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THE EFFECT OF INDUCED MOOD ON 3- AND 6-YEAR-OLD  
CHILDREN'S MEMORY FOR AFFECTIVE NARRATIVE CONTENT

by

Debby A. Boyes

A thesis  
presented to the University of Manitoba  
in fulfillment of the  
thesis requirement for the degree of  
Master of Arts  
in  
Psychology

Winnipeg, Manitoba

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DEBBY A. BOYES

A thesis submitted to the Faculty of Graduate Studies of  
the University of Manitoba in partial fulfillment of the requirements  
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MASTER OF ARTS

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## ABSTRACT

The present study was concerned with the effect of induced mood on memory for affective narrative content in 3- and 6-year-old children. The aim was to add substantive information on the topic by extending the findings of the only published work on mood and memory for affective narrative content in 8-year-old children by Potts, Morse, Felleman, and Masters (1986). There were 96 subjects (48 boys, 48 girls). One half of the subjects were 3-year-olds, and one half were 6-year-olds. Two thirds of each age group participated in a standard happy or sad mood-induction procedure, and the other third constituted a no-induction control group. Three mood-manipulation assessments were made: (a) children's self-ratings of their own mood state, made immediately following mood induction; (b) adult judge's ratings of the children's self-ratings; and (c) adult judges' ratings of the children's generated thoughts. Children heard six positive, six negative, and six neutral events evenly distributed throughout a 3-min taped children's story. Free-recall and cued-recall memory were measured immediately afterwards in all children, while recognition memory was assessed only in 6-year-old children. The mood-induction procedures were highly effective, as

judged by adults on measures of appropriateness and intensity of children's happy and sad thoughts. Self-rating of mood assessments demonstrated the following: the happy mood-induction procedure was more effective than the sad-mood induction procedure. For both moods, the inductions were more effective in boys than girls. In older children, the effectiveness of the happy-mood induction was high, while the effectiveness of the sad-mood induction was low. In younger children, the effectiveness of the happy-mood induction was moderately high, while that for the sad-mood induction was moderate. In younger children, mood inductions were highly effective in the presence of a male, and low in the presence of a female. In older children, mood inductions were moderately effective in the presence of a male or female. For free-recall memory, older children recalled more than younger children. Children recalled more from a story with a positive initial event than one containing a negative initial event. Happy older children recalled more than sad-mood and no-induction older children. Younger children's memory was not affected by mood. Happy older children who heard a story with a positive initial event recalled more than all other children. Younger children's memory did not vary with the affect of the initial story event. Happy children's recall of neutral story events was high, while no-induction children's recall of negative story events was moderately high. Other

children's recall for affective narrative content was moderate, and did not vary with mood and type of affective content. Several complex and uninterpretable higher-order interactions among variables were found. For cued-recall memory, older children recalled more than younger children. Children's recall for affective story content increased across positive, negative, and neutral events. Older children recalled more in the presence of a female than a male, while younger children's memory was unaffected by sex of experimenter. Older children recalled more negative and neutral events than positive events. Younger children recalled more negative than neutral and positive events. Several complex and uninterpretable higher-order interactions among variables were found. For recognition memory, children recognized more negative and neutral events than positive events. Children recognized more events from a story with a positive initial event than one containing a negative initial event. Children who heard a story with a negative initial event in the presence of a male recognized less events than all other children. For recognition of distractor items, sad-mood children recognized more distractors than happy-mood and no-induction children. Children recognized more distractors from a story with a negative initial event than one containing a positive initial event. Several higher-order interactions among variables were found. Some effects corroborated the

predictions based on the existing literature, and some contradicted them. Discrepancies were discussed with reference to the methodological issues in mood and memory research with young children. It was concluded that memory for affective narrative content was not reliably related to induced mood.

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## INTRODUCTION

Naturally-occurring moods have been acknowledged to be important factors in many domains of human behaviour, such as broad personality traits (Costa & McCrae, 1980; Tellegen, 1984; Warr, Barter, & Brownridge, 1983; Watson & Clark, 1984), dimensions of temperament (Buss & Plomin, 1975; Hubert, Wachs, Peters-Martin, & Gandour, 1982; Rothbart & Derryberry, 1981; Thomas & Chess, 1977), subjective well-being (Deiner, 1984; Schwartz & Clore, 1983), dysfunctional behaviours (Beck 1967; McNair & Lorr, 1964), and physiological events (Marcus, Maccoby, Jacklin, & Doerling, 1984; Tanner, 1972). A number of psychological instruments have been designed to measure mood (e.g., The Profile of Mood States, POMS, McNair, Lorr, & Droppleman, 1971; Quality of Mood Scale, Thomas, Chess, Birch, Hertzig, & Korn, 1963). Some scales have quantified mood by employing subscales (e.g., Temperament Assessment Battery, Martin, 1984). Several psychologists have incorporated mood into their theories (e.g., Abelson, Kinder, Peters, & Fiske, 1982; Fiske, 1981; Higgins, Kuiper, & Olsen, 1981; Watson & Tellegen, 1985; Wyer & Carlston, 1979).

Historically, naturally-occurring moods have played an integral role in some personality and learning theories

(e.g., Eysenck, 1969; Freud, 1952; Hebb, 1955; Piaget, 1981; Yerkes & Dodson, 1908). For example, emotions always have been known to influence performance on various tasks, with the intensity of emotional arousal influencing performance in an inverted U-shaped fashion (the Yerkes-Dodson law, Yerkes & Dodson, 1908). For Freud (1936), one hypothesized type of affect (anxiety) was responsible for triggering cognitive processes (defense mechanisms) whose function was to keep other affects that are associated with pain from conscious awareness. Piaget (1981) has viewed affect as important in determining the tendency to approach or avoid situations, and thus in determining the amount of intellectual effort expended and the rate of acquisition of knowledge obtained in different domains.

Although naturally-occurring mood has been assumed to be of theoretical importance, the most recent research efforts on the effects of mood on a variety of behaviours and cognitions have focused on experimentally-induced mood states, rather than naturally-occurring mood states. The development of laboratory techniques for inducing mood states has contributed to the rapid growth of research on the effects of mood on adults' and children's behaviour.

For research with adults, the techniques for inducing mood states have included hypnotic suggestion (e.g., Bower, Gilligan, & Montiero, 1981), having subjects generate thoughts of past affective experiences (e.g., Wright &

Mischel, 1982), manipulations of task performance that result in success or failure experiences (e.g., Forgas & Bower, 1987), giving an unsolicited gift (e.g., Isen, 1970), reading affectively-toned self-referent statements (e.g., Velten, 1968), listening to mood-music (e.g., Clark & Teasdale, 1985), and posturing appropriate to a mood (e.g., Laird, Wagener, Halal, & Szegda, 1982).

In research with children, techniques for inducing mood states have included having children generate thoughts of past affective experiences (e.g., Masters, Barden, & Ford, 1979), and having children listen to affectively-toned stories (Hayes, Scott, Chemelski, & Johnson, 1987). Some of the procedures used in child studies have combined a number of mood-inducing techniques, including having children listen to affectively-toned stories, illustrated by affectively-valenced pictures and modeled by the appropriate affect of an experimenter (Bartlett & Santrock, 1979). Other child studies have used mood-inducing techniques in a repetitive procedure. Children have been asked to generate thoughts of past affective experiences prompted by the presentation of affectively-toned stories and pictures. Subsequent to the initial mood induction, children have been presented with additional affectively-toned stories and pictures (Duncan, Todd, Perlmutter, & Masters, 1985).

Most of the recent research using mood-induction techniques has focused on the role that mood states play in

influencing social behaviours and memory performance. Induced-mood states have exerted influences over a variety of social behaviours, such as aggression (e.g., Berkowitz & Turner, 1974; Harris & Siebel, 1975), altruism (e.g., Cialdini & Kendrick, 1976; Isen, Clark, & Schwartz, 1976; Isen, Horn, & Rosenhan, 1973; Moore, Underwood, & Rosenhan, 1973), focus of attention (e.g., Rosenhan, Salovey, & Hargis, 1981; Thompson, Cowan, & Rosenhan, 1980), person-perception judgements (e.g., Forgas & Bower, 1987; Gouax, 1971), self-gratification (e.g., Mischel, Coates, & Raskoff, 1968; Rosenhan, Underwood, & Moore, 1974), and sociability (e.g., Batson, Coke, Chard, Smith, & Taliaferro, 1979; Gouax & Gouax, 1971; Mehrabian & Russell, 1974).

