings about the plane going in the water suggests an understanding of the problem. Additionally, the moral responses were also related to the Problem, in that if the plane was left at home the problem would not have occurred.

Based on predictions of the Causal Network Model, the parts of the story which include information about the Problem and Resolution (Consequence Episode 1 and Attempt/Consequence Episode 3) are all story elements that would: (a) be situated on the main causal chain, and (b) have causal connections to other elements in the story. Thus, the differential response success for the Problem and Resolution questions by the 5 year olds would not be expected given these predictions. As can

be seen in Figure 3 the Problem, situated in event $C_{(1.4)}$, is on the causal chain and has several causal connections to other events in the story. Answering the Problem question, however, would require an more extensive backward search through the child's memory representation of the story than would answering the Resolution question and this may have exceeded the youngest children's resources capabilities. Further, this result may have also been influenced by the Problem being situated within the Consequence category in this particular story rather than in the Initiating Event category where problems are usually created (see Table 1). Although some stories are also constructed in a similar manner to the one used in this study this type of construction may have exceeded the 5-year-old children's inferencing abilities to deal with such a difference. It would be of interest in the future to modify the picture story, creating the Problem in the first Initiating Event, to see if this would in fact make a difference for the 5 year olds.

In this section the discussion focused on the overall results for these Integrative Inferential questions. The next section discusses the three comparisons between Integrative Inferential questions (Set 2) and questions where children were asked about one part of the story at a time (Set 1).

Comparisons between answering Set 1 Guided questions (Literal and Inferential) questions and Set 2 Integrative Inferential Questions (Problem - Resolution)
(Research Question 7)

Recall that it was hypothesized that the younger children would receive a higher score for the Set 1 questions than the Set 2 questions and the discrepancy between these scores would decrease with age. This hypothesis was based on the fact that the Set 1 questions ask about one

part of the story at a time and thus should be easier to answer than the Set 2 Integrative Inferential questions where the children were required to infer information from the story as a whole.

Three comparisons between Set 1 – Guided questions and Set 2 Integrative Inferential questions were conducted. The comparisons were as follows:

(a) Set 1 - Inferential questions and Set 2 - Integrative Inferential questions,

(b) Set 1 - Consequence, Episode 1 question and Set 2 - Problem question,

(c) Set 1 - Attempt/Consequence, Episode 3 questions and Set 2 - Resolution question.

Findings for these comparisons showed that when required to infer information from the story as whole the 4 and 5 year olds answered fewer questions correctly than when specifically asked inferential questions focusing on one part of the story. The same result was found when asking about the Problem of the story (Set 2) than when asked the Consequence question from Episode 1 (Set 1). The 4 year olds also answered fewer questions correctly about the Resolution when required to infer the information from the story as whole (Set 2) than when asked specifically about the story outcome (i.e., Attempt/Consequence, Episode 3) (Set 1). There were no significant differences across any of the comparisons for the 6 and 8 year olds (see Figures 10, 11, and 12). Such age-related improvements in inferencing abilities are also believed to reflect an increased ability to integrate larger amounts of story information (van den Broek, 1989).

These results are particularly illuminating for the youngest two age groups of children. The comparisons allow one to see that even though

these children had difficulty answering the Integrative Inferential questions they were able to demonstrate knowledge about the same parts of the story when the task requirements were more supportive. These results support and extend the finding of Crais and Chapman (1987) that inferential questions requiring children to integrate information within the story are more poorly answered than questions, Literal or Inferential, which ask them about a specific element of the story. The availability of the picture stimuli and priming of the Set 1 questions in the present study likely accounts for the results being seen in younger children rather than in the older typically developing children as was the case in the Crais and Chapman study.

One of the future goals of this questioning research is to provide developmental data of children with language impairment. For these children the comparison data could potentially provide a clinically useful reference point for speech-language pathologists in assessment of story comprehension abilities across tasks which differ in resource demands and which could then also lead to functional intervention targets.

The discussion now proceeds to the eighth research question, which investigated Importance Judgements. Similar to the Problem and Resolution questions this questioning task also required integrative inferencing abilities.

Set 3 - Importance Judgements
(Research Question 8)

This research question investigated which two pieces of information children of different ages considered important in the story. Story information that children considered the most important will be

discussed first, followed by information considered to be the second most important. Since Importance Judgements require children to consider the story as a whole their responses are therefore believed to reflect knowledge about causal relationships between story elements (van den Broek, 1989).

'Most Important' Judgement

The most frequently chosen response categories by children in the present study were Consequences and Attempts. For the Consequence category at least, the results in the present study corroborated the findings reported by Stein and Glenn (1979) for the 6-year-old children in their study and the 8-year-old children in van den Broek's (1989) study, in that children frequently considered Consequence information important in the story. van den Broek (1989) has observed that if children are aware of the causal relationships in a story, the main goal is frequently chosen as the most important part of the story. For the story used in the present study this would be information shown in the picture scene 12, Episode 2, Internal Response question (see Appendix B), when the girl elephant is asking the lifeguard to help them get the plane. Table 20 shows that this response category was not chosen by any of the children in this study. In the present study, the top three response choices for the 4-year-old children focused on: (a) the loss of the plane, (b) retrieving the plane, and (c) returning the plane to the giraffe. The 5 and 6 year olds focused on: (a) retrieving the plane, and (b) returning the plane to the giraffe. It was not until 8 years of age that children chose the Consequence (the plane being returned to the giraffe) most frequently (see Table 20). As previously discussed goal attainment in this particular story was sequential and hierarchical; that is, the retrieval of the plane was necessary for the return of the plane to the giraffe. The 5-and-6-year-old children, in choosing the retrieval of the plane, appear to leave it

to the listener to make the assumption that the plane was returned to the giraffe. Further, such response choices focus on the 'local' level of goal attainment in the story. That is, retrieving the plane is related to goal attainment specific to the third episode in which it occurs, whereas returning the plane to the giraffe relates to 'global' goal attainment which is the main goal of the story and which operates across episodes.

An unusual finding was the highest response category choice of the Consequence in Episode 1 (Appendix B, picture 4) made by the 4 year olds, especially in light of the results for the Set 2-Problem and Resolution questions in which the 4 year olds were least successful of all the age groups in answering the Problem question correctly. Recall also that examination of error responses appeared to show that the 4-year-old children did not seem to understand which part of the story represented the problem. Thus, if responses to Importance Judgement questions reflect children understanding of causal inferences, it seems unlikely that these children chose this response category because they had understood the causal significance of this particular part of the story to the story as a whole. A more likely explanation is drawn from story narration research conducted by Marchman (as cited in Berman & Slobin, 1994). Marchman examined story narrations of a picture story and found that 3-and 4-year old children always commented on a part of the story where the main character, a young boy, fell out of a tree, but 9 year olds and adults rarely mentioned that part of the story. Marchman concluded that the young children focused on the salience of the picture rather than the contribution of the particular event to the overall goal and outcome of the story. Similarly, the youngest children in this study may have chosen this part of the story based on the saliency of information depicted in that particular picture.

Based on earlier research by Stein and Glenn (1979) and van den Broek (1989) it was not expected that children in the present study would choose the main goal of the story in Importance Judgement questions. However, even though the children did not choose the main goal (the need to get the plane), the choice of the story action and outcome categories (the lady elephant getting the plane and the giraffe receiving his plane) and the event that precipitated the goal (the plane landing in the water) showed that at least some children were aware that the plane needed to be retrieved and returned to the giraffe, thus indicating their understanding of the goal.

'Second Most Important' Judgement

Children again chose Attempt and Consequence response categories when answering this question. One additional category was added, that being the Reaction category related to how the giraffe felt regarding the return of his plane. Making the Second Most Important Judgement appeared more difficult for most of the children. As can be seen in Table 20 the Attempt, Episode 3 and Don't Know responses were the most frequently chosen categories by the 4 year olds. Similarly there were only two response categories chosen by more than 10% of the 5 year olds, Attempt, Episode 3 and Attempt, Episode 2. Further, there was also greater variability in responses to the Second Most Important Judgement question for the 6 and 8 year olds, suggesting that in general, it was more difficult for the children to choose a second part of the story that they considered important.

In choosing Consequence categories the children in this study performed similarly to children of comparable ages in previous research studies. Thus, it seems that sensitivity toward specifically choosing the main goal of the story is an age-related effect and the inclusion of older

children in the study sample might have revealed this trend. Importance Judgement research studies involving written stories have asked children to rate each story statement on a Likert scale as to the importance of that statement to the story (e.g., very important, somewhat important, not important). Adapting this task and asking children to rate the importance of each of the pictures in the story used in this study would be of interest. After rating the pictures children could then be asked to explain what it was that they considered important about the picture they chose as the most important part of the story. This may reveal if, in fact, young children are making Importance Judgements based on the causal relationships in the story or based on the saliency of the picture scene, thus leading to a clearer understanding of the children's interpretation of the story events in the picture story. Finally, since a future goal of this research is to provide data for children with language impairment, the collection of Importance Judgments from children developing typically in the current study will serve as a reference point from which to evaluate possible differences between these two groups.

The last comparison is between the Importance Judgement questions and the story narrations. This comparison was conducted to determine whether response categories selected by children as important in the story also categories included in story narrations.

Inclusion of Importance Judgement Response Choices in Story Narrations
(Research Question 9)

Previous research conducted by Stein and Glenn (1979) found a high degree of overlap between information children considered

important in stories and information included in children's story narrations. Stein and Glenn used orally presented stories; however, it was predicted that a similar result would be found in the present study utilizing a picture story.

Inspection of response category choices in Importance Judgements and equivalent story elements included in story narrations across the four age groups participating in the present study revealed a similar trend to that found by Stein and Glenn. In the present study the Attempt and Consequence categories were the most frequently chosen in the Importance Judgement task, and these categories were included frequently in children's story narrations (see Table 21). Also similar to Stein and Glenn, differences were evident across the two tasks. In the present study, Setting and Initiating Event information was more frequently included in narrations but less frequently chosen in Importance Judgements whereas similar percentages of children included Reaction information in both Importance Judgements and narrations. One difference found in the present study from Stein and Glenn relates to the Internal Response category. Some of the 6 year olds and most of the 10 year olds in their study frequently chose the Internal Response category in Importance Judgements, yet few children in either age group included this information in story narrations. In the present study, the Internal Response category was never chosen by the 4, 5 and 6 year olds and rarely chosen by the 8 year olds, and this information was also infrequently included in story narrations across all age groups.

This result, therefore, provides corroborating evidence across the two tasks (questioning and narration) that information included in a child's story narrations is also salient and relevant to him/her when responding to questions. The findings of the present study also generally confirm Stein and Glenn's results showing that young children do

include information they consider important in a picture story when telling the story.

Two questions of interest became apparent while conducting the study and in analyzing the data: (a) does a questioning task allow children to demonstrate knowledge of the story they already possess or do the questions themselves support the children to make inferences about story information which they many not have made independently, and (b) what does it mean when children provide information in a questioning task that is not included in story narrations? These two questions will be addressed next.

Demonstrating Knowledge versus Question-Induced Inferencing

In a questioning task such as the one developed for this study, it could be that, in answering questions, children are actually demonstrating knowledge of the story that they possess, as suggested by Goldman, Varma, Sharp, and the Cognition and Technology Group at Vanderbilt (1999). It could also be the case that the questions possibly induce inferencing as suggested by Trabasso, van den Broek, and Liu (1988), thus allowing children to go beyond what they gleaned from the initial narration of the story. These two premises, demonstrating knowledge and question-induced inferences, seem difficult to separate entirely. Questions, by nature, compel the responder to think about a particular topic. Thus, even if that individual possessed understanding of a topic, being questioned about that topic may induce him or her to make new inferences.

In considering the question tasks in this study, (a) Set 1 – Guide Questions (Literal and Inferential), (b) Set 2 - Integrative Inferential (Problem-Resolution), and (c) Set 3 - Integrative Inferential (Importance

Judgements), it is reasonable to assume that the Integrative Inferential questions (Problem-Resolution and Importance Judgements), which presumably required children to incorporate the story as a whole, would therefore be evaluating understanding a child already possessed. Thus, if children answered these questions correctly one might conclude that the children were demonstrating understanding. If, however, a child had difficulty answering the Integrative Inferential questions but was able to answer the Set 1 questions, which asked about individual parts of the story, one might conclude that the Set 1 questions induced the child to make inferences or connections between story events and states.