The general conclusion that can be drawn from the body of literature on social behaviours, for both children and adults, is that positive mood has been associated with increased benevolence to self and others, increased sociability and attention, and decreased aggression.

For example, Moore et al. (1973) studied the effect of induced-mood states on children's prosocial behaviour, specifically, altruism. Second- and third-grade children were asked to focus on past events that had made them happy or sad. Children assigned to a control condition spent the same amount of time doing nothing or counting slowly while the experimenter listened. Immediately afterward, all children were given an opportunity to donate some of the 25

pennies that they had received for participating in the experiment to other children. The experimenter emphasized to the children that donating was entirely voluntary. The children were then left alone and allowed to make a donation. Children who had focused on happy thoughts gave more pennies to other children than did children in the control or sad conditions. Children who had focused on an unhappy event contributed less pennies to other children than the control subjects.

Mehrabian and Russell (1974) studied the effect of induced moods on sociability in adults by exposing subjects to slide-presented scenes that had been previously rated for their affective consequences (pleasurable, unpleasurable). They found that subjects had a greater desire to affiliate with other people when they were watching the pleasurable than the unpleasurable slides. These tendencies were accentuated as the pleasurableness of the slides increased.

Generally, induced negative moods, for both children and adults, have had the opposite effect of positive moods on behaviour; that is, negative moods have decreased benevolence, sociability, and attention, and increased aggression. However, negative moods sometimes have produced the same kinds of behaviour that have been produced by positive moods. For example, Cialdini and Kendrick (1976), in a replication of the procedures used by Moore et al. (1973) across three different age levels (6-8, 10-12,

15-18), found that negative mood increased the rates of donation by older subjects as compared to younger subjects and controls. The authors interpreted the results as support for the idea that as children mature, they increasingly internalize social norms regarding the desirability of exhibiting prosocial behaviour.

However, in studies that have used adult subjects, lower rates of donation under conditions of negative affect have been found. As well, some studies have demonstrated that negative moods have appeared to have no effect on social behaviours (e.g., Isen, 1970; Mischel et al., 1968). So, while the general results have been fairly consistent regarding the facilitative effect of positive moods on social behaviours, the role of negative moods has been less certain in some studies.

Within the realm of learning and memory, there has been growing evidence that certain mood states affect memory performance (see Blaney, 1986 and Isen, 1984, for reviews; Gilligan & Bower, 1984). Generally, in the mood and memory studies, positive moods have been associated with enhanced recall of positive materials, while the effects of negative moods on recall have been mixed. Sometimes negative moods have had no effect on subjects' recall (e.g., Bartlett, Burleson, & Santrock, 1982; Isen, Shalcker, Clark, & Karp, 1978). Sometimes negative moods have increased subjects' recall of negative materials (e.g., Bower, 1981). Sometimes



negative moods have increased subjects' recall of negative materials, but to a lesser extent than positive mood (e.g., Nasby & Yando, 1982; Teasdale & Fogarty, 1979).

Although the general results of mood and memory studies have been consistent with the findings of the mood and social behaviour studies, such that positive moods have consistently facilitated recall of materials, and negative moods may or may not have facilitated recall of materials, the search for a mood-memory relationship in the literature has been much more complex than the search for a mood-social behaviour relationship. Specifically, mood has been demonstrated to affect memory in particular patterns. The patterns of effect of mood on memory have included state-dependent learning, mood-congruent learning, and facilitating effect of positive moods on general performance.

Examination of the findings of the studies that have investigated these patterns of mood influences on memory have yielded mixed support for the effect of mood on adults' memory, and weak support for the effect of mood on children's memory. For example, mood-congruent learning has been the best documented mood effect finding in the adult studies. However, a mood-congruence effect on children's memory has been reported in only one child study (Nasby & Yando, 1982).

Although there have been very few child studies that have investigated the influence of mood on children's memory (Bartlett et al., 1982; Bartlett & Santrock, 1979; Duncan et al., 1985; Nasby & Yando, 1982; Potts, Morse, Felleman, & Masters, 1986), the question may be asked whether mood reliably influences children's memory. Therefore, to come to some consensus on this question, it is useful to examine closely the child studies of mood and memory, within the context of the three patterns of mood effects on memory: state dependence, mood congruence, and facilitating effect of positive moods. Organization of a review of the child studies in this manner makes it possible to compare the findings of the child studies to the findings of the adult studies. It is important to note that some of the findings of the effects of mood on memory have been corroborated in adult clinical populations (e.g., Lloyd & Lishman, 1975). However, as there are no studies of the effects of naturally-occurring mood on memory in children, any discussion of the effects of mood on adult subjects' memory is limited to the findings of studies that have used mood-inducing techniques. Before proceeding with a review of the findings in the mood and memory literature with children, it is necessary to engage in a preliminary discussion of the conceptualization of mood, as it has evolved in the context of the experimentally-induced mood literature. Following this discussion, it is useful briefly

to review the contemporary theoretical work on mood and memory.

## MOOD

The concept of mood has not been separated from emotion or affect by some theorists (e.g., Bower, 1981), whereas others have identified mood as an affective phenomenon differing qualitatively from emotion (e.g., Ekman, 1984; Isen, 1984; Simon, 1982). As is the case with research on human emotions (see Mandler, 1984), there is no actual definition of mood, but rather, there is an agreement on certain characteristics or elements of mood that set it apart from emotions.

In her review of affect and cognition theory and research, Isen (1984) has suggested that, although the term used to represent mood need not be of concern, she prefers the term 'feeling'. "'Feelings', or 'feeling state', which might also be called 'moods', refers to pervasive, global, generalized affective components of states that influence seemingly non-affect-related events" (p.185).

Simon (1982) has stated that "arousal of the autonomic and endocrine systems can occur at a more diffuse and subtle level [and] when the state is not acute and interruptive, the terms 'moods' and 'feeling' will often be applied instead of 'emotion'. Typical examples are sadness and happiness" (p.334). Further, Simon has elucidated his

personal taxonomy for the terms, preferring to "employ affect as a generic term, emotion to refer to affect that interrupts and redirects attention, mood to refer to affect that provides context for ongoing thought processes without noticeably interrupting them, and valuation to refer to association of cognitive labels attributing a positive or negative valence to objects or events" (p. 336).

Generally, there is a broad consensus that moods are a component of affect, functionally distinguishable from emotions, wherein the nonspecificity or pervasiveness of the consequences of moods sets it apart from emotions. Emotions are specific and affect-goal directed in their effects. That is, emotions focus on the emotion itself. Moods are nonspecific or pervasive, and non-affect-goal directed in their effects. That is, moods focus less on the emotion. Isen (1984) contrasts emotions and moods in the following way: the emotion of anger usually has a particular referent, is directed at a particular object, and has sets of behaviours associated with it. Consequently, for example, the emotion of anger interrupts ongoing thoughts and behaviours, changing the activity of the time as well as the context of the activity. Meanwhile, the mood of irritability may accompany the anger, but it has neither specific referents or targets, nor specific behaviours associated with it. It is more global in its effects, such that one feels generally irritated, ready to be contrary and

confronting to all; yet, there may be no such observable behaviour. Consequently, the mood of irritability redirects our ongoing thoughts and behaviours, without noticeably changing our basic activities nor the context of the activities themselves.

In addition, there is some agreement that moods are cognitive as well as affective. That is, in many cases the mood of irritability is induced without any emotional event. Most of us are too familiar with mornings when we 'got up on the wrong side of the bed' or days when things 'don't go our way', resulting in a mood of irritability throughout seemingly everything we endeavour to accomplish. Consequently, our everyday moods also seem to redirect our ongoing thoughts and behaviours.

For purposes of the present study, the functional distinction between moods and emotions has been used, such that moods have been identified as global affect (e.g., irritability) rather than discrete affect (e.g., anger). Furthermore, within the present study global affect has been dimensionalized into positive and negative affect (e.g., pleasant, unpleasant). Moods, here, have been conceptualized in this restrictive way for several reasons. First, a two-dimensional system of emotion accounts for much of the variance in affect and has been well replicated (e.g., Russell, 1978, 1979; Russell & Ridgeway, 1983; Schlosberg, 1954; Watson, Clark, & Tellegen, 1984; Watson &

Tellegen, 1985; Zevon & Tellegen, 1982). Studies of subjects' concepts of emotion (as indexed by such words as happiness, fear, sadness) have demonstrated that for adults and for children emotions are interrelated in a highly systematic fashion, revealing either underlying bipolar dimensions interpreted as pleasant-unpleasant, as well as arousal-sleepiness (see Russell, 1978, 1979; Russell & Ridgeway, 1983); or positive and negative affect as the two dimensions in a 45° rotation of the former system (see Watson & Tellegen, 1985).

A second reason for focusing on positive and negative moods was to simplify the analysis of the variation in the experiencing of different mood states. One of the central interests of the study was the change in the individual's habituated or normal feeling tone (Kagan, 1978). If independent concepts (e.g., happy and surprised) or interchangeable concepts (e.g., happy and glad) had been studied, the procedures and measurements of studying them would not have been as satisfying as compared to a study of opposite moods (e.g., happy and sad). Specifically, of all the positive facial expressions preschoolers and adults have been asked to demonstrate, happy facial expressions have been posed most easily, even in the preschool years, while the posing of all negative facial expressions has been difficult for both children and adults, with the possible exception of sadness (Lewis, Sullivan, & Nasen, 1987).

The third reason for studying positive and negative moods was based on the observation that most of the previous research on the influence of mood on non-affect-related thought and behaviour has focused on the effects of happy and sad moods. In adult studies, these mood states have been identified as elation and depression, whereas in child studies, mood states have been identified as happy and sad. Finally, the fourth reason has arisen from the qualitative observation that the subjects of interest to this study, that is children, have acquired meanings of simple positive and negative moods, as demonstrated by their use of the verbal labels in correspondence with a given expression (Lewis, Michalson, Goetz, & Jaskir, 1985, cited in Lewis et al., 1987).



## THEORY

The aim of the present study was primarily heuristic, that is, to test hypotheses of the effects of moods on children's memory, rather than to test theoretical conceptualizations of the effects of moods on children's memory. Theoretical conceptualizations of the effects of moods on memory are mentioned in the study because theoretical implications of the effects of mood on children's memory are discussed when the results are presented.

In the present study, moods have been conceptualized as global positive or negative ways of feeling that broadly influence ongoing thoughts and behaviours. Although social learning and information processing theories may be useful in proposing underlying processes responsible for the influence of mood on cognition and behaviour (e.g., Bandura, 1977; Craik & Tulving, 1975; Jenkins, 1974; Mischel, 1973), specific models in cognitive psychology have been suggested as ways in which the processing of moods may be conceptualized (Bower, 1981; Bower et al., 1981; Bower, Montiero, & Gilligan, 1978; Clark & Isen, 1982; Isen et al., 1978). These models include (a) an associative network and spreading activation theory, (b) automatic and controlled processes, and (c) a contextualist position.

Both Bower (1981) and Clark and Isen (1982) have related the influence of mood on memory to spreading activation theories of memory. These specific models propose that knowledge is organized in memory according to a semantic network, and that different emotions can be represented by different nodes or units in this same network. When one element of a network is 'activated', an emotion may become associated with the coincident events because the activation spreads along the associative pathways and material closely related to the node receives activation. Memories are retrieved by the spreading of activation from the current emotion unit as well as from the units corresponding to the explicitly presented retrieval cues. Thus, the spreading activation process makes particular portions of the network selectively accessible for recall. The central assumption of this model is that the course of the cognitive processes must be responsive to the context. Hence, one effect of a happy mood will be to activate memory nodes associated with feelings of happiness.

Bower (1981) has developed the concept of 'priming' in the context of the associative network and spreading activation view of memory. Memory nodes or units in the network remain inactive (unconscious) until they become primed by an emotion and enter conscious awareness. Isen et al. (1978) have proposed the accessibility hypothesis, which is also compatible with an associative theory of memory;

that is, affective tone operates to increase accessibility of the stored memory. Both theorists conceptualize mood as an important dimension of cognitive organization, and most of the recent research on state dependency across adult studies has used this perspective to understand the findings.

Clark and Isen (1982) have also related the influence of mood on memory to the concept of automatic and controlled processes in cognitive psychology. They have suggested that moods may be processed, in part, automatically (without effort and without conscious awareness), while the behaviour that accompanies a mood state may involve controlled processes (with effort and with conscious awareness), such as strategies of mood maintenance and mood repair (i.e., people try to feel better if they are feeling badly). This conceptualization has been useful in explaining the frequently reported asymmetry of effects in memory between positive and negative moods (Isen, 1984). That is, positive and negative states may be associated with different strategies for dealing with moods, and thus positive and negative moods may have different effects on memory. This perspective has important application in understanding the asymmetry results in child studies (Bartlett & Santrock, 1979; Bartlett et al., 1982; Nasby & Yando, 1982). Specifically, one might expect that young children would not be effective users of controlled processes because young

children may not have learned a substantial number of strategies for controlling mood.

Additionally, Clark and Isen (1982) have proposed an alternate view, within a schema or contextualist theory, for understanding the mood-congruency effects and the facilitating effects of positive moods on overall performance. They have suggested that mood states activate related information in memory to form a particular context that facilitates integration of new information as well as recall of previously learned information. Theoretically, a positive mood would be expected to invoke a semantic meaning or semantic context that is more extensive than that invoked by a negative state. Then, this larger context should facilitate more rapid and more efficient processing than contexts induced by other moods. Furthermore, they have suggested that moods have two processing functions: to provide simple context cues and semantic meaning. This is in contrast to the conceptualization of mood processing in the spreading activation model, such that moods are viewed as providing simple contextual cues.

## MOOD AND MEMORY STUDIES

As previously discussed, mood, historically, has been assumed to be of theoretical importance in human behaviour, while more recently theorists have started to incorporate mood into their models of thought and behaviour. Furthermore, research on the relationship between mood and social behaviour has provided evidence that mood influences how we behave toward ourselves and others. As well, the influence of mood on memory, which has long interested psychologists, has been the most heavily researched topic in the literature on mood-cognition relationships. Although the influence of mood on recall has been fairly clear in adult studies, mood effects on children's recall has been less clear. The following review emphasizes the child investigations in the mood-memory literature. However, to highlight processes comparable in child and adult studies, the review draws generally on the patterns of mood effects on memory (state dependence, mood congruence, and facilitating effect of positive moods) that have been found in the adult literature.

### State-dependent Memory

State-dependent memory implies that what one remembers during a given mood is determined in part by what one learned when previously in that mood. Although concordance between mood at encoding and mood at retrieval are implicit to this phenomenon, the affective valence of the to-be-remembered material is irrelevant. The assumption about the process underlying state-dependent memory effects is that mood during learning serves as a retrieval cue when that specific mood recurs at the time of recall. Consequently, the basic hypothesis is that people best retrieve a memory by reinstating the mood they were experiencing when they originally stored information in memory. For example, a happy subject can better recall some information that was stored when the subject was happy.

This phenomenon has been consistently demonstrated in animals with the use of drug-induced states (Weingartner, 1984), and in unusual adult subject populations with mood-induced states [(hypnotizable subjects, patients with affective disorders) e.g., Bower, 1981; Bower et al., 1978; Weingartner, Murphy, & Stillman, 1978]. The most relevant of these studies, a well-designed investigation by Bower (1981), a leader in this type of research, warrants detailed comment.