In his 1989 study, van den Broek asked both Importance Judgement questions and questions that evaluated individual parts of the story. He specifically asked the Importance Judgement questions first because the questions regarding individual parts of the story might have evoked inferences that were otherwise not obvious to the child. In the present study, the questions evaluating one part of the story at a time were asked first, followed by the integrative inferential questions. It is probable, then, that at least some of the children who successfully answered the integrative inferential questions only had done so because the Set 1 questions had evoked inferencing about the causal relationships between story events that have not been previously obvious to the children. Thus, the present study likely provided optimal conditions for the children to demonstrate knowledge or to make inferences because of the question order chosen.

Van den Broek asserts that integrative inferencing questions may be particularly problematic for young children because they are required to take into account a large number of inferences related to a particular story in order to answer such a question. The complexity of the task may therefore lead one to underestimate young children's ability to make

inferences or fully understand motivations/goals and outcomes of the story. In contrast, questions which focus on one part of the story at a time may actually evoke inferences about the causal links between story elements that the child would not normally have made, and hence are likely to overestimate the extent to which children make inferences spontaneously. Again, the presentation order in the present study probably maximized the likelihood of the youngest children making inferences and connections between the story events necessary to respond correctly to the integrative inferential questions. This may in fact explain why the 6 and 8 year olds in the present study answered these questions successfully; the present study may have obtained children 'best' performance. Such a finding lands support for further investigations regarding the extent to which guided questions facilitate success on integrative questions as this may provide information useful in clinical and educational settings.

Questions versus Narration

The second question of interest relates to what it means when children provide information in a questioning task that they do not include when telling the story. As previously discussed, it is certainly not necessary for children to include all of the information they know to have told a well-formed and coherent story. In fact, Trabasso and Rodkin (1994) found a distinct tendency for individuals to exclude parts of a story that could be implied. Thus, if a child narrated the following:

a lady elephant came along with a net [Initiating Event],
she got the plane [Attempt],
and then she gave it to the giraffe [Consequence].

The Internal Response/Goal (*she thought she could get the plane with the net*) which would occur between the Initiating Event and Attempt is

implied. Thus, beyond the developmental constraints already discussed (background knowledge, causal inferencing knowledge, and attentional limitations etc.) one would have to determine if information absent in a narrated story was necessary for a listener to make a coherent representation of the story.

In the present study, the questioning tasks were completed after the narration task so as not to confound the children's spontaneous story narrations because it was presumed that the questioning task could possibly evoke inferencing about the causal relationships between story characters and the events across episodes. Investigating the effects of question-induced inferencing on children's the story narrations by presenting the tasks in the opposite order may provide useful insights for application in clinical and educational settings.

Limitations of the Study

A specific limitation was identified regarding the possibility of an order effect for Importance Judgement responses. In the present study, the Importance Judgement task was administered last. However, the task demands of the Set 2 (Problem-Resolution) questions may have caused a response bias toward those particular parts of the story. In future research, it would be of interest to investigate order effects for the questioning tasks to determine the effect of such variations.

Another limitation relates to whether the younger children (4 and 5 year olds) actually understood the language concepts of 'Problem' and 'Importance' necessary to answer the Set 2 and 3 questions. Thus, it may be that lack of understanding of these concepts influenced the findings for these questions. While it is possible that the younger children did not understand these questions, only rarely did they give *'I*

don't know' responses to the Problem question or the Importance Judgement questions. Further the response categories chosen by children in the Importance Judgements across all age groups were similar. Therefore it would appear that the children believed that they could answer these questions.

Further, developmental trends in children's story comprehension was assessed with only a single story. While it is believed that the results are valid since the questions were derived from models of story comprehension and the research literature it will be important to validate these findings with additional stories.

A more general limitation of any study of story comprehension is the fact that attempting to evaluate any aspect of the 'comprehension' construct is not a simple task. Clearly, there can be no single indicator of a child's underlying competence. The questioning tasks were chosen as a measure of story comprehension based on models available in the current research literature and the social validity of the task itself. However, it must be acknowledged that this is only one means of assessing story comprehension.

Another option would have been to evaluate story comprehension via acting out the story (e.g., Feagans & Short, 1991) or manipulation of objects (e.g., Newton, 1994) where child responses required no verbal language. However, examination of the studies using these techniques showed that only the external action events of the stories were evaluated while the internal cognitive states and causal connections between events were not measured, presumably because they could not be easily enacted. Since the present study was interested in evaluations of children's understanding of internal motivations and thoughts of

characters, use of a non-verbal comprehension task was not considered an option.

Another limitation appears to be the ceiling effects for both the Set 1 and Set 2 questions. It is the case that a more challenging task would reveal more about a child's skills than a simpler task. However, a more challenging task can also make it look like s/he does not have knowledge which has been the concern when children's story knowledge is viewed only via their story narrations. If only difficult or complex tasks are utilized one might not be able to tell whether the child has any knowledge at all. If children do not include information when narrating a story it may mean that they lack knowledge of that particular element or they may understand that element but omit it due to the complexity of the task. In addition, a growing number of authors highlight the importance of linking assessment and intervention. Peña & Gillam (2000) point out that there has been an overwhelming preoccupation with assessment to determine the status of the learner rather than with how to remediate language learning difficulties. Further, most tests lack measurement variables directly related to learning, and are therefore of little use in designing interventions. Using only challenging tasks, one learns if child can cannot perform such tasks; when including a range of tasks, some of which a child can successfully complete, one can determine a starting point for intervention.

Finally, as discussed in the literature review, story comprehension abilities are not only a reflection of a child's story schema knowledge and knowledge of temporal and causal relationships, but also of general world knowledge and knowledge of social interactions for the type of events depicted in the story. In this regard, the picture story included three themes: (a) taking a toy away from child, (b) losing a toy, and (c) getting help to retrieve a toy. These themes were chosen as they are

likely to have been experienced by children aged 4 – 8 either directly, in stories, television or film. However, it is possible that some children participating in the study may not possess the background or social interaction knowledge of such themes. Such lack of experience could have contributed to variability in individual performance on the task.

Future Research and Implications for Professional Practice

The results of the present study have provided substantial developmental information for young typically developing English-speaking children's ability to answer questions, which required them to integrate the story as whole and answer questions about each part of the story. The questions were temporally and causally sequenced and mapped to the cognitive schema such that children could map the local story into its component parts. The findings lead to the consideration of future research directions.

Although several avenues for extension of the present research exist, three immediate directions are of interest regarding application of the questioning tasks. These include: (a) determining developmental trends for children with language impairment, (b) use of the questioning tasks as a Dynamic Assessment protocol, and (c) use of the questioning tasks within an intervention program.

(a) Examining Developmental Trends for Children with Language Impairment

There is presently limited information about the narrative comprehension abilities of children identified with language impairments using questioning tasks. The few studies that have used questioning tasks (e.g., Bishop & Adams, 1992; Crais & Chapman, 1987; Harris &

Newhoff, 2002; Merritt & Liles, 1987), did not evaluate all parts of the story and the questions themselves were not always derived from theoretical models of story comprehension, nor were the temporal-causal questioning cycles suggested by Trabasso et al. (1988) utilized. Without a comprehensive set of questions evaluating all story elements from the beginning to the end of the story, it would not be possible to determine the extent and scope of potential developmental differences for children with language impairments compared to children developing language typically.

Crais and Chapman (1984) found that children with learning disabilities had particular difficulty answering integrative inferential questions. Thus, the integrative inferential questions (Set 2 and 3) used in the present study would provide important information with respect to whether children with language impairment follow a different development pattern as compared to children developing typically. To the author's knowledge, there are presently no published data on Importance Judgements for children with language impairment. Thus, extending the questioning protocol to children with language impairment would be an important contribution to our knowledge in this area.

(b) Dynamic Assessment Protocol

Dynamic Assessment is an approach that follows a test-mediation-retest format and focuses on learner modifiability on a particular task. Dynamic Assessment is based on Vygotsky's conceptualization of the 'zone of proximal development' (ZPD). Vygotsky describes the ZPD as the difference between a child's level of performance on a task when functioning independently and the child's level of performance on the same task when functioning in collaboration with a more knowledgeable partner (Vygotsky, 1978). Dynamic Assessment also provides

information on the amount and kind of adult mediated support that is most helpful for the child. The questioning sets developed for this study are readily adaptable to this type of assessment. The questions not only provide information about a child's story knowledge but as previously discussed may induce children to think about and make connections and inferences they had not made spontaneously, thus providing information regarding the child's narrative abilities with mediated support. Thus, after future research investigating the utility of the questioning sets as a Dynamic Assessment tool, clinicians may be able to use them in determining the degree and intensity of services needed for individual children with narrative comprehension and narration difficulties along with possible intervention goals.

(c) Intervention Program

In an effort to improve reading comprehension, intervention programs have been developed in which Story Grammar information was taught to school-age children in reading and writing tasks. Questioning tasks were used to support students' comprehension of written material (see Idol, 1987 for research with children in Grades 3 – 4, and Dimino, Gersten, Carnine & Blake, 1990 for research with high school students). These studies showed that use of questioning tasks led to greater gains in the students' reading comprehension than interventions that did not use such strategies.

Kintsch (1977) states that whether an individual reads or listens to a story, the comprehension processes are the same after the initial perceptual analysis; thus, the questioning task developed in the present study may be useful in an intervention program that could be applied to both oral and written stories. It would be of interest to investigate if

gains were evident across both domains if intervention was provided in only one domain (oral or written).

Applications of the questioning protocol in any of the areas would hopefully lead to clinically and educationally helpful strategies. Oral narrative abilities are considered a bridge to written language; if this is so, then helping children with language learning difficulties develop the skills necessary to understand stories should help minimize the effects of such difficulties.

CONCLUSION

Understanding and telling stories have become an important topic of research because stories are integral parts of both social and educational milieus. In this study I explored the existence of developmental trends in young children's understanding of a complex picture story using questioning tasks.

Research on narratives has generally focused on children's story narrations. However, producing a story places high demands on children. Children may understand a story but be unable to demonstrate such understanding because of the complexity of the task. Thus, a questioning task consisting of three sets of questions was developed for the present study to allow young children to demonstrate understanding of a story that might not be discernable when they tell a story. The questions evaluated children's understanding of each part of the story from beginning to end, along with their knowledge of the story as a whole. My study did not specifically investigate children's story narrations. However, since it is situated within a larger project collecting

local normative data for story narrations, comparisons of children's abilities across questioning and narration tasks were possible.

Results for the children participating in the study (i.e., typically developing children aged 4, 5, 6, and 8) revealed some unexpected findings. First, the Set 1 Guided questions (Literal and Inferential), which evaluated individual parts of the story, showed significant age-related differences only for the youngest children. By age 5, the children demonstrated understanding of events that were depicted in the pictures (Literal), along with internal states and events that were not depicted (Inferential).

Examination of the individual Set 1 question types revealed the age-related effects for the 4 year olds were specific to Setting, Initiating Event, Internal Response and Explanation questions. The youngest children's difficulty in answering these questions appeared to be primarily developmental, in that they seemed to lack the schema knowledge or knowledge of causation necessary to understand and interpret the picture scenes as a 'story' or they made inaccurate assumptions of listener knowledge about the story.

Similarly, age-related differences were also found for the Set 2 – Integrative Inferential questions (Problem-Resolution), but only for the two youngest age groups. Children needed to integrate the story as a whole in order to answer these questions. Thus, when the demands of the questioning task increased, the 4-and 5-year-old children answered these questions correctly less frequently than older children. Such differences likely reflect an increased ability to integrate larger amounts of story information on the part of the two older groups. The younger children were able to demonstrate that they possessed some knowledge about the Problem and Resolution when asked about this information in

the Set 1 questions. This finding reveals increasing the task demands in questioning tasks impacts their ability to demonstrate knowledge or make inferences about the story.

The Importance Judgement questions revealed that all age groups from 4-8 years considered the Attempt and Consequence categories to be the most important in the story. Additionally, across all age groups information considered important was also frequently included in children's story narrations. This, again, supports and extends earlier research findings to younger children.

The comparisons between questioning tasks and the narration task confirmed the research hypothesis. The findings in this study corroborated and extended earlier research with older children to children of a younger age, showing that in the questioning task children revealed knowledge about story information that had not been included in the narrations. Also similar to earlier studies, the difference across these tasks tended to decrease as a function of age. These results support using both questioning and narration tasks when evaluating young children's story comprehension abilities as each method provides a different perspective on the child's knowledge and capabilities.

Beyond the overall findings related to the specific research questions addressed in the study, question and picture-related factors were also revealed. These findings provide information that will guide both the modifications to picture scenes and questioning protocol in future studies.