Subjects were presented with lists of materials to be learned while they were in each of four hypnotically-induced

states: joy, sadness, anger, or fear. The subjects were then brought back to the laboratory for a recall test, which was conducted while the subjects were in either the same or a different emotional state as that during their initial learning of the memory list. The findings demonstrated that retention was highest when recall of a list took place in the same emotional state as in acquisition, regardless of what that state was; it was poorest when recall occurred in the mood state opposite to that in acquisition; and it was intermediate when recall took place in the other two mood states.

Although the results of this experiment were dramatic, suggesting powerful influences of mood on memory, other investigators have failed to find state-dependent memory in their work on mood and memory. In commenting on this development in the research, Mayer and Bower (1985) indicated, "we now believe the original result was a chance, spurious outcome" (p. 1001).

An increasing number of studies of state dependence using more typical subject populations (nonhypnotized-college students) have yielded partial or no support for mood-dependent learning in adults (e.g., Isen, Shalcker, Clark, & Karp, 1978, Experiment 2; Macht, Spear, & Lewis, 1977; Share, Lisman, & Spear, 1984, Experiments 1 & 2; Weingartner et al., 1978, Experiment 3; Wetzler, 1985). One explanation, found throughout the literature (e.g.,

Garcia & Beck, 1985; Mayer & Bower, 1985), offered to account for the nonreplication of state-dependent memory in the mood literature is an experimenter-bias effect; that is, the effect has been obtained most readily using free-recall testing of affectively-biased stimuli in conjunction with a strongly suggestive mood-induction technique (hypnosis). Subjects may report events congruent with the induced mood because they think that they should. However, most recently, Bower and Mayer (1985) were unable to find state-dependent memory using hypnosis and affectively-biased stimuli.

Child studies. In overview, there have been few studies conducted with children (Bartlett et al., 1982; Bartlett & Santrock, 1979; Duncan et al., 1985; Nasby & Yando, 1982) on state-dependent learning using mood-induced states. The findings of these studies are similar to the findings for the adult studies. Bartlett and Santrock (1979) and Bartlett et al. (1982, Experiment 2) reported only asymmetrical state-dependent learning of a small magnitude. That is, happy mood, but not sad mood, influenced recall. Additionally, however, Bartlett et al. (1982, Experiment 1) also reported a failure to find state-dependent memory in children. Let us consider these studies in more detail.

Bartlett and Santrock (1979), using an incidental-learning procedure, studied state-dependent



effects on free-recall, cued-recall, and recognition performance in 32 five-year-old children. Mood at input was induced through the experimenter's behaviour and the affective tone (happy, sad) of three short stories, accompanied by colored pictures. Within each story six to-be-remembered words (e.g., toy truck, ball) were embedded. Mood at memory testing was induced through a second experimenter's behaviour and presentation of six affectively-toned (happy, sad) pictures. The effect of each mood-induction technique was self-rated by each subject, who indicated his or her mood by choosing one of 2 schematic faces--one smiling (happy), and one with a downturned mouth (sad). Analyses of the effectiveness of mood at input and mood at test revealed that the happy-at-input and happy-at-test conditions produced more appropriate responses than the sad-at-input and sad-at-test conditions. Although the analysis of the free-recall data demonstrated a significant mood-at-input x mood-at-test interaction, further analysis suggested that the difference was between the happy-happy and happy-sad conditions but not between the sad-sad and sad-happy conditions. Consequently, the results of this study only provide evidence for state-dependent memory which is asymmetrical from one mood to another. Bartlett and Santrock (1979) have argued that the beneficial impact of congruent mood was more pronounced when mood at input was happy than when it was sad because the sad

conditions of the study were more neutral than sad. This argument seems reasonable in terms of the differential effect of the mood-inducing procedures, such that happy-mood inductions were more successful than sad-mood inductions in the children. State-dependent memory was not found for the cued-recall and recognition data in the study. This result is consistent with the findings for state-dependent memory using mood induction and drugs in the adult studies (Eich, Weingartner, Stilman, & Gillin, 1975).

Bartlett et al. (1982) attempted to replicate the state-dependent memory effect on free recall of material, by using a two-list intentional-learning procedure, with 16 four-year-olds and 16 eight-year-olds. Mood at input was induced by having the subjects generate two thoughts, either happy or sad, and then think about the first thought for several seconds. Mood at test was induced by having the subjects dwell on the second thought that subjects had not concentrated on before. Each child received two study-test trials on each of two lists of words (9-item list for 4-year-olds, 15-item list for 8-year-olds). One list was studied and recalled after induction of a happy mood and the other after induction of a sad mood. Subsequently, delayed free-recall (10 min) and cued-recall tests were given for the words on both lists. Consequently, in both the delayed free-recall and cued-recall tests, state-dependent memory effects should have been revealed in a list by an

experimental group interaction. Analyses of the data yielded a greater state-dependence effect for cued recall than for free recall. In addition, the state-dependent memory effects were asymmetrical from one mood to another. In both cued- and free-recall tasks, there was a difference between the happy-happy and happy-sad conditions but no difference between the sad-sad and sad-happy conditions.

Thus, although Bartlett et al. (1982) failed to confirm a state-dependent effect of sadness, they found a state-dependent effect of happiness on free-recall and cued-recall memory. This result is not consistent with studies of adult state-dependent memory effects for mood and for drugs. In adult studies, state-dependent memory effects have been reported for free-recall memory but not cued-recall memory.

In the above study, a number of procedures were used to check the effectiveness of the mood-inducing technique (e.g., self-rating of mood by subjects, rating of character's mood in a picture). It is difficult to interpret the study's conflicting state-dependent memory findings in terms of ineffectual mood-induction techniques because analyses of the mood manipulations demonstrated reliable main effects of self-rated mood and mood of character. Nevertheless, we do not know the direction of the effect of moods because the authors did not report it. Therefore, a differential effectiveness of the happy and sad

mood-induction techniques may explain the asymmetrical effects found in the study.

Several specific criticisms may be made about the mood-inducing techniques used in the above study. First, the mood inductions during input and test were nearly identical; that is, the subjects were asked to think two mood-appropriate thoughts at the beginning of the experiment and concentrate on one during list learning while concentrating on the second during testing. Hence, the effects reported in the study could be attributed to similarities in cognitive content rather than mood. Consequently, support for state-dependence effects is questionable. Second, one of the mood-manipulation checks may have been a mood-induction procedure. The check required subjects to view pictures, to describe what was happening in the picture, and then to rate the affective state of the picture character. It is obvious that having asked subjects to do these tasks could have invoked mood in the subjects. More specifically, the affect portrayed in the picture character might have influenced the mood of the subjects.

Duncan et al. (1985) found no support for state-dependent memory using an incidental-learning task with 72 five-year-old children. The authors interpreted their finding and other investigators' inconsistent findings for children as instances of methodological differences

across studies. Included in their discussion are differences in subject variables (e.g., ages of the subjects studied), experimental variables (e.g., length of the retention interval, the nature of the material to be remembered), the method and the number of mood inductions, and the method of checking the effectiveness of the mood inductions.

Generally, there is weak empirical support for the state-dependence phenomenon for mood states across both adult and child studies. Furthermore, there are many unresolved methodological issues in the child studies. It seems clear that further study of the state-dependent mood phenomenon in children would require examination of many procedures, and would be laborious and complex. Such a study was beyond the scope of the present research focus. Therefore, state-dependent memory effects in children are not dealt with further. However, references will be made to additional findings in the state-dependent memory studies that bear on mood-congruent learning and facilitating effect of positive moods on children's memory.

#### Mood-congruent Memory

Mood-congruent memory refers to a tendency for persons to recall more affectively-valent material that is congruent with their particular mood than material that is incongruent with their mood. In this instance, concordance between mood

at encoding and mood at retrieval is not necessary. The assumption about the process underlying mood-congruent memory effects is that mood can serve as a retrieval cue when the information to be remembered is affectively congruent with the mood. Consequently, the basic hypothesis is that people's moods evoke better memory for affectively-congruent material. For example, a happy person can better recall happy events than sad events, while a sad person can better recall sad events than happy events.