These findings have potential for application to educational sand clinical settings. The Set 1 Literal and Inferential questioning task appears to have the greatest utility with very young children. These

questions allow young children to demonstrate understanding of a story that the task requirements of the Problem-Resolution questions and story narration did not always elicit. Thus, after a child tells or listens to a story, parents and teachers could ask these types of questions to support or monitor a child's understanding of the story.

The Problem-Resolution questions offer particularly useful information to educators. As stated earlier, oral narratives are considered a bridge between oral and literate language styles. Therefore, if children are not able to understand the central components in oral stories read or told to them, they are likely also to have difficulty understanding these central elements when reading a story themselves. Thus, asking these two questions allows a teacher to obtain an immediate indication of a child's ability to identify story components that are considered important and necessary for successful comprehension of a story. These types of questions are already commonly utilized as part of clinical and educational settings, and as such educators will likely enjoy the fact that they do not have to extrapolate the research information to be of use in the classroom environment. The research data from this study can be directly used as comparison data by teachers.

All of the questions were designed to be 'generic' to allow for comparisons of question types across episodes. Again, the data presented in Appendices M and O allows educators to quickly and easily determine how similar the child in their classroom is performing to the children in the study sample across each individual question. The use of a generic question set was also considered important to allow for replication of the questioning protocol in novel stories for future research.

The data from this study with children developing typically most importantly provides the reference point from which to now study children with language impairment. Such an investigation will allow for the determination of the scope of possible developmental differences between these two groups of children across the three questioning tasks.

The last words belong to Ben, who the night before my oral defense told me 'Mum, you'll be great, just don't say anything stupid.' Unfortunately, I didn't manage to accomplish that in the defense and only you, the reader can determine if I accomplished it here.

BIBLIOGRAPHY

Bartlett, F. C. (1932). *Remembering: A study in experimental and social psychology.* Cambridge, England: Cambridge University Press.

Baumann, J. (1984). The effectiveness of a direct instructional paradigm for teaching main idea comprehension. *Reading Research Quarterly, 20,* 93 – 115.

Beck, I., McKeown, M., McCaslin, E., & Burkes, A. (1979). *Instructional dimensions that may affect reading comprehension: Examples from two commercial reading programs.* Pittsburgh: University of Pittsburgh, Learning Research and Development Centre.

Berman, R., & Slobin, D. (1994). Narrative Structure. In R. Berman & D. Slobin (Eds.), *Relating events in narrative: A crosslinguistic developmental study* (pp.39-84). Hillsdale, NJ: L. Erlbaum Associates.

Berman, R. (2001). Setting the narrative scene: How children begin to tell a story. In K. Nelson, A. Aksu-Koc, & C. Johnson (Eds.), *Children's language. Developing narrative and discourse competence (Vol 10),* (pp. 1-30). Mahwah, NJ: Lawrence Erlbaum Associates.

Bishop, D., & Adams, C. (1992). Comprehension problems in children with specific language impairment: Literal and inferential meaning. *Journal of Speech and Hearing Research, 35,* 119-129.

Black, J., & Bower, G. (1980). Story understanding as problem solving. *Poetics, 9,* 223-250.

Blishen, B. R., Carroll, W. K., & Moore, C. (1987). The 1981 socioeconomic index for occupations in Canada. *Canadian Review of Sociology and Anthropology, 24,* 465-488.

Bourg, T., & Stephenson, S. (1997). Comprehending characters' emotions: The role of event categories and causal connectivity. In P. van den Broek, P. Bauer, & T. Bourg (Eds.), *Developmental spans in event comprehension and representation. Bridging fictional and actual events.* (pp. 295 – 319) Mahwah, NJ: Lawrence Erlbaum Associates.

Chi, M. (1978). Knowledge structures and memory development. In R.S. Siegler (Ed.), *Children's Thinking: What develops?* (pp. 73-96) Hillsdale, NJ: Lawrence Erlbaum Associates.

Cohen, J. (1988). *Statistical power analysis for the behavioural sciences* (rev. ed). Hillsdale, NJ: Academic Press.

Crais, E., & Chapman, R. (1987). Story recall and inferencing skills in language/learning-disabled and non-disabled children. *Journal of Speech and Hearing Disorders, 52,* 50-55.

Dimino, J., Gersten, R., Carnine, D., & Blake, G. (1990). Story grammar: An approach for promoting at risk secondary students' comprehension of literature. *Elementary School Journal, 91*(1), 19-32.

Dimino, J., Taylor, R., & Gersten, R. (1995). Synthesis of the research on story grammar as a means to increase comprehension. *Reading and Writing Quarterly: Overcoming Learning Difficulties, 11,* 53-72.

Dubé, R. (2000). *Development of the Picture Story Language Instrument for Deaf children.* Unpublished doctoral dissertation, University of Alberta, Alberta.

Feagans, L., & Short, E. (1984). Developmental differences in the comprehension and production of narratives by reading-disabled and normally achieving children. *Child Development, 55,* 1727 – 1736.

Gillam, R., Pena, E., & Miller, L. (1999). Dynamic assessment of narrative and expository discourse. *Topics in Language Disorders, 20* (1), 33-47.

Goldman, S. (1985). Inferential reasoning in and about narrative texts. In A. Graesser & J. Black (Eds.), *The psychology of questions* (pp. 247-276). Hillsdale, NJ: Lawrence Erlbaum Associates.

Goldman, Varma, Sharp, and the Cognition and Technology Group at Vanderbilt (1999). Children's understanding of complex stories: Issues of representation and assessment. In S. Goldman, A. Graesser, & P. van den Broek (Eds.), *Narrative comprehension, causality, and coherence. Essays in honor of Tom Trabasso* (pp.135-159). Mahwah, NJ: Lawrence Erlbaum Associates

Goldman, S., & Varnhagen, C. (1986). Memory for embedded and sequential story structures. *Journal of Memory and Language 25,* 401-418.

Graesser, A. (1990). Psychological research on question answering and question asking. *Discourse Processes 13,* 259-260.

Graesser, A., & Clark, L. (1985). *The structures and procedures of implicit knowledge.* Norwood, NJ: Ablex.

Graesser, A., Lang, K., & Roberts, R. (1991). Question answering in the context of stories. *Journal of Experimental Psychology: General, 120*(3), 254-277.

Haberlandt, K. (1980). Story grammar and reading time of story constituents, *Poetics, 9,* 99-118.

Harris, G. (1993). American Indian cultures: A lesson in diversity. In D. Battle (Ed.), *Communication disorders in multicultural populations* (pp. 78-113). Boston, MA: Andover Medical Publishers.

Harris Wright, H., & Newhoff, M. (2001). Narration abilities of children with language-learning disabilities in response to oral and written stimuli. *American Journal of Speech-Language Pathology, 10,* 308-319.

Hoggan, K., & Strong, C. (1994). The magic of "Once upon a time": Narrative teaching strategies. *Language, Speech and Hearing Services in Schools, 25,* 76-89.

Idol, L. (1987). Group story mapping: A comprehension strategy for both skilled and unskilled readers. *Journal of Learning Disabilities, 20,* 196-205.

Kail, M., & Hickmann, M. (1992). French children's ability to introduce referents in narratives as a function of mutual knowledge. *First Language, 12,* 73-94.

Kintsch, W. (1977). On comprehension stories. In M. Just & P. Carpenter (Eds.), *Cognitive processes in comprehension* (pp.33-62). Hillsdale, NJ: Lawrence Erlbaum Associates.

Kintsch, W. (1994). A cognitive architecture for comprehension. In H. Pick, P. van den Broek & D. Knill (Eds.), *Cognition conceptual and methodological* issues (pp.143-163). Washington, DC: American Psychological Association.

Mackie, J. (1980). *The cement of the universe: A study of causation.* Oxford: Clarendon Press.

Mandler, J.M., & Johnson, N.S. (1977). Remembrance of things parsed: Story structure and recall. *Cognitive Psychology, 9,* 111-151.

Mandler, J. M., Scribner, S., Cole, M., & DeForest, M. (1980). Cross-cultural invariance in story recall. *Child Development, 51,* 19-26.

McCauley, R. (2001). *Assessment of language disorders in children* (pp. 49-77). Mahwah, NJ: Lawrence Erlbaum Associates.

Memory, D. (1983). Main idea prequestions as adjunct aids with good and low-average middle grade readers. *Journal of Reading Behavior, 15*(2), 37-48.

Merritt, D., & Liles, B. (1987). Story grammar ability in children with and without language disorder: Story generation, story retelling, and story comprehension. *Journal of Speech and Hearing Research, 30,* 539-552.

Miller, J., & Chapman, R. (1998). *Systematic analysis of language transcripts (SALT).* Madison, WI: University of Wisconsin, Language Analysis Lab.

Newton, D. (1994). Pictorial support for discourse comprehension. *British Journal of Educational Psychology, 54,* 31-39.

Oakhill, J. (1984). Inferential and memory skills in children's comprehension of stories. *British Journal of Educational Psychology, 35A,* 441-450.

O'Brien, E., & Meyers, J. (1987). The role of causal connections in the retrieval of text. *Memory and Cognition, 15,* 419-427

Omanson, R. (1982a). An analysis of narratives: Identifying central, supportive and distracting content. *Discourse Processes, 5,* 195-224.

Omanson, R (1982b). The relation between centrality and story category variation. *Journal of Verbal Learning and Verbal Behavior, 21,* 326-337.

Rumelhart, D. (1975). Notes on a schema for stories. In D. Bobrow & A. Collins (Eds.), *Representation and understanding: Studies in cognitive Science* (pp. 237-272) New York: Academic Press.

Shank, R. (1975). The structure of episodes in memory. In D. G. Bobrow & A.M. Collins (Eds.), *Representation and understanding: Studies in cognitive science* (pp. 237-272). New York: Academic.

Schneider, P., Dubé, R., & Hayward, D. (2002). *The Edmonton Narrative Norms Instrument: Project report.* Unpublished manuscript.

Semel, E., Wiig, E., & Secord, W. (1995). Clinical Evaluation of Language Fundamentals - 3 (CELF-3). San Antonio, TX: The Psychological Corporation.

SPSS for Windows Rel. 11.0.1 (2001). Chicago: SPSS Inc.

Stein, N., & Glenn, C. (1979). An analysis of story comprehension in elementary school children. In R. Freedle (Ed.), *New directions in discourse processing,* (Vol. 4 pp. 53-120). Norwood, NJ: Ablex.

Thorndyke, P. (1977). Cognitive structures in comprehension and memory of narrative discourses. *Cognitive Psychology, 9,* 77-110.

Toronto, A., & Merrill, S. (1983). Developing local normed assessment instruments. In D. Omark and J. Erikson (Eds.), *The bilingual exceptional child* (pp. 105-121). San Diego, CA: College Hill Press.

Trabasso, T., & Nickels, M. (1992). The development of goal plan of action in the narration of a picture story. *Discourse Processes 15,* 249-275.

Trabasso, T., & Rodkin, P. (1994). Knowledge of goal/plans: A conceptual basis for narrating Frog Where are You? In R. Berman & D. Slobin (Eds.), *Relating events in narrative: A crosslinguistic developmental study* (pp. 85-106). Hillsdale, NJ: L. Erlbaum Associates.

Trabasso, T., Secco, T., & van den Broek, P. (1984). Causal cohesion and story coherence. In H. Mandl, N. Stein, & T. Trabasso (Eds.), *Learning and comprehension of text* (pp. 83-111). Hillsdale, NJ: Lawrence Erlbaum Associates.

Trabasso, T., & Sperry, L. (1985). Causal relatedness and importance of story events. *Journal of Memory and Language, 24,* 595-611.

Trabasso, T., & van den Broek, P. (1985). Causal thinking and the representation of narrative events. *Journal of Memory and Language, 24,* 612-630.

Trabasso, T., van den Broek, P., & Liu, L. (1988). A model for generating questions that assess and promote comprehension. *Questioning Exchange, 2,*(1), 25-38.