Well-replicated evidence of this phenomenon has been found in research conducted with adults (e.g., Bower, 1981; Bower et al., 1981). Even the few early studies on the effects of mood on learning and memory have supported a mood-congruence effect. In a review of these experiments, involving induction of pleasant and unpleasant mood prior to learning, Bousfield (1950) concluded that "pleasant mood is associated with facilitation of responses (including learning) to pleasantly toned stimuli. Unpleasant mood is associated with facilitation of responses (including learning) to unpleasantly toned stimuli" (p. 71).

Recent research with adults has demonstrated the mood-congruence effect across a variety of measures, such as recollection of personal events (e.g., Madigan & Bollenbach, 1982, Experiment 1a & 2; Mathews & Bradley, 1983; Natale & Hantas, 1983), latency of affective-memory-association retrievals (e.g., Teasdale & Fogarty, 1979; Teasdale &

Taylor, 1981), recall of affective words (e.g., Brown & Taylor, 1985; Clark & Teasdale, 1985, Experiment 1; Teasdale & Russell, 1983), and recall of affective-sentence content (e.g., Laird et al., 1982, Experiment 1 & 2). Teasdale and Taylor (1981) examined the personal memories that happy and sad mood evoked in adult subjects. In a within-subject design study, happy and sad moods were induced and then subjects were presented with a series of words. For each word they were asked to recall a past real-life experience, either pleasant or unpleasant, that they associated with the word. Latency of retrieval for each experience was measured. Results demonstrated that happy subjects retrieved happy memories faster than sad ones, and that sad subjects retrieved sad memories faster than happy ones.

As noted earlier, the results of the mood-congruent memory studies have yielded evidence of subjects' differential susceptibility to the influence of positive versus negative mood. Specifically, results from some studies have shown that, whereas positive mood selectively influences the processing of affectively-valent information, negative mood often does not. In addition, in some studies it has been found that, although negative mood also influences recall, it influences recall to a lesser extent than positive mood.

Thus, in a few studies on the effect of mood on memory, symmetrical results of positive and negative mood have been

obtained, but in several studies, nonsymmetrical results have been obtained. Some of the studies in the adult literature are open to a variety of interpretations because of inconsistencies in methodology. Specifically, some studies have involved comparisons between positive and negative material (no neutral material) within a given mood condition; some studies have contrasted only happy and sad conditions (no control condition); and some studies have not verified the effectiveness of the mood-induction techniques. For example, when investigators have obtained an effect of positive mood on memory, not negative, it might be argued that the result was due to failure to induce negative mood. As well, differences between studies in the tendency to demonstrate parallel effects of negative and positive moods may be attributed to differences in mood-induction procedures and the type of materials to be remembered in the studies. For example, Clark and Teasdale (1985) found a mood-congruent effect that was stronger for female subjects than males when the positive and negative words to be recalled were positive or negative personal descriptors, as opposed to abstract nouns. Subsequently, examination of the sex differences in the study indicated that words for which the women were likely to show mood congruence were also words that women are more likely to use than men in everyday contexts.



In summary, although the clearest documented finding for mood influences on adult memory is the mood-congruent effect, the findings for negative moods are often clouded by other factors. Investigators have yet to determine whether differences in procedures account for the differential impact of positive and negative moods on memory or whether the differential effect of positive and negative moods on memory may be due to the distinctiveness of the induced moods.

Child studies. A number of studies of memory in children have been conducted. They have included a large number on memory itself (see previous discussion), and few of memory for affective content (e.g., see previous discussion of Bartlett & Santrock, 1979 and Bartlett et al., 1982). However, there are only two published studies of the effects of mood on memory in children (Nasby & Yando, 1982; Potts et al., 1986). Since both studies are central to the present thesis, let us consider each in detail.

Nasby and Yando (1982), using an intentional-learning procedure, investigated state-dependent and mood-congruent memory in 108 ten-year-olds on a single free-recall measure. Mood at encoding and retrieval was induced by having the subjects generate a past experience appropriate to the mood condition (happy, neutral, sad) and dwell on it for 30 s. Each subject was presented with 24 taped adjectives at a

rate of one word per 3 s. Each adjective was classed for valence (highly positive, slightly positive, slightly negative, highly negative), and frequency of normed usage (high, medium, low).

As noted earlier, in the study no support for state-dependent memory was found. However, there were some findings in the study relevant to a discussion of mood-congruent memory. Specifically, children who experienced a happy mood during encoding recalled more of the high- and medium-frequency positive adjectives than children who experienced a sad mood. Children who experienced a sad mood during encoding did not recall more of the negative adjectives than happy-mood children, but recalled fewer positive adjectives. As well, children who experienced a happy mood during retrieval recalled more positive adjectives, while children who experienced a sad mood during retrieval did not recall more of the negative adjectives.

Considered generally, these findings provide evidence that moods facilitate children's memory, such that a happy mood facilitated the encoding and retrieval of positive material, that is, a mood-congruence effect. In addition, however, one finding also provided evidence that mood impaired children's memory. That is, a sad mood impaired the encoding of positive material as compared to a neutral mood. This pattern of mood effect is not consistent with

the pattern usually obtained in experiments with adults. In adult studies, negative moods have not been found to impair memory for positive material.

It is difficult to interpret the results of Nasby and Yando (1982) because there are no other comparable studies in the mood-memory literature on children. Nonetheless, the results of the study are subject to the criticism that there was no assessment of the effectiveness of the mood-induction procedure. As noted in earlier discussion, the absence of a mood check prevents an accurate assessment of the results, as the mood-induction procedure may have been differentially effective across mood conditions.

Potts et al. (1986), using an incidental-learning procedure, investigated mood-congruent memory and the facilitating effect of positive mood on 72 seven-, eight-, and nine-year olds' memory, as measured by memory for story content, free recall, cued recall, and recognition of 21 affectively-valent events (seven positive, seven negative, seven neutral) embedded in a story. There were a number of between-group factors, including mood (happy, sad, no mood), time of mood induction (prior to hearing the story, after hearing the story), sex of subject (boys, girls), valence of initial story item (positive, negative) and the within-subject factor of story item valence (positive, negative, neutral).

No support was found for a mood-congruency effect on children's memory. That is, children did not tend to recall more story events that were affectively similar to their moods. Rather, more positive and negative story events were recalled than neutral events on free-recall, cued-recall, and recognition measures. As well, children tended to recall slightly more negative than positive items. The above finding suggests that one's memory is influenced by the affective valence of information, despite one's mood. Although this is a unique finding in the mood-memory literature with children, Potts et al. (1986) noted that adult subjects have demonstrated better recall of material of any affective valence than nonaffective material. More often, however, mood-congruent memory has been found for affectively-valenced material. Potts et al. (1986) attributed the inconsistent finding to the narrative material used as task stimuli, such that more cues were available for affectively-valenced stimuli in a connected related text than for unrelated words. Therefore, the availability of more cues in a narrative may be overwhelming, and thus prevent simpler, more direct mood-congruency effects on memory.

Potts et al. (1986) stated that positive and negative moods in children facilitated overall recall performance. "Under most conditions, subjects in whom a mood state was not induced recalled slightly fewer story items than happy

or sad subjects" (p. 52). This also is a unique finding in the mood and memory literature. However, it is important to note that, although Potts et al. (1986) reported data in support of their statement, they did not find an effect of mood on children's memory. That is, according to the statistical test, positive and negative moods did not affect children's recall.

Time of mood induction, generally, had no effect on children's memory. However, sex of subject influenced children's memory, such that boys recalled more story items than girls on a free-recall measure. As well, sex of subject and valence of the initial story item influenced memory. Specifically, the findings showed that sad girls who heard a positive initial event recalled more story events than all other girls, and boys in the corresponding condition (sad mood, positive initial item) on a free-recall measure. Further, sad girls' recognition memory was more accurate than happy or neutral girls, while boys' recognition accuracy did not differ according to mood condition. In addition, Potts et al. (1986) reported a complex and uninterpretable four-way interaction among mood, sex, affective valence of initial item, and story item valence on children's recognition memory.