Trabasso, T., van den Broek, P., & Suh, S. (1989). Logical necessity and transitivity of causal relations in stories. *Discourse Processes, 12,* 1-25.

van den Broek, P. (1988). The effects of causal relations and hierarchical position on the importance of story statements. *Journal of Memory and Language, 27,* 1-22.

van den Broek, P. (1989). Causal Reasoning and inference making in judging the importance of story statements. *Child Development, 60,* 286-297.

van den Broek, P. (1994). Comprehension and memory of narrative texts: Inferences and coherence. In M.A. Gernsbacher (Ed.), *Handbook of psycholinguistics* (pp. 539-588). San Diego: Academic.

van den Broek, P. & Gustafson, M. (1999). Comprehension and memory for texts: Three generations of reading research. In S. Goldman, A. Graesser, & P. van den Broek (Eds.), *Narrative comprehension, causality, and coherence. Essays in honor of Tom Trabasso* (pp. 15-34). Mahwah, NJ: Lawrence Erlbaum Associates.

van den Broek, P., & Kremer, K. (2000). The mind in action: What it means to comprehend during reading. In B. Taylor, M. Graves & P. van den Broek (Eds.), *Reading for Meaning. Fostering comprehension in the middle* grades (pp. 1-30. Newark, DE: Teachers College Press.

van den Broek, P., Rohleder, L., & Narvaez, D. (1996). Causal inferences in the comprehension of literary texts. In R. Kreuz & M. McNealy (Eds.), *Empirical approaches to literature and aesthetics* (pp. 179-200). New Jersey: Ablex.

van den Broek, P., & Trabasso, T. (1986). Causal networks versus goal hierarchies in summarizing text. *Discourse Processes, 9,* 1-15.

van Dijk, T., & Kintsch, W. (1983). *Strategies of discourse comprehension.* New York: Academic Press.

Varnhagen, C. (1991). Text relations and recall for expository prose. *Discourse Processes, 14,* 399-422.

Vygotsky, L. (1978). *Mind in society: The development of higher psychological processes.* Cambridge, MA: Harvard University Press.

Warren, W., Nicholas, D., & Trabasso, T. (1979). Event chains and inferences in understanding narratives. IN R. O. Freedle (Ed.), *Advances in discourse processes: Volume 2. New directions in discourse processing* (pp. 23-52). Norwood: NJ: Albex

Westby, C.E. (1999). Assessing and facilitating text comprehension problems. In H. Catts & A. Kahmi (Eds.*), Language and reading disabilities* (pp. 199-259). Needham Heights, MA: Allyn & Bacon.

Wiig, E.H., Secord, W., & Semel, E. (1992). *Clinical Evaluation of Language Fundamentals – Preschool.* San Antonio, TX: The Psychological Corporation.

Winograd, P. (1984). Strategic difficulties in summarizing texts. *Reading Research Quarterly, 19,* 404 – 425.

Wolfman, C. (1991). Sensitivity to causal cohesion in stories by children with mild mental retardation, children with learning disabilities , and children without disabilities. *Journal of Special Education, 25,* 135-154.

Appendix A: Criteria for Determining Causal Relations Between Story Events

The first, essential criterion is the determination of necessity in the circumstances. Using counterfactual reasoning, some event, action, or state A is necessary for the event, action, or state B if and only if the nonoccurrence of A would prevent the occurrence of B. For example, event A, 'The dog ate just about everything he could find,' is causally related to event B, 'The dog soon became really fat,' because overeating is a necessary event for becoming fat. Using counterfactual reasoning, if the dog had not been such a glutton, a state representing the nonoccurrence of A, then he would not likely have become so fat, an event representing the prevention of the occurrence of B. If, in some situation, counterfactual reasoning does not hold (i.e., the nonoccurrence of A does not prevent B), then two statements are not causally related.

The second criterion for identifying a causal relation is the determination of sufficiency in the circumstances. Event or state A is a sufficient cause of event or state B if, when A occurs in the narrative context, B naturally occurs. Considering the above example, become fat is a natural consequence of overeating. Indeed, overeating is defined by consuming more energy than can be expended, leading to storage of the extra energy as fat. Although the criterion of sufficiency is a corequisite condition of causality (Mackie, 1980), it is often loosened to allow for enabling relationships to be considered as causal (Trabasso & Sperry, 1985). An enabling relationship, such as that between 'The dog's owner absent-mindedly left food scraps all over the house' and 'The dog soon became really fat,' loosely fits the necessity criterion (it would be somewhat more difficult, at least, for the dog to become fat if the owner did not leave food out) but does not satisfy the sufficiency criterion (simply leaving food around does not lead to overweight – the dog must also eat the food). Because leaving food out provides an enabling condition in which the dog has access to excess food, the relationship is given the same status as a direct causal relationship between overeating and overweight.

Note: From Varnhagen, 1991, p.401

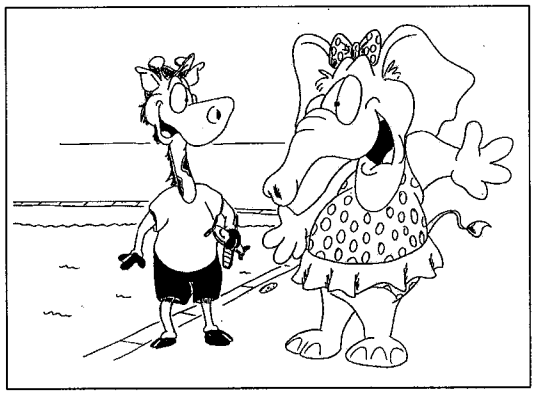
Appendix B: 'The Airplane' Story Script

Characters: 2 female elephants; male giraffe; male elephant
Context: swimming pool

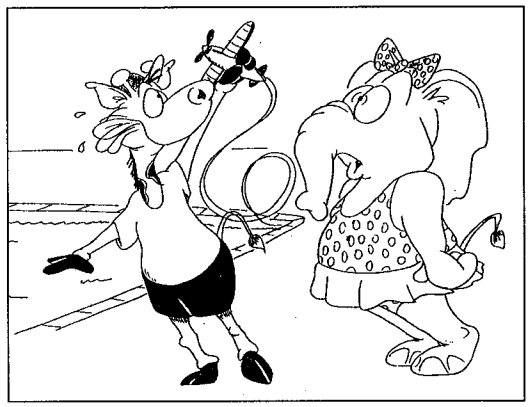
Picture #	Story Script	Story Grammar Category
1	One day Lizzy the Elephant and George the Giraffe were at the swimming pool. George had a toy airplane	Setting
2	Lizzy saw George's toy airplane. She thought that it looked really neat. She decided to take it from George so that she could play with it.	Initiating Event Internal Response Internal Plan
3	So she tried to grab the toy airplane from George. George didn't want to give it to her.	Attempt
4	The toy airplane accidentally fell in the swimming pool. It was floating in the pool.	Consequence
5	George was very mad at Lizzy for dropping his toy airplane in the pool. Lizzy felt bad about what she had done.	Reaction Reaction
6	Then Lizzy saw Jim the Elephant lifeguard standing by the pool. She though that maybe Jim could help them get the toy airplane out of the pool. She decided to ask Jim for some help.	Initiating Event Internal Response Internal Plan
7	Lizzy showed Jim the toy airplane in the water. She asked him if he could get it out.	Attempt
8	Jim tried to get the toy airplane out of the swimming pool. He could not reach the airplane because it was too far out.	Consequence
9	George was still very upset with Lizzy. Lizzy felt bad about what she had done. Jim the lifeguard wasn't sure what to do about the toy airplane in the water.	Reaction Reaction
10	Mrs. Elephant saw the toy airplane in the water. She thought that she could help Lizzy and George get the toy. She decided to go see if she could help.	Initiating Event Internal Response Internal Plan
11	Mrs. Elephant scooped the toy airplane out of the swimming pool with her bag.	Attempt
12	She gave the toy airplane back to George.	Consequence
13	George was happy to have his toy airplane back. Lizzy felt relieved that her friend had his toy back.	Reaction Reaction

Note: Adapted from Dubé 2000 (pp. 163-164)

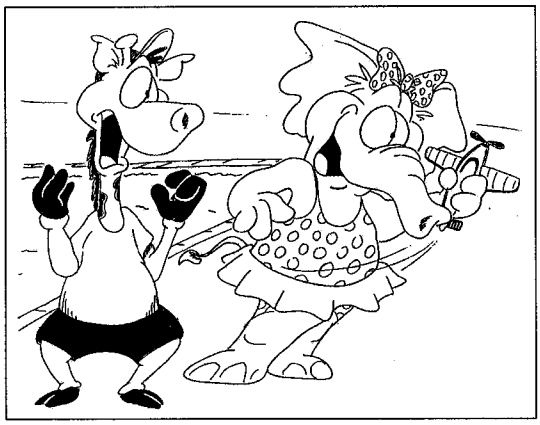
Appendix C: Story Illustrations



1



2



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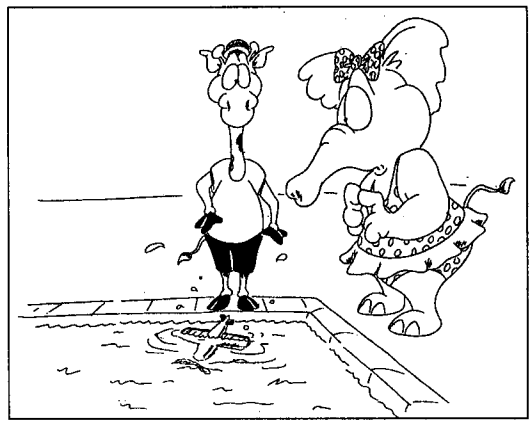

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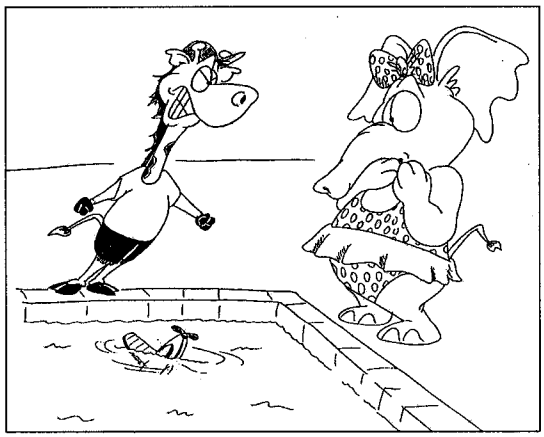

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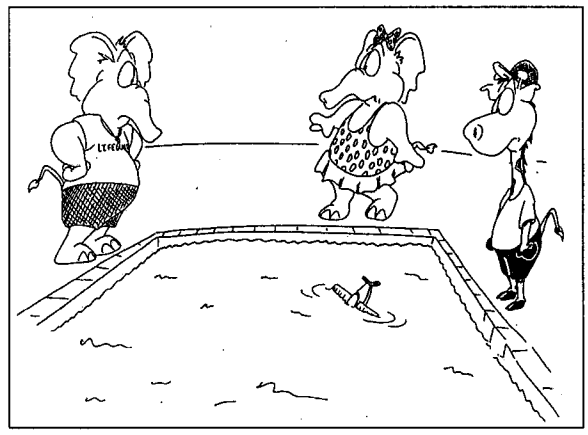

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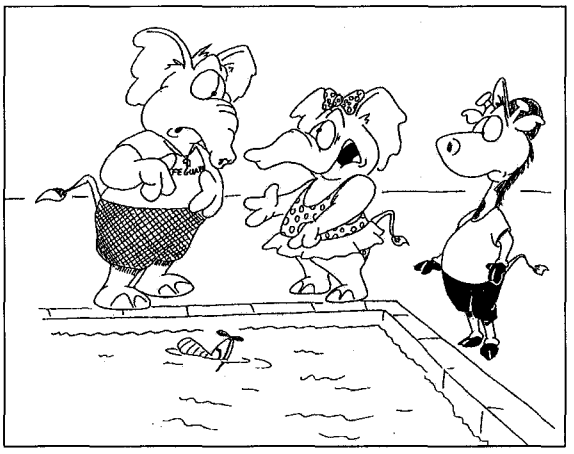

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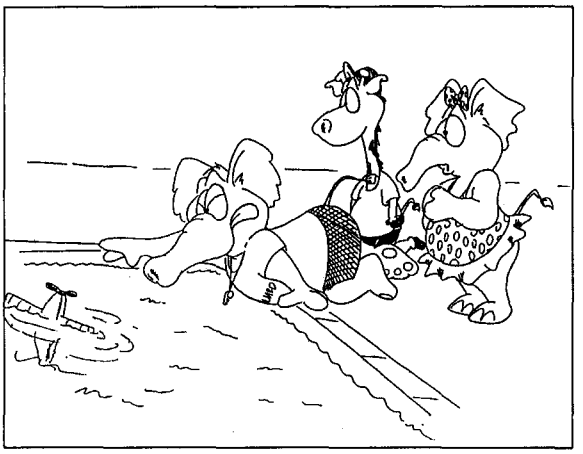