In the above study, it is difficult to interpret the reported patterns of mood influences on memory for several reasons. First, Potts et al. (1986) is the only study of

its kind. Other investigators, interested in studying the mood-memory relationship in children and adults, have not examined the effects of so many different variables on memory. These variables include: time of mood induction, sex of subject, affective valence of initial story item, story item valence, and mood. Further, most of the variables examined in the Potts et al. (1986) study have not been dealt with in previous studies (i.e., time of mood induction, sex of subject, affective valence of initial story item). Consequently, the findings in the study are not conclusive.

Secondly, for one of the claimed effects, data were not reported to support the statement that negative and positive moods significantly facilitated overall recall performance. In most of the child studies, main effects of mood on children's memory performance have not been reported. Bartlett and Santrock (1979) have reported a main effect of mood on memory performance. Specifically, the happy-at-input groups made more positive responses on a recognition memory task than sad-at-input groups. However, Bartlett and Santrock (1979) indicated that the better performance of happy-mood children was not due to more accurate recognition memory but more positive responding to recognition items that had never been presented. Thus, in the child studies, investigators have not clearly demonstrated that moods facilitate children's memory.

Finally, interesting effects of a number of the variables (i.e., sex of subject, affective valence of initial story item, story item valence) on children's memory are only revealed in higher-order interactions, and are somewhat complex. This suggests that mood influences on children's memory is not as straightforward as other research might suggest. Nonetheless, the effects appear to be of considerable magnitude in the higher-order interactions. Therefore, they are worthwhile pursuing further. Additional investigation of the issues raised by Potts et al. (1986) might clarify the effect of mood on children's memory.

In summary, evidence for mood-congruent memory in children is weak when compared to adult studies because of the fewer studies, the smaller magnitude of effects, and the discrepant findings of the effect of negative moods on children's memory compared to adult studies.

#### Facilitating Effect of Positive Moods

Facilitating effect of positive moods implies that one's overall performance on tasks during positive moods will be increased compared to performance during other mood states. The underlying assumption is that positive moods function as a meaning context, and thus provide more cues than other mood states. Consequently, the basic hypothesis is that people encode and retrieve information more rapidly

and efficiently because of the greater number of cues available during a positive mood.

The facilitating effect of positive moods on memory has received very little attention in adult research. In the only published study in the adult literature, Isen & Daubman (1985) demonstrated a facilitating effect of positive mood. However, the investigators examined cognitive performance, that is, category formation, rather than general memory performance. More often, investigators interested in adult memory processes have studied the influence of positive mood on the recall of positively-valenced material. Some of the investigators have reported that subjects who experience positive mood recall positive words more efficiently (e.g., Isen et al., 1978).

Research directly investigating the facilitating effect of positive moods on children's memory is limited (Potts et al., 1986; Potts, Huston, & Wright, 1984). In one unpublished study, Potts et al. (1984) found that children's positive moods enhanced learning of both positive and negative content from a televised story (cited in Potts et al., 1986). In the only published study, Potts et al. (1986) did not find an effect of mood on children's memory. As previously discussed, Potts et al. (1986) reported a tendency for positive and negative moods to facilitate overall recall performance. However, this finding was not supported by data.



Generally, there is weak empirical support for the facilitating effect of positive moods phenomenon across both adult and child studies.

## STATEMENT OF PROBLEM

The focus of the present study was the notion that children's memory may be less affected by mood states than adults' memory, or that children's memory may be affected quite differently by mood states than adults' memory. The research with children contains significant shortcomings. First, the strength of conclusions drawn from the literature is highly restricted by the very small number of studies. Second, there is little empirical support for the hypothesis that mood affects children's memory. Finally, there is no consistent methodology across studies. Thus, the hypothesis that mood affects children's memory has not been adequately examined.

The present study examined the influence of mood on children's memory, taking into account the findings and problems of previous mood and memory research with children. The study had several purposes. First, to determine whether mood states account for any variance in children's recall, an extension of the Potts et al. (1986) study of children's mood and memory in a complex-learning situation was conducted. Second, in order to provide additional information on the effect of mood on children's memory, younger children than have been studied before participated

as subjects. Third, in order to draw developmental inferences, young children of two age groups served as subjects.

### Research Study

As noted, the study was an extension of Potts et al. (1986), using younger children as subjects. In addition, two different age groups of young children participated as subjects. Narrative materials (a story), similar to Potts et al. (1986), were used. The purpose of the research study was twofold. The first purpose was to determine if induced moods influence children's memory. The second purpose was to examine the age-related effects of induced moods on children's memory. Variables of interest in the study included mood induction, type of learning paradigm, affective valence of initial story event, affective valence of story events, age of subject, type of material to-be-remembered, type of recall test, and sex of subject. Let us consider the role of each, and on the basis of the available evidence, the hypotheses and rationale for control procedures used in the study.

Mood induction and predictions. In an investigation of mood effects on memory, it is crucial that assessments be made of the moods to verify that differences in memory effects between groups are due to differences in the mood of

the groups. The absence of an assessment of the effectiveness of mood induction has been common in mood-effect studies (e.g., Nasby & Yando, 1982). When assessments have been made, they have not been statistically analyzed. Potts et al. (1986) did not statistically analyze the effectiveness of their mood inductions. Consequently, predictions about the mood-induction procedure, that is about the thoughts (sad, happy) generated by the subjects, were considered in terms of the findings of other studies. In some studies (Bartlett et al., 1982; Duncan et al., 1985), investigators have analyzed the effectiveness of mood induction using children's self-ratings of moods in combination with other mood manipulation checks (i.e., adult ratings of subject's facial expressions, subject ratings of the affective tone of picture-story characters, and subject ratings of the affective tone of stories).

Bartlett et al. (1982) used subject ratings of the affective tone of picture-story characters and the affective tone of stories to assess the effectiveness of mood inductions. However, the investigators did not completely report their findings on the effectiveness of mood inductions. That is, they reported an effect of mood for children's self-ratings of mood, but they did not indicate the direction of the effect.

Duncan et al. (1985), using adult ratings of subjects' facial expressions, reported that the self-ratings of mood

procedure was not successful with children. That is, they found no variance in children's self-ratings of mood across mood conditions. Although one explanation of this finding might be that children do not accurately report mood states, another explanation might be that the mood inductions were not successful.

In one study (Bartlett & Santrock, 1979), investigators analyzed the effectiveness of mood induction using only children's self-ratings of moods. Bartlett and Santrock (1979) reported that the self-rating of mood procedure was successful with children, and also reported the direction of the effect. Specifically, they found that happy-condition children rated their moods more appropriately than sad-condition children. In addition, girls were less likely to rate their mood appropriately in a sad-mood condition.

The child studies are somewhat inconsistent in terms of the procedures and results regarding the effectiveness of mood inductions as assessed by children's self-ratings. However, a pattern does emerge. When the self-ratings of mood procedure is successful with children, then it is most successful with happy-condition children. Further, when the self-ratings of mood procedure is successful with children, it is least successful with sad-condition girls.

Therefore, it was predicted that children's self-ratings of mood would demonstrate the following: the appropriateness of the happy-condition children's

self-ratings of mood to their condition would be moderately high, and the sad-condition children's low. Appropriateness of the no-induction condition children's self-ratings of mood to their condition would be high. In addition, an interaction of sex and mood was predicted: the appropriateness of the happy-condition boys' and girls' self-ratings of mood to their condition would be moderately high, sad-condition boys' moderate, and sad-condition girls' low. Appropriateness of the no-induction condition children's self-ratings of mood to their condition would not differ between boys and girls.

Consistent with the above predictions, it was also predicted that adult raters' reports of subjects' intensity of thought would demonstrate the following: happy-condition children's intensity of thoughts would be moderately high, while sad-condition children's would be low. In addition, an interaction of sex and mood was predicted: happy-condition boys and girls would report moderately high intense thoughts; and sad-condition boys would report moderately intense thoughts. Sad-condition girls would report low intense thoughts.

Learning paradigm and mood effects. Potts et al. (1986) found two patterns of memory for affectively-valent materials in children. First, positive and negative mood in children facilitated children's overall recall of story

events. This pattern has not been typically found in studies with adults. More often, positive moods in adults have facilitated adults' performance, not negative moods. However, in the Potts et al. (1986) study, evidence for the different pattern in children was not strong. That is, the authors did not report an effect of mood on children's memory. Consequently, the possibility that positive and negative moods would facilitate children's memory deserved further consideration.

One explanation for the absence of an effect of moods on children's memory has been provided by investigators who failed to find an effect of mood (e.g., Bartlett & Santrock, 1979; Duncan et al., 1985). These investigators have attributed the absence of mood effects on memory to the use of an incidental-learning paradigm in their studies. That is, subjects were not told that their memory would be tested. Potts et al. (1986) used an incidental-learning paradigm, rather than an intentional-learning paradigm. In an intentional-learning paradigm, subjects are told that their memory will be tested. Bartlett and Santrock (1979) have suggested that in an intentional-learning paradigm, affective states may have more powerful effects on memory performance because motivational factors, such as achievement motivation and self-control, are of greater importance than in an incidental-learning paradigm. Furthermore, Duncan et al. (1985) have suggested that affect

is more likely to influence memory processes in young children when the material to be remembered has a certain distinctiveness, gained through the use of intentional-memory processes. In the general learning and memory literature, Weissberg and Paris (1986) demonstrated that children from 3 to 7 years of age recalled more items to be remembered in an intentional-learning situation (lesson context) than an incidental-learning situation (game context).

Two mood-memory studies with children have used an intentional-learning paradigm (Bartlett et al., 1982; Nasby & Yando, 1982). Although Bartlett et al. (1982) and Nasby and Yando (1982) did not report an effect of positive and negative moods on overall recall, they did report that positive mood facilitated overall recall. The data of both studies may be criticized, as previously discussed (see p. 26 for criticisms of Bartlett et al., 1982 and p. 33 for criticisms of Nasby and Yando, 1982). Nonetheless, the data are highly suggestive and indicate that further research with clearer definitions is in order. Therefore, it was deemed important to test the effect of moods on children's memory using an intentional-learning paradigm.

The most pertinent studies did not allow any firm predictions about the effect of mood on memory. The general literature on state-dependent learning, mood-congruent learning, and mood-social behaviour relationships, all



discussed previously, did permit some general predictions. That is, for example, stronger state-dependent memory effects have been found for affectively-valent material; and for example, positive and negative moods have been found to similarly increase children's rates of donations. Generally, therefore, these effects suggested that in the present study, the following should occur: when children's memory for affectively-valent material was measured, then mood should facilitate overall recall. Furthermore, the use of an intentional-learning paradigm should have increased the chances of finding this effect.

Therefore, it was predicted that happy-condition children's overall recall of story events would be high; sad-condition children's overall recall of story events would be moderately high; and no-induction condition children's overall recall would be moderate.

Valence of initial story event effects. A variable that could influence the effect of mood on memory could be valence of the initial story event; that is, whether or not the initial story event is positively or negatively toned. A second explanation for the absence of an effect of moods on children's memory in the Potts et al. (1986) study might be the inclusion of variables, such as time of induction and valence of initial event, that weaken the influence of mood on children's memory. For example, in testing children's

memory, Potts et al. (1986) were specifically interested in studying the valence of initial story event as a potential source of mood induction. The authors reported that induced mood was consistently related to the valence of the initial story event and sex of subject. In other words, induced mood could be intensified or attenuated by the initial presentation of story items that were congruent or incongruent with the mood state of the subject.

In the present study, it was of greater interest to demonstrate evidence for the facilitating effect of positive and negative moods on children's memory than the modifying effect of the initial valence of the story event. Furthermore, examination of the differing effects of differently valenced story events was beyond the scope of the present study. That is, an examination of the mood-induction properties of different events within a narrative would have required many conditions, including varying the affective valence of the first story event, the first two story events, and so on to the last story event. Therefore, for purposes of the present study, the valence of the initial story event was not systematically studied, and no predictions were made about it. However, to conform to the procedures of Potts et al. (1986), the order of the affect of the first event of the narrative was alternated from subject to subject.

Valence of story event effects. Potts et al. (1986) reported that children recalled more positive and negative story events than neutral events. However, they are the first investigators to report this pattern of memory in children. Therefore, further research on the issue was required to support the finding. Consistent with Potts et al. (1986), it was predicted that children would recall more positive and negative items than neutral items during recall measures for affectively-valenced narrative content. This was expected to be the case for free- and cued-recall and recognition measures outlined below.

Age effects. Research on mood and memory effects has focused on older, school-aged children and young adults. Age is a factor that has been of particular importance in the study of memory for narrative material, especially for young children, who typically pass much time at home or at daycares listening to stories. In the only mood-memory study that analyzed for age differences in children's memory (Bartlett et al., 1982), the investigators reported that recall of material did not vary with age. This finding is contrary to the common finding of strong age effects in learning and memory research (Kail & Hagen, 1977). This discrepant finding may be attributed to the procedures of Bartlett et al. (1982). That is, although Bartlett et al. (1982) conducted an interference-paradigm study of

state-dependent learning with 4- and 11-year-olds, they adjusted for age by varying list length of to-be-remembered words. The adjustment may, therefore, have eliminated an age effect that would be found if different age groups were given an identical amount of materials to be remembered. In the present study, amount of materials to be remembered was not adjusted for age.

Research on age differences in children's memory has traditionally tested for and found age effects using same-length lists of words (Todd & Perlmutter, 1980). In the general work in memory with children, results of studies suggest that recall performance increases directly with age (Flavell, 1970; Wellman & Somerville, 1980; Flavell & Wellman, 1977; Ratner, 1984). However, this prediction is an oversimplification. Type of material to be remembered and type of recall task need to be taken into account when making predictions about children's memory performance.

In the present study, narrative materials (a story) were used as stimuli in order to replicate the procedure of Potts et al. (1986). In addition, however, a story was also chosen because a story is more ecologically valid for young children than lists of words. That is, the use of a story as stimulus material was more relevant to children in their natural environment than the use of a list of words. Current research, using ecologically-valid procedures (e.g., search for object, interesting and familiar tasks), has

demonstrated weak age effects. Memory performance of young children has been found to more nearly approximate older children's performance (Nelson & Ross, 1980; Todd & Perlmutter, 1980; Somerville, Wellman, & Cultice, 1983; Wellman & Somerville, 1980). This finding suggested that the use of an ecologically-valid task should attenuate the effect of age on children's free-recall memory.

Therefore, it was predicted that older children would recall moderately more story events than younger children on a free-recall measure.

For cued-recall memory, two studies suggested that the effect of age should be more moderated. Stein and Glenn (1975, cited in Kail & Hagen, 1977) investigated different aged children's recall of narrative materials and found that the semantic categories of events and consequences were recalled most often by children of all ages. This finding suggested that younger children's memory performance would be similar to that of older children's. Cole and Scribner (1977) demonstrated, in a cross-cultural study, that embedding the stimuli to be remembered in a story context, in which each event was meaningfully linked to another event, enhanced recall by subjects, and that story items were recalled in the order in which they fit into the category on a cued-recall measure. This finding suggested that when cued-recall items are presented in the same order as in the narrative, then there should be no effect of age on children's cued-recall memory.

Therefore, it was predicted that children's recall of story events would not vary with age on a cued-recall measure.

Age was not a factor of interest in measuring recognition memory. Pilot work with 3- and 6-year-old children suggested that 3-year-olds tend to respond positively rather than accurately throughout the recognition task, even after appropriate responding throughout free-recall and cued-recall tasks. This finding may be a reflection of the nature of the effect of demand of multiple tasks on 3-year-olds, or a reflection of 3-year-old children's propensity to agree with statements. Such effects with young children have been found in the literature (Kail & Hagen, 1977). Thus, recognition tasks were conducted only with 6-year-old children.