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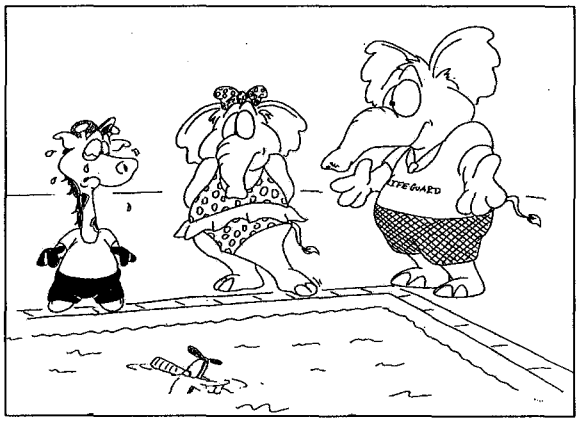

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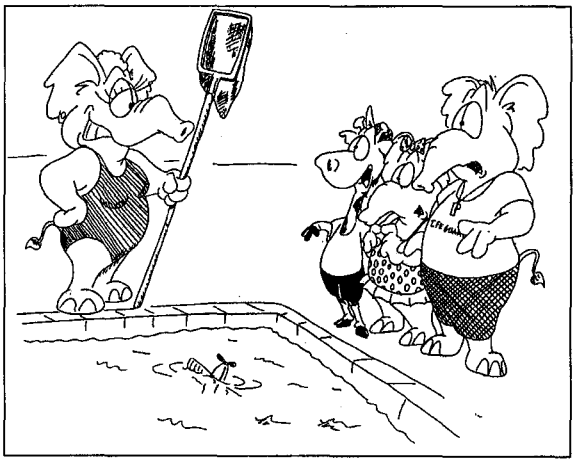

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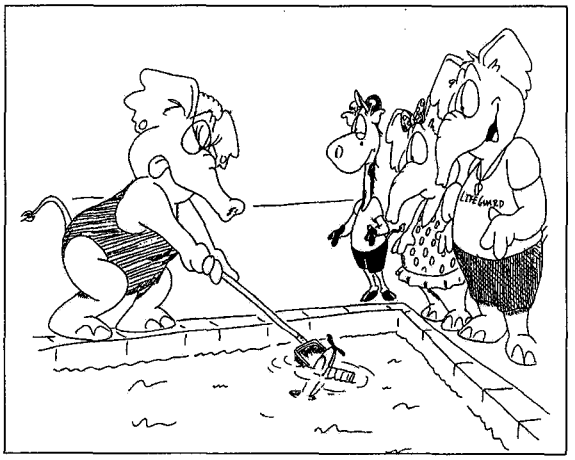

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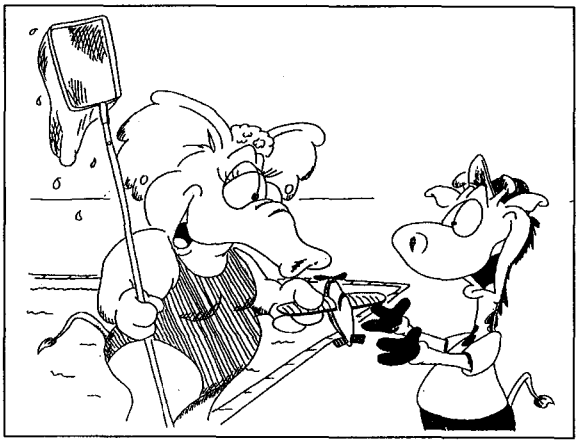

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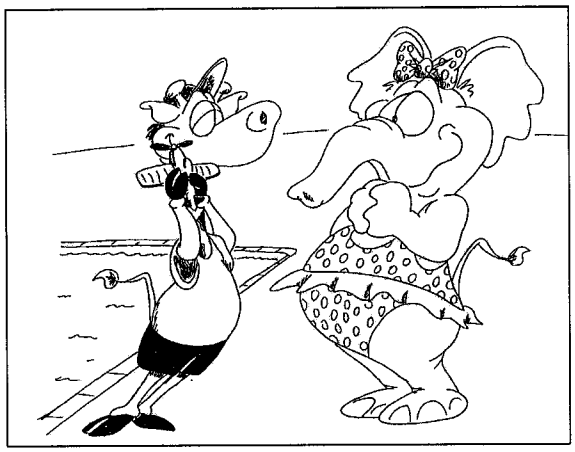

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Appendix D: Allowable Prompts for Set 3 Integrative Inferential Questions (Importance Judgments)

Examiner: *What do you think was the most important thing that happened in this story?*
(1) Child: (gives moral of story)

PROMPT (Moral):
Yes, that's what they learned from the story. Can you also tell me something you think was important that happened in the story?

(2) Child: *I don't know* (or repeats moral)

PROMPT (Pictures):
Think about all the pictures that helped tell the story. What was the most important thing that happened?
(Child can look at the pictures if s/he needs to)

(3) Child: *He was sad.*

PROMPT (Clarify):
Which part of the story do you mean?

(4) Child: *He got his plane back, and he was happy.*

PROMPT (Two parts of story):
You've told me two things; which was the most important (child answer part A) *or* (child answer part B)?
(If child still give both story parts score both)

Examiner: *What do you think was the second most important thing that happened in the story?*
(5) Child: (repeats answer given in response to Question 1)

PROMPT (Repeat):
That's the same as the answer you just gave me. Can you think of something else that was important in the story?
(If still gives the same answer, accept)

Any combination of these prompts could be used in an attempt to obtain a response from a child.

Appendix E: Scoring Criteria for Individual Questions in the Three Questioning Tasks

Set 1 Guided Questions: Literal and Inferential

General Scoring Conventions:
Note: Within the table the following notations are used

- G = giraffe, E = elephant, L = lifeguard
- E1 = Episode 1, E2 = Episode 2, E3 = Episode 3
- Questions 1, 11, 19 have 2 parts; check child answers for both pieces of information

Question	SG Category	Example Answers	Score
Q1A	Setting E1 Character 1 Giraffe **Literal**	Fully Acceptable: giraffe / male / boy / George / made up name - Pomy, Udhi (or another type of animal, e.g., horse) Not Acceptable: pronoun	2 0
Q1B	Setting E1 Character 2 Elephant (girl) **Literal**	Fully Acceptable: elephant / female / girl / Martha / made up name like Pomy, Udhi (or another type of animal, e.g., cow) Not Acceptable: pronoun	2 0
Q1C	Setting E1 Characters Unspecified **Literal**	Acceptable: says animals / people (without differentiating) e.g., two animals Not Acceptable: pronoun	1 0
Q2	Setting E1 Location **Literal**	Fully Acceptable: at swimming pool / beach / park / island has a plane / toy they're playing / talking G asks E to play with plane (give credit if plane misidentified - ball, helicopter) Partially Acceptable: bath, behind water Not Acceptable: zoo / home / in there / jungle	2 1 0

Q3	Initiating Event E1 **Literal**	Fully Acceptable: Playing / holding / showing the plane got a plane E sees G with plane G gives plane to E - giving a turn G grabs plane from E plane flies (give credit if plane misidentified - ball etc) Not Acceptable: had a plane (passive tense) / E and G and plane / they're swimming / put plane in water / Elephant wants it	2 0
Q4	Internal Response E1 **Inferential**	Fully Acceptable: Wants / decided to get plane wants her plane back wants to try / have a turn thinks he should share / thinks it will splash in water to throw it in the water acceptable emotion about plane (wow etc.) **ALSO accept** answer related to Q3 (e.g., Q3 G playing with plane - Q4 that she could too) Not Acceptable: to go in swimming pool / she was dizzy / nervous	2 0
Q5	Attempt E1 **Literal**	Fully Acceptable: grabs the plane / flies plane / play with it going to throw the plane G gives plane to E G gives a turn E gets it so she going to try	2
Q6	Consequence E1 **Literal**	Fully Acceptable: (accidentally) throws/drops plane in the water plane sinks she let it in the swimming pool Not Acceptable: just says 'sinking'	2 0

Q7	Reaction E1 Character 1 Giraffe **Literal**	Fully Acceptable: acceptable emotion e.g., mad, sad, worried, bad Partially Acceptable - mean	2 1
Q8	Explanation E1 Character 1 Giraffe **Inferential**	Fully Acceptable: acceptable reason given in Q7 e.g., because plane is lost / sunk E threw plane in water/ she did it it was his favourite toy / didn't want it to sink because it was his airplane cause he didn't like that he couldn't fly his plane anymore Partially Acceptable - she did it / didn't want E to see the plane Not Acceptable: mad at Elephant / his plane was broken / ruined	2 1 0
Q9	Reaction E1 Character 2 Elephant (girl) **Literal**	Fully Acceptable: acceptable emotion e.g., sad, bad, embarrassed, scared, sorry oops, etc Not Acceptable: good	2 0
Q10	Explanation E1 Character 2 Elephant (girl) **Inferential**	Fully Acceptable: acceptable reason given in Q9 e.g., because she didn't mean to drop / throw plane in pool it was an accident she didn't know that was gonna happen because she threw his plane in the water the Giraffe is mad at her / parents will be mad at her she took it from him / plane is in the water she can't get it that was not nice Partially Acceptable: she didn't say please Not Acceptable: she broke / wrecked the plane / thinks it's her plane / she didn't like it / she wanted to play with it come more	2 1 0

Q11A	Setting E2 Character 3 Elephant (male) **Literal**	Fully Acceptable: Mention of new character e.g., another elephant / lifeguard/ boss / Dad / brother etc. Not Acceptable: pronoun	2 0
Q11B	Initiating Event E2 **Literal**	Fully Acceptable: comes over / sees the plane in the water lifeguard looks worried / G & girl E look worried girl E asks for help L says what's wrong (give credit if plane misidentified - ball etc) **ALSO accept** reasonable answer to the question (e.g., L going to get it / tell the boss that E threw in water / other E came and try to pull it from the water)	2
Q12	Internal Response E2 **Inferential**	Fully Acceptable: what happened / how did plane get in pool plane not supposed to be in pool they need help / he will get it out not sure he can get it out kids did that on purpose / by accident they forgot to take plane out of water shouldn't put toys in there Oh I feel sorry for G / he said uh oh / oh I wish I had a net / to use a net If he had a helper that could scoop it out of the pool Partially Acceptable: Dad had an idea Not Acceptable: E tells L not her fault / talks to L telling about the problem / G & E should get it / it sunk / G shouldn't have brought a toy so she wouldn't have bothered it	2 1 0

Q13	Attempt E2 **Literal**	Fully Acceptable: tries to get / reach plane reaches for plane Partially Acceptable: grab it Not Acceptable: look in water / dive in	2 1 0
Q14	Consequence E2 **Literal**	Fully Acceptable: couldn't reach plane it's too far away / went further away it was sinking / sinking more Partially Acceptable: wouldn't work / it sunk / didn't know what to do Not Acceptable: G sad / G crying / he didn't try to get it	2 1 0
Q15	Reaction E2 Character 1 Giraffe **Literal**	Fully Acceptable: acceptable emotion e.g., sad, worried, bad, upset, crying he's gonna cry	2
Q16	Explanation E2 Character 1 Giraffe **Inferential**	Fully Acceptable: acceptable reason given in Q15 e.g., because plane is lost / ruined / sinking / sunk L can't get his plane out it was his favourite toy / didn't want it to sink L pushed plane further away Partially Acceptable: not nice / **repeat of information given from E1** Not Acceptable: comments about Elephant dropping in water/ plane was broken	2 1 0

Q17	Reaction E2 Character 3 Elephant (male) **Literal**	Fully Acceptable: acceptable emotion e.g., sad, disappointed, embarrassed, confused sorry, etc he's saying I don't know / how can I get that out Partially Acceptable: scared Not Acceptable: happy / okay / angry / nervous	2 1 0
Q18	Explanation E2 Character 3 Elephant (male) **Inferential**	Fully Acceptable: acceptable reason given in Q17 e.g., because he can't get it / couldn't help thought plane was stuck because they'd / she dropped plane in the water he pushed it further away didn't want it to sink Partially Acceptable: Giraffe is crying-sad / G brought a toy /threw the plane in the water / no toys allowed Not Acceptable: he liked it / he didn't like that / he tried to get it / didn't want G plane in the water / he splashed the G	2 1 0
Q19A	Setting E3 Character 4 Elephant (lady) **Literal**	Fully Acceptable: Mention of new character e.g., another elephant / lady lifeguard / mother / wife / sister etc Not Acceptable: pronoun	2 0
Q19B	Initiating Event E3 **Literal**	Fully Acceptable: comes over / sees the plane in the water has a net (give credit if plane misidentified - ball etc) **ALSO accept** reasonable answer to the question (e.g., mother one is gonna catch it / gonna do it with the net / E going to catch it / girl had a fishing net that could reach it / mother gonna try to get the plane] Not Acceptable: she got the plane	2 0

Q20	Internal Response E3 **Inferential**	Fully Acceptable: they need help / she will get it out to grab a net just like you get fishes out of the water they forgot to take plane out of water (give credit if mislabels plane or net – e.g., butterfly / ball / hand holder) Partially Acceptable: thinking a net would be very good / to get that – indicating net / had a good idea Not Acceptable: has a net / G put in water / E crash landed it	2 1 0
Q21	Attempt E3 **Literal**	Fully Acceptable: indicates E tries **OR** gets the plane e.g., (puts in net) will / tries / gonna get / reach plane reaches for plane / almost got it she gets / got the plane she did / she did it / she did that very thing - **IF** relates to response in Q21 - she was thinking to get the plane	2
Q22	Consequence E3 **Literal**	Fully Acceptable: gives plane to Giraffe/ G got his plane back G said thank you – (implies he has the plane back)	2
Q23	Reaction E3 Character 1 Giraffe **Literal**	Fully Acceptable: acceptable emotion e.g., happy, excited, glad, thankful says thank you	2
Q24	Explanation E3 Character 1 Giraffe **Inferential**	Fully Acceptable: acceptable reason given in Q24 e.g., he got plane back elephant got / gave the plane it was his favourite toy he loved it / liked it Partially Acceptable - it didn't sink Not Acceptable: describing plane - nice, shiny, new	2 1 0

Q25	Reaction E3 Character 2 Elephant (girl) **Literal**	Fully Acceptable: acceptable emotion e.g., happy, glad, good, relieved, feels better	2
Q26	Explanation E3 Character 2 Elephant (girl) **Inferential**	Fully Acceptable: acceptable reason given in Q26 e.g., because Giraffe has plane back because lady elephant got it for Giraffe Giraffe is not mad at her because she thought it was gonna sink wasn't gonna be gone forever Giraffe is happy (give credit if mislabels plane - e.g., ball) Partially Acceptable: G loved it / liked it / she said sorry / she wanted to play with it too / she liked it / because now they can play with it together Not Acceptable: E grabbed out of Giraffe's hands	2 1 0
		Total **Literal** Score:	/40
		Total **Inferential** Score:	/18

Additional Scoring Conventions

Some responses can be considered acceptable and correct even if they do NOT appear in the above list but they are reasonably related to the previous question.

Examples:

1) **Q4** That she could do it just like he could [Internal Response E1].
Q5 *She did it way too fast* [Attempt E1– this doesn't appear on the list; however, it is an acceptable response when considered in light of the child's response in Q4 and would receive FULL credit].

2) **Q19** The girl coach had a net to get the airplane, throw it in her get it back up [Setting character 4, Initiating Event E3].
Q20 *It's a good plan* [Internal Response E3 – this would only receive Partially Acceptable from the above list but in light of the previous answer it would receive FULL credit].

Set 2 Integrative Inferential Questions: Problem - Resolution

Q1	Problem **Integrative Inferential**	Fully Acceptable: Plane was in water / E threw plane in water Giraffe couldn't get plane / G lost his plane / both want the plane Partially Acceptable: [they're fighting about the plane / plane was broken / if child retells most of the story (2 episodes) and includes the relevant information	2 1
Q2	Resolution **Integrative Inferential**	Fully Acceptable: lady elephant got the plane out (with her net) lady elephant gave plane back to Giraffe lady elephant got a net by the lady with the net the girl lifeguard came to go get it the E that was fixing the problem with the scooping the net out Partially Acceptable: lifeguard / swimming girl / sister elephant - (without mentioning net) / they're so smart / he tried to get it / if child retells most of the story (2 episodes) and includes the relevant information	2 1
		Total Score:	/4

Set 3 Integrative Inferential Questions: Importance Judgements

There are no point designations for responses to Set 3 questions.
The child's responses are matched to the Story Grammar categories and response examples provided for Set 1 responses.

General Examples

Child's Response	Scoring Codes
The swimming girl catched it	Attempt; Episode 3
That the dad tried to reach it	Attempt; Episode 2
A net	Setting; Episode 3
A giraffe	Setting; Character 1; Episode 1
When she threw it in there because if she didn't there wouldn't be no story	Consequence; Episode1

Additional examples

(a) Use a Character 5 designation when a specific character is not given (e.g., 'they')

Child's Response	Scoring Codes
(Um) that they feel happy again	Reaction; Character 5; Episode 3

(b) If a child gives two or more Story Grammar categories, give credit for both

Child's Response	Scoring Codes
About he really liked it when his airplane got out	Reaction; Character 1; Episode 3 and Explanation; Character 1; Episode 3
The safety guard came along and try to get it	Initiating Event; Episode 2 and Attempt; Episode 2
That Mrs elephant got it back for him	Attempt; Episode 3 and Consequence; Episode 3

(c) If the child gives a moral instead of Story Grammar category, assign a code of 'M' for moral.

Child's Response	Scoring Codes
To not run on deck	M
Play with an adult by the pool	M

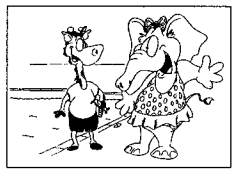
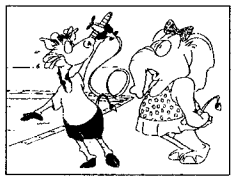
(d) If child's answer in not a moral or a Story Grammar category (exception = I don't know) assign a code of 'NSG' for no Story Grammar category.

Child's Response	Scoring Codes
The giraffe is sinking	NSG
They can't colour on the deck	NSG
And then they went home	NSG

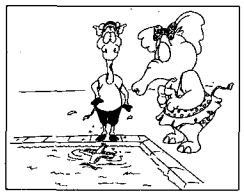
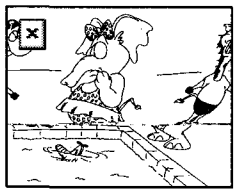
(e) If child's answer is 'I don't know' or a 'non-response' assign a code of 'DK' for don't know

Child's Response	**Scoring Codes**
I just don't know	DK
I can't tell you	DK

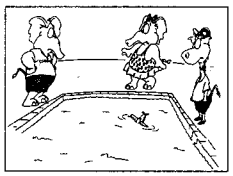
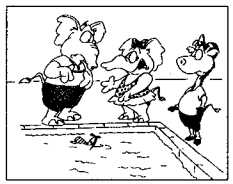
Appendix F: Typical Response Patterns Across the Four Age Groups for the Three Questioning Tasks

Picture	Question	4 Year Olds	5 Year Olds	6 Year Olds	8 Year Olds
Set 1 Guided Questions – Literal and Inferential					
Episode 1  1.	Q1. Who is in this story? (Setting–Characters 1 & 2 - Literal)	N: *One, two*	F: *Kind of a giraffe was that one and elephant*	F: *There's a giraffe and an elephant*	F: *(Um) Timmy and Veronica I think*
	Q2. Where are the animals? (Setting–Location – Literal)	N: *There and there*	N: *Down at the zoo*	F: *At the pool*	F: *The animals are at the swimming pool*
 2.	Q3. What happens first in the story? (Initiating Event – Literal)	N: *They're happy*	F: *(Ah) the horse is flying his airplane*	F: *Well the boy has an airplane and he plays it and zoom it around*	F: *First they come to the pool (and they pl) and Timmy brings (his plane) his little toy plane and then he starts showing Veronica*
	Q4. What was the elephant thinking? (Internal Response – Inferential)	N: *He was thinking to go in the swimming pool*	F: *He was thinking that whoa that's a cool plane I wanna play with it*	F: *Maybe I could play with it*	F: *Veronica was thinking (like) oooow sweet*

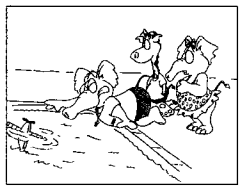
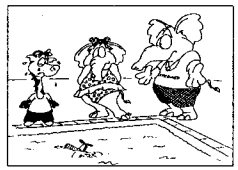
Note: F = Fully acceptable response, P = Partially acceptable response, N = Not acceptable response.

Picture	Question	4 Year Olds	5 Year Olds	6 Year Olds	8 Year Olds
 3.	Q5. What did she do? (Attempt – Literal)	F: *He tooked it away from him*	F: *She grabbed it from him*	F: *She snatched it from the giraffe and he said hey*	F: *Timmy (like) accidentally threw it and Veronica caught it and she said let me tried and so Timmy (let him and th) let her and then (she um) she tried*
 4.	Q6. What happened when she did that? (Consequence – Literal)	F: *He throw it in the water*	F: *She dropped it in the pool and it started to sink*	F: *(Um) it fell in the water*	F: *She accidentally tried it too hard and it went into the pool*
 5.	Q7. How did the giraffe feel? (Reaction Character 1 – Literal)	F: *He feeled angry*	F: *Angry*	F: *Angry*	F: *He felt mad at her*
	Q8. Why did he feel that way? (Explanation for Reaction – Inferential)	F: *'Cause he put it in the water*	F: *Because the elephant threw his airplane in the water*	F: *Because the elephant dropped his favourite toy into the water*	F: *('Cause she I) 'cause she (um) almost broke his plane*

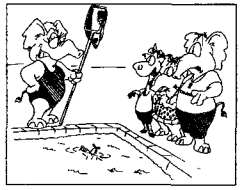
Note: F = Fully acceptable response, P = Partially acceptable response, N = Not acceptable response.

Picture	Question	4 Year Olds	5 Year Olds	6 Year Olds	8 Year Olds
	Q9. How did the elephant feel? (Reaction Character 2 – Literal)	F: *He feeled sad*	F: *(Ah ah) bad*	F: *(Um) sad*	F: *She felt sad for him*
	Q10. Why did she feel that way? (Explanation for Reaction – Inferential)	F: *'Cause he just got that (ai) airplane in the water*	F: *'Cause she threw the airplane in the water*	F: *'Cause she dumped (his thing his air toy) his favourite toy airplane into the water*	F: *Because she felt sorry for him because (she was) it was an accident*
Episode 2  6.	Q11. What happens next? (Setting-Character 3; Initiating Event – Literal)	Setting: N Initiating Event: N *Everybody just got mad but sad*	Setting: F Initiating Event: F *(The) the plane doctor came by*	Setting: F Initiating Event: F *The lifeguard came*	Setting: F Initiating Event: F *Then the lifeguard comes (and he like sees what g) and he asks Timmy and Veronica what's going on*
 7.	Q12. What was the lifeguard thinking? (Internal Response – Inferential)	N: *He think it sunk*	F: *If he could reach in there and get it*	F: *Oh I feel sorry for the giraffe*	F: *He was thinking whoo (what) I better get that plane*

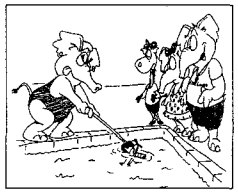
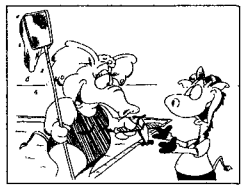
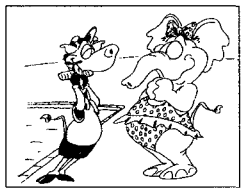
Note: F = Fully acceptable response, P = Partially acceptable response, N = Not acceptable response.

Picture	Question	4 Year Old	5 Year Old	6 Year Old	8 Year Old
 8.	Q13. What did he do? (Attempt – Literal)	F: *He's tryin to reach it but he almost got in the water*	N: *He scooped it right back out*	F: *Tried to reach for it but it was too far*	F: *He tried to reach for it*
 9.	Q14. What happened when he did that? (Consequence – Literal)	F: *He knocked it way down in the water*	F: *Just sunk a little some more looks like (the giraffe ele) the giraffe cried*	F: *He couldn't reach it and the giraffe (got r) he started crying and the elephant felt sad*	F: *But he couldn't and he almost fell in so then he popped back up*
	Q15. How did the giraffe feel? (Reaction Character 1 – Literal)	F: *Sad*	F: *Bad*	F: *Very sad*	F: *Timmy was starting to cry because he was very sad that (he w) he might not be able to see his plane again that's how he was feeling and he was thinking that*
	Q16. Why did he feel that way? (Explanation for Reaction – Inferential)	N: *('Cause) 'cause those guys are sad too*	N: *I don't know*	F: *Because his favourite toy was nobody could get it*	F: {Not asked; answered in last question}

Note: F = Fully acceptable response, P = Partially acceptable response, N = Not acceptable response.

Picture	Question	4 Year Olds	5 Year Olds	6 Year Olds	8 Year Olds
	Q17. How did the lifeguard feel? (Reaction Character 3 – Literal)	N: *Angry*	F: *(Ah) happy*	F: *Very very sad*	F: *He felt sorry for Timmy*
	Q18. Why did he feel that way? (Explanation for Reaction – Inferential)	N: *'Cause (he) he got airplane sick*	F: *'Cause he couldn't get it*	F: *Because he couldn't get the airplane back*	F: *'Cause he saw Timmy crying and (he) feels sorry for him ('cause) 'cause what happened*
Episode 3  10.	Q19. What happens next? (Setting-Character 4; Initiating Event – Literal)	Setting: N Initiating Event: F *(He) he got a net*	Setting: F Initiating Event: F *He called someone else to scoop it right back out*	Setting: F Initiating Event: F *The lifeguard girl came with her little scooper*	Setting: F Initiating Event: F *(The lifeguard's) the lifeguard's (um) wife who wants to swim she (ah) brings her little net and then (she) she said I'll help you*
	Q20. What was the lady elephant thinking? (Internal Response – Inferential)	P: *He was thinking a net would be very good*	F: *(If she) if she should get it with the net*	F: *I can get that with my net*	F: *She would get it back*

Note: F = Fully acceptable response, P = Partially acceptable response, N = Not acceptable response.

Picture	Question	4 Year Olds	5 Year Olds	6 Year Olds	8 Year Olds
 11.	Q21. What did she do? (Attempt – Literal)	F: *He kind of scooped it up*	F: *Scooped it right back out*	F: *(She put) she put it in and she got it*	F: *She scooped it up*
 12.	Q22. What happened when she did that? (Consequence – Literal)	N: *She got it out*	N: *She got his plane back*	N: *She took it out*	F: *Then she gave it back to Timmy*
 13.	Q23. How did the giraffe feel? (Reaction Character 1 – Literal)	F: *Happy*	F: *Happy*	F: *The giraffe was very happy*	F: *Timmy felt really good*
	Q24. Why did he feel that way? (Explanation for Reaction – Inferential)	N: *'Cause*	F: *'Cause the plane was back out*	F: *Because he had his toy airplane back*	F: *'Cause his plane was back*

Note: F = Fully acceptable response, P = Partially acceptable response, N = Not acceptable response.

Picture	Question	4 Year Olds	5 Year Olds	6 Year Olds	8 Year Olds
	Q25. How does the little elephant feel? (Reaction Character 2 – Literal)	F: *Happy too*	F: *Good 'cause the plane was back out*	F: *The elephant felt happy for him*	F: *(She h) she felt good for him*
	Q26. Why did she feel that way? (Explanation for Reaction – Inferential)	N: *'Cause he is*	F: {Question not asked; answered in last question}	F: *Because it wasn't in the water anymore*	F: *Because she didn't want him to be sad*
Set 2 Integrative Inferential Questions – Problem-Resolution					
	Q1. What was the problem in this story?	N: *I (don't) can't tell you*	N: *That (the um) the horse didn't get his airplane until the lady lifeguard came*	F: *That the elephant snatched it and it fell in the water*	F: *It was Veronica (accidentally um put in) was gonna try his plane but she accidentally got it in the pool and the first step was that the lifeguard tried to reach it*
	Q2. How did that problem get fixed in the story?	N: {Question not asked; did not answer last question}	F: *They netted it out*	F: *The girl elephant came and got it for him*	F: *That the lifeguard's wife he came and (he he um she) I mean (she um) she scooped it up*

Note: F = Fully acceptable response, P = Partially acceptable response, N = Not acceptable response.

Set 3 Integrative Inferential Questions – Importance Judgements					
	Question	4 Year Olds	5 Year Olds	6 Year Olds	8 Year Olds
	Q1. What do you think was the most important thing that happened in this story?	*It was in the water* Consequence Episode 1	*Horse got it back* Consequence Episode 3	*That the giraffe got his toy plane back* Consequence Episode 3	*The important thing is about their feelings because (the) the whole story everyone has feeling for (like) the whole time.* {Prompt Clarify} *Well what I think is important one thing is (that when Veronica) when Timmy I knew that he was feeling really sad because (he) it looked like he was crying* Reaction Giraffe Episode 2
	Q2. What do you think was the second most important thing that happened in the story?	*I can't tell you* (Don't Know)	*(Ah) the lady lifeguard got it for him* Attempt Episode 3	*That they both felt happy for each other* Reaction Episode 3	*About the lifeguard was feeling sorry for Timmy when he almost fell in and he tried his hardest to get it* Reaction Lifeguard

Appendix G: Information Letter / Consent Form

UNIVERSITY OF ALBERTA

PARENTAL INFORMATION LETTER
PROJECT TITLE: Narrative norms for Alberta
INVESTIGATORS: Dr. Phyllis Schneider, Associate Professor, University of Alberta,
Denyse Hayward. Ph.D student, Faculty of Rehabilitation Medicine, University of Alberta,

The purpose of this project is to study how children understand and tell stories from pictures. A child's ability to understand and tell stories can predict how well the child will achieve in school later. We want to collect stories from a large number of children so that we can describe how children understand and tell stories at different ages. When we have published this information, clinicians and teachers can use it to figure out when a child is having trouble with language in general.

Each child in the study will be given a commonly used language test, to make sure that children in the study represent a wide range of language skills so the results will be applicable to more children. Then each child will look at six sets of pictures, one set at a time, and will be asked to tell the story that is shown in the pictures. Last the child will be asked questions about each of the six stories. The child will be audiorecorded to help the researchers record the child's stories and score the child's answers to questions.

The study will take place in the child's playschool or daycare. Each child will spend about one hour with the researcher. If this is too long for some children the study will be completed over two visits.

We would also need to know your occupations and ethnic background so that we can make sure that children in the study come from families with a wide range of backgrounds. This will also make the results applicable to more children.

All information collected in the study will be kept completely confidential except when professional codes of ethics and or legislation require reporting. The names of children and families will not appear in any document or report and will not be given to anyone other than the researchers. Transcripts will be stored in a locked filing cabinet, both during the study and after it is done, for at least 7 years. If any further analysis is carried out on the transcripts after this project, approval will again be obtained from an ethics review board. Any information that identifies the children will be destroyed upon the completion of the study.

General results from the study will be shared with parents who request it on the consent form. Although participating children will not benefit directly from this study, we believe that the results will be very useful for assessing children's language development in the future. If during the study a speech or language difficulty is suspected, the researchers will contact the family to provide them with information concerning speech and language programs available in the Capital Health Region.

We will explain the study to each child whose parents give permission. The study will only proceed if the child agrees to participate. Either the child or the parent can withdraw from the study at any time without any negative consequences.

If you have any questions about the study, please call the researchers at the above numbers. If you would like to talk to someone who is not involved in the study, you may contact Dr. Paul Hagler at 492-9674. Please return one signed copy of this letter to the school if you give your consent.

Thank you for considering this request.

Phyllis Schneider Denyse Hayward

Department of Speech Pathology and Audiology

PARENTAL CONSENT FORM

PROJECT TITLE: Narrative norms for Alberta
INVESTIGATORS: Dr. Phyllis Schneider, Associate Professor, University of Alberta,
Denyse Hayward, Ph.D student, Faculty of Rehabilitation Medicine, University of Alberta,

I give my consent for my child to participate in the project described on the attached information sheet. I give Phyllis Schneider, Denyse Hayward and their research assistants permission to talk to and record my child as described above. I understand that my confidentiality and my child's confidentiality will be protected, and that my child may withdraw from the study at any time without any negative consequences. I understand that any information that identifies my child will be destroyed at the completion of the study. Results from this study will be used in presentations and publications for researchers, clinicians and educators, and as part of a research thesis. I have received a copy of this form.

_____ _____ _____
Signature of parent/guardian Relationship to child Date

Please list both parents' usual occupations (even if currently unemployed). Be as specific as you can (eg., "manager of printing company" rather than just "manager"; "self-employed in _____").

Father's occupation: _____

Mother's occupation: _____

_____ _____
Child's full name (please print) Child's birth date (day - month - year)

_____
Child's Signature (if the child can write)

Name of child's school _____

_____I would like a copy of the final research report when it becomes available. My address is:

_____

_____

_____

Ethnic Background Information

Please mark the ethnic group(s) to which your child belongs.

_____ Aboriginal

_____ Chinese

_____ South Asian

_____ Black

_____ Arab and West Asian

_____ Filipino

_____ Southeast Asian

_____ Latin American

_____ Japanese

_____ Korean

_____ All Others

as per Statistics Canada Census categories

Appendix H: Instructions and Allowed Prompts for the Test Story – Story Narration Task

Do not ask the child questions or give any prompts other than the ones described below. You can give neutral responses as the child tells the story such as "uh-huh," "oh," "okay."

Instructions:

> Now I have some more picture stories. First I'll show you all the pictures. Then we'll go back to the beginning of the story, and then I want you to look at the pictures and tell me the story that you see in the pictures. I won't be able to see the pictures so you need to tell me the story really well so I can understand it. Okay?

If the child has trouble getting started:

> You say: How would you start your story? [pause]

If that doesn't work:

> You say: Would you start "one day", or "once upon a time?"

If child says "one day/once upon a time" and stops:

> You say: "oh", [repeat what child said] [pause]

If child still doesn't respond or says "don't know":

> You say: What happens in the story?

If child says nothing or "don't know":

> You say: Look at the pictures – what do you think is happening in the story?

If child still can't get started or go on:

> You say: Let's try the next page.

TERMINATE TESTING IF THE CHILD CANNOT GET STARTED AFTER TWO PAGES OF THE TEST STORY.

If the child mumbles or says something you don't understand:

You say: I didn't hear that – could you repeat that? [You can also remind the child after s/he repeats to talk in a clear voice so that the microphone can hear the story]

If child wants you to label something in the picture:

You say: What do YOU think?

If child says nothing or "don't know":

You say: This is your story – you get to decide [pause]

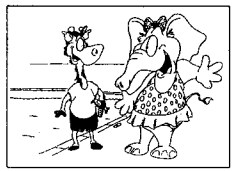
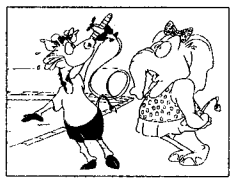
If the child is still stuck on a label:

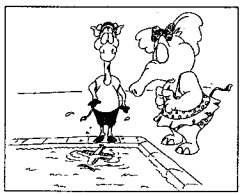
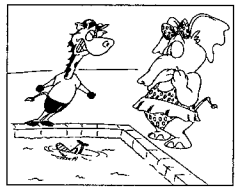
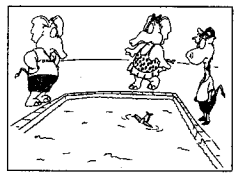
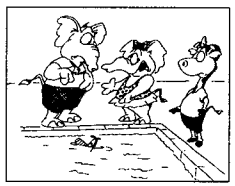
You say: Let's not worry about that – tell me the rest of your story.

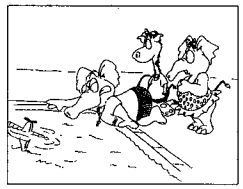
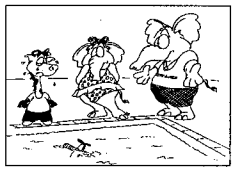
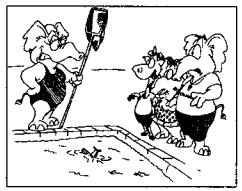
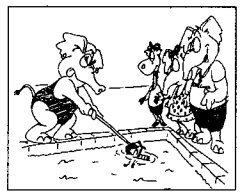
Any time the child gets stuck in the story:

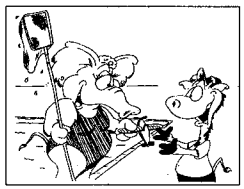
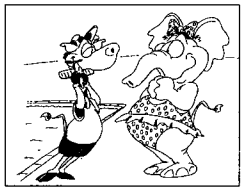
Look at the child expectantly and wait for the child to continue. Be sure and give the child time to respond. Don't yield to the pressure to fill in the silence. Only give prompts when it appears that the child is not going to say anything. A good strategy is to repeat the last thing the child said rather than giving more explicit help.

Appendix I: Typical Narrations for the Three-Episode Picture Story Across the Four Age Groups

Picture	4 Year Olds	5 Year Olds	6 Year Olds	8 Year Olds
Episode 1  1.	*The giraffe talk with xx giraffe.*	*(The cow and the moose they) the cow and the elephant they want to go in the water.*	*The giraffe and the elephant got together. And the giraffe got a airplane.*	*Once there were two friends. And they were by the swimming pool. And the giraffe (um) had a (air) toy airplane. And (he wanted) he said do you want to play with me?*
 2.	*The giraffe play with a plane.*	*Then they broke their airplane.*	*The giraffe is putting it up high and pretending it's going.*	*And he was playing with his airplane and made it go loop and then up.*
 3.	*Elephant (l) get the plane. And he get it. (He he) he hold it.*	*And then the elephant wanted to see it.*	*Then the elephant takes it. And she tries to do it too.*	*And then the elephant # got really dizzy ## and grabbed it away from him. And (he) the giraffe was (ver) very nervous.*

Picture	4 Year Olds	5 Year Olds	6 Year Olds	8 Year Olds
 4.	*The elephant dropped the plane in the water.*	*(And then he throw it into the) and then he put it in the water.*	*But the elephant throwed it in the water.*	*And then by accident # the elephant dropped it into the # pool.*
 5.	*(The p the the the) that giraffe xx the elephant.*	*(And then they and then it) and then the cow was so mad at (that that that) that elephant.*	*The giraffe gets angry.*	*And (the) the (um) giraffe got very mad at her.*
Episode 2  6.	*(That hm m that uh uh) that giraffe look at that plane and (look) swims in the pool.*	*And then the other elephant came.*	*Then there's a lifeguard coming along.*	*And the lifeguard seen that (the the thing) the airplane was in the water.*
 7.	*(Uh uh) that elephant look at that elephant.*	*(And then he said) and then the other elephant talked to the cow.*	*The elephant is explaining what happened.*	*And the elephant told (her) him that she needed his help to get the airplane.*

Picture	4 Year Old	5 Year Old	6 Year Old	8 Year Old
 8.	*(That eleph) that elephant look at that plane in the water.*	*(And then it) and then it was trying to reach (that the) the airplane.*	*The lifeguard tries to get it. But she can't get it.*	*But it was too far for him.*
 9.	*(And and that) and that giraffe cry!*	*(And then then it got soaked) then he got soaked.*	*(So) so the giraffe starts crying.*	*So he couldn't get it. And he didn't know what to do. So he told them to find somebody else.*
Episode 3  10.	*(And tha) and there's three elephants. (Uh) that elephant going to pick the plane out of the pool.*	*And then he got a net.*	*(Then comes) and then comes a lady with a net.*	*And then (the) a woman with a net came over and said she would get it.*
 11.	*He get it out.*	*And then he grabbed it out of the water.*	*Then she gets it out of the water.*	*And she put the net in the water.*

Picture	4 Year Olds	5 Year Olds	6 Year Olds	8 Year Olds
 12.	*He got it.*	*And then he gave it to the cow.*	*Then she gives it to the giraffe.*	*And she got the airplane.*
 13.	*He got it (for) for (the) the giraffe.* *That's the end.*	*(And and then he) and then he was so proud.*	*Now the giraffe is hugging the airplane.*	*(And he was) and the (zebra um) giraffe was very happy.* *The end.*

Appendix J: Instructions and Allowable Prompts for the Training Story - Story Narration Task

The purpose of the training story is to familiarize the child with the storytelling format and to provide assistance in getting started if necessary. Note that more explicit prompts are permitted with the training story than with the test stories. You can use the test story prompts with the training story, but do not use the training story prompts with the test stories. Be very careful to use the correct prompts with the test stories.

Instructions to child:

> I have some pictures that tell a story. First I'll show you all the pictures and we'll go back to the beginning of the story, and then I want you to look at the pictures and tell me the story that you see in the pictures. I won't be able to see the pictures so you need to tell me the story really well so I can understand it. Okay?

If the child tells "a story": Proceed to the first test story.

If the child is inexplicit (e.g., He's going in there):

> You say: Remember I can't see the pictures. Can you start again? (ONLY for the training story – do not use for the test stories)

If the child labels items in the picture rather than telling a story:
> You say: You've told me what's in the picture - now can you tell me a **story** about the picture?

If the child again labels or says nothing:

> You say: How would you start your story?

If the child has trouble getting started (e.g., says nothing, says "I don't know", continues to label)**:**

> You say: Would you start "One day," or "Once upon a time"?

If the child repeats "one day" or "once upon a time" and stops:

> You say: That's right, [repeat what child said and pause]

If the child still has difficulty:

Repeat what the child started with and add: ...there was a boy who... [pause]

If the child still has difficulty:

Complete the sentence for the child: One day there was a boy who went shopping.
[Note: this prompt is only for the practice story – don't use it with the test stories]

If the child has trouble with later pages:

You say: Then what happens in the story?

Appendix K: General Testing Instructions for the Questioning Tasks

Instructions:

> I'm going to ask you some questions about this story that you told. First, I'll show you all the pictures again so you can remember the story and then I'll go back to the beginning and ask you my questions. Remember you don't have to tell me the story, just answer my questions.

Set 1 and Set 2 questions Allowable Prompts:

Prompts are acceptable IF a child's answer to the question is unclear or not understandable.

Examples:

Examiner: *Where are the animals?*
Child: *Here.*

PROMPT: *What do you mean 'here'?*

Examiner: Where are the animals?
Child: Points to the animals.

PROMPT: *Can you tell me with your words?*

Set 1 Questions are displayed in Table 8.

Set 2 Questions – Problem – Resolution

> Close the book and ask the next two sets of questions.

Allowable Prompt:
If a child asks to see the pictures they may do so OR if you are uncertain as to which part of the story the child is referring to, you may ask them to show you in the pictures.

Set 2 Questions are displayed in Table 8.

Set 3 Questions Allowable Prompts:

Instructions:

> Now these next two questions I'm interested in what you thought of the story.

Examiner: *What do you think was the most important thing that happened in this story?*
Child: (gives moral of story)

PROMPT (Moral):
Yes that's what they learned from the story. Can you also tell me something you think was important that happened in the story?

Child: *I don't know.* (or repeats moral)

PROMPT (Pictures):
Think about all the pictures that helped tell the story. What was the most important thing that happened?
(Child can look at the pictures if they need to.)

Child: *He was sad.*

PROMPT (Clarify):
Which part of the story do you mean?

Child: *He got his plane back, and he was happy.*

PROMPT (Two parts of story):
You've told me two things, which was the most important (child answer part A) *or* (child answer part B)?
(If they still give both story parts score both).

Examiner: *What do you think was the second most important thing that happened in the story?*
Child: (repeats answer given in response to Question 1)

PROMPT (Repeat):
That's the same as the answer you just gave me. Can you think of something else that was important in the story?
(If still gives the same answer accept).

You can use any combination of these prompts in an attempt to obtain a response from a child.

Appendix L: Means and Confidence Interval Data for Literal Questions Types Across the 4 Age groups

	Age							
Question types	4		5		6		8	
	mean	(95%CI)	mean	(95%CI)	mean	(95%CI)	mean	(95%CI)
Settings	74	(69 -78)	89	(84 -94)	96	(91 -100)	99	(95 -100)
Initiating Events	69	(65 -74)	92	(87 -96)	98	(93 -100)	99	(94 -100)
Attempts	88	(84 -91)	93	(89 -97)	99	(95 -100)	99	(95 -100)
Consequences	67	(61 -73)	74	(68 -80)	82	(76 -88)	88	(81 -94)
Reactions	87	(84 -90)	93	(89 -96)	93	(90 -96)	95	(92 -98)

Note. CI = Confidence Interval, means and confidence interval data are expressed as percentages.

Appendix M: Percentage of Children Within Each Age Group Correctly Answering Each of the Literal Questions

	Age			
Question	4	5	6	8
Setting - characters				
Episode 1				
Giraffe	76[a]	90	98	100
Girl Elephant	82	88	90	100
Episode 2				
Lifeguard	86	98	98	100
Episode 3				
Lady Elephant	66[a]	94	96	100
Setting – Location				
Episode 1	54[a]	72[a]	98	98
Initiating Event				
Episode 1	62[a]	82	94	98
Episode 2	70[a]	94	100	100
Episode 3	76[a]	100	100	100
Attempt				
Episode 1	88	96	100	98
Episode 2	84	84	98	100
Episode 3	92	100	100	100
Consequence				
Episode 1	84	92	98	100
Episode 2	68[a]	88	74[a]	90
Episode 3	48[a]	40[a]	68[a]	74[a]
Reaction				
Episode 1				
Giraffe	94	96	100	100
Girl Elephant	90	98	92	94
Episode 2				
Giraffe	96	100	100	98
Lifeguard	52[a]	74[a]	78[a]	82
Episode 3				
Giraffe	100	98	96	100
Girl Elephant	94	92	96	98

Note. [a] = question answered by less than 80% of children in the age group.

Appendix N: Means and Confidence Interval Data for Inferential Questions Types Across the 4 Age groups

	Age							
Question types	4		5		6		8	
	mean	(95%CI)	mean	(95%CI)	mean	(95%CI)	mean	(95%CI)
IRs	66	(60 -72)	85	(78 -91)	88	(81 -94)	91	(85 -97)
Explanations	65	(60 -71)	80	(74 -85)	90	(84 -96)	90	(84 -96)

Note. CI = Confidence Interval, IRs = Internal Responses, means and confidence interval data are expressed as percentages

Appendix O: Percentage of Children Across Age Groups Correctly Answering Each of the Inferential Questions

	Age			
Question	4	5	6	8
Internal Response				
Episode 1	56[a]	86	90	96
Episode 2	56[a]	80	86	82
Episode 3	86	88	88	98
Explanation				
Episode 1				
Giraffe	80	86	98	100
Girl Elephant	68[a]	82	92	92
Episode 2				
Giraffe	36[a]	86[a]	96[a]	100[a]
Lifeguard	46[a]	70[a]	80	68[a]
Episode 3				
Giraffe	76[a]	92	100	90
Girl Elephant	66[a]	78[a]	92	84

Note. [a] question answered correctly by less than 80% of children in the age group.

Appendix P: Percentage of Children Correctly Answering Questions (Literal and Inferential) and Percentage of Children Including Equivalent Information in Story Narrations Across Age Groups

	Age and Task							
	4		5		6		8	
Category	Q	P	Q	P	Q	P	Q	P
Setting - characters								
Episode 1								
Giraffe	76[a]	62[a]	90	88	98	86	100	100
Girl Elephant	82	68[a]	88	80	90	82	100	100
Episode 2								
Lifeguard	86	60[a]	98	90	98	92	100	100
Episode 3								
Lady Elephant	66[a]	46[a]	94	70[a]	96	84	100	98
Setting – Location	54[a]	68[ab]	72[a]	76[ab]	98	74[a]	98	86
Initiating Event								
Episode 1	62[a]	56[a]	82	60[a]	94	84	98	90
Episode 2	70[a]	36[a]	94	64[a]	100	78[a]	100	94
Episode 3	76a	48[a]	100	70[a]	100	92	100	98
Internal Response								
Episode 1	56[a]	24[a]	86	28[a]	90	26[a]	96	40[a]
Episode 2	56[a]	2[a]	80	2[a]	86	0[a]	80	2[a]
Episode 3	86	2[a]	88	4[a]	88	2[a]	98	4[a]
Attempt								
Episode 1	88	70[a]	96	80	100	88	98	100
Episode 2	84	68[a]	84	88[b]	98	94	100	94
Episode 3	92	92	100	100	100	96	100	100
Consequence								
Episode 1	84	92[b]	92	98	98	100	100	100
Episode 2	68[a]	66[a]	88	62[a]	74[a]	74[a]	90	92
Episode 3	48[a]	58[ab]	40[a]	78[ab]	68[a]	86	74[a]	94
Reaction								
Episode 1								
Giraffe	94	60[a]	96	80	100	98	100	94
Girl Elephant	90	12[a]	98	12[a]	92	18[a]	94	26[a]
Episode 2								
Giraffe	96	30[a]	100	44[a]	100	60[a]	98	78[a]
Lifeguard	52[a]	4[a]	74[a]	8[a]	78[a]	8[a]	82	24[a]
Episode 3								
Giraffe	100	52[a]	98	74[a]	96	84	100	94
Girl Elephant	94	10[a]	92	8[a]	96	14[a]	98	38[a]

Note. Q = Questioning task, P = Production task.

[a] question answered or included in story productions by less than 80% of children in the age group.

[b] information included in story production more often than answered in questioning task.

Appendix Q: Means and Confidence Interval Data for Problem and Resolution Questions Types Across the 4 Age groups

	Age							
	4		5		6		8	
Question	mean	(95%CI)	mean	(95%CI)	mean	(95%CI)	mean	(95%CI)
Problem	31	(21 -40)	51	(41 -61)	88	(78 -98)	92	(82 -100)
Resolution	43	(35 -52)	71	(63 -80)	84	(75 -93)	90	(81 - 98)

Note. CI = Confidence Interval, means and confidence interval data are expressed as percentages.