Sex of subject effects. Potts et al. (1986) reported strong sex differences in their study. Boys recalled more story items than girls on a free-recall measure of memory. For a recognition measure, sad-condition girls' recognition performance was more accurate than happy and no-induction girls. Boys' recognition performance was unaffected by their mood condition.

Nasby and Yando (1982) also found sex differences. Boys recalled more words than girls on a free-recall measure of memory. Although the finding of Nasby and Yando (1982)

provides some support for an effect of sex of subject on children's memory, the authors did not demonstrate that the effect of mood was modified by sex of subject. This difference between the results of the two studies may have occurred because the two studies used different materials. That is, Potts et al. (1986) tested children's memory for narrative content, while Nasby and Yando (1982) tested children's memory for words. It seemed clear that sex of subject deserved additional research to determine if sex of subject and mood of subject would influence children's memory.

Consistent with the Potts et al. (1986) study, it was predicted that boys would recall more story items than girls on a free-recall measure of memory. In addition, an effect of both sex of subject and mood on children's recognition performance was predicted as follows: girls in a sad condition would have high recognition accuracy for story events, while girls in a happy condition and no-induction condition would have moderate recognition accuracy for story events. Boys' recognition accuracy would not vary with their mood condition.

## HYPOTHESES

In summary, the hypotheses of the present study included the following:

- (1) The appropriateness of the happy-condition children's self-ratings of mood to their condition would be moderately high; and sad-condition children's self-ratings of mood to their condition would be low. Appropriateness of the no-induction condition children's self-ratings of mood to their condition would be high.
- (2) The appropriateness of the happy-condition boys' and girls' self-ratings of mood to their condition would be moderately high; and appropriateness of the sad-condition boys' self-ratings of mood to their condition would be moderate, while appropriateness of sad-condition girls' self-ratings of mood to their condition would be low.
- (3) Raters' reports of children's intensity of thought would show that happy-condition children would report moderately high intense thoughts; and sad-condition children would report low intense thoughts.



- (4) Raters' reports of children's intensity of thought would show that happy-condition boys and girls would report moderately high intense thoughts, and sad-condition boys would report moderately intense thoughts, while sad-condition girls would report low intense thoughts.
- (5) Overall recall of story events would be high for happy-condition children, moderately high for sad-condition children, and moderate for no-induction condition children.
- (6) Children would recall more positive and negative story events than neutral story events during free-recall, cued-recall, and recognition measures for affectively-valenced narrative content.
- (7) Older children would recall moderately more story events than younger children on a free-recall measure of memory.
- (8) Children's recall of story events would not vary with age on a cued-recall measure of memory.
- (9) Boys would recall more story events than girls on a free-recall measure of memory.
- (10) Recognition accuracy for story events would be high for girls in a sad-mood condition, and moderate for girls in a happy-mood and no-induction condition. Boys'

recognition accuracy would not vary with their mood condition.

## DESIGN OF STUDY

To test the above hypotheses, the following experiment was performed. Ninety-six children served as subjects. Forty-eight (24 boys, 24 girls) were 3 years of age; and forty-eight (24 boys, 24 girls) were 6 years of age. Subjects were exposed to one of two standard mood-induction procedures (happy or sad) or a control no-induction procedure. For the standard mood-induction procedure, subjects were asked to think, to report, and to talk about either a happy or a sad past experience. Thus, there were three conditions, including equal numbers of boys and girls in each of two age groups.

Three mood-manipulation assessments were included in the design of the study. The first manipulation assessment was derived from children's reports of generated thoughts during the mood inductions. Children's generated thoughts were recorded on paper by the experimenter. Adult judges rated the thoughts for intensity of affect and appropriateness of thought to mood condition. The second manipulation assessment was the children's self-ratings of their own moods, which were made immediately after mood induction. Children's reports of moods were recorded on paper by the experimenter. The third assessment was derived

from the children's self-ratings of their own moods. An adult judge rated the children's ratings of mood for appropriateness of mood to mood condition.

Children then heard 18 affectively-valent events embedded in narrative material. The narrative materials, a 3-min story, described two children's adventures together over the course of one day as they tried to take a wagon-load of apples to 'Grandma's Bakery'. Sex of experimenter, sex of voice recording of the narrative, and affective valence of the initial story event were counterbalanced across subjects in each age group. The 6-year-old children's memory for narrative events was examined through free-recall, cued-recall, and recognition memory tasks, while the 3-year-old children's memory was examined through free-recall and cued-recall memory tasks. Children's responses during the tasks were recorded on paper by the experimenter.

## METHOD

### Subjects

Ninety-six children served as subjects. Forty-eight 6-year-olds were drawn from three elementary schools in the Seven Oaks school division #10 area (Centennial, West St. Paul, Governor Semple); and forty-eight 3-year-olds were drawn from seven provincially-funded daycare centers in the Seven Oaks area (Kidi-Garden Day Nurseries, Seven Oaks Day Care Center, Shepherd's Care Day Nursery, Maples Day Care Inc., Sugar 'n Spice Kiddie Haven Inc., Machray Day Care Center, Sunshine Day Nursery) of the City of West Kildonan, Manitoba, Canada. Children identified by the daycare center directors and school teachers as having special needs (e.g., mental retardation) were not recruited for the present study. The mean age of the 6-year-olds was 80 months, with a range of 71 to 84 months; while the mean age of the 3-year-olds was 43 months, with a range of 35 to 48 months.

Parental permission for the children's participation in the study was solicited with the cooperation of the directors of the daycare centers and the principals of the schools. As school and daycare policy forbid the release of children's names, the experimenter was not able directly to

recruit subjects. Rather, directors and principals distributed information about the study and Parental Consent Forms (see Appendices A and B) to parents of 3- and 6-year-olds enrolled in their facilities. Thereafter, prior to any experimental manipulations, children with parental permission to participate were each informed about the study, and asked if they wished to participate.

Boys and girls of each age were randomly assigned to one of the three experimental conditions as defined below, with eight boys and eight girls per condition. For each condition, half of the subjects were seen by a male experimenter, and half by a female experimenter.

#### Apparatus

A standard audio cassette recorder and player (Sanyo, Model 9818) was used to record the narrative materials for the study to eliminate variations in inflection in presentation across subjects. As well, for purposes of alternating the first two events of the narrative, and counterbalancing for sex of the voice recording across subjects, one of four recordings was used with each subject, including: (a) a female-voice recording of the initial positive event narrative, (b) a female-voice recording of the initial negative event narrative, (c) a male-voice recording of the initial positive event narrative, and (d) a male-voice recording of the initial negative event

narrative. These recordings were produced on four separate standard audiotapes.

Following recommendations of an audiologist, the same audiotape equipment, preset for volume (65 db sound pressure level, A-weighted scale), was used to play the narrative to the subjects throughout the study. Insertion of the appropriate rewound voice-recording tape into the player and tape-onset was controlled by the experimenter. Tape-offset occurred automatically at the end of the recording. Again, following the recommendation of the audiologist, the heads of the tape recorder were cleaned, according to manufacturer's instructions, every 10 plays.

#### Narrative Materials

The narrative materials followed the form of the materials employed by Potts et al. (1986). Potts et al. (1986) constructed a story consisting of 25 sentences that described two child protagonists who, in the course of one day together, experienced an evenly distributed variety of seven positive, seven negative, and seven neutral events. This story was used to study children with a mean age of 97.6 months.

Subjects in the present study were younger than those in the Potts et al. (1986) study, and may have had lower comprehension levels. Accordingly, in the present study, the number of story events was reduced from 21 (i.e., seven

positive, seven negative, seven neutral) to 18 (i.e., six positive, six negative, six neutral); and the number of sentences was reduced from 25 to 22. The 22 sentences described two children's adventures together, over the course of one day, while trying to take a wagon-load of apples to 'Grandma's Bakery'. The six positive, six negative, and six neutral events, embedded in the 22 sentences, were evenly distributed throughout the narrative.

Work conducted by the author, prior to the study, showed that the narrative to be used in the study was satisfactory. The specific events of the story were rated by adult judges for appropriateness of affect (positive, negative, neutral), similarity of affect intensity, and similarity of comprehension by 3- and 6-year-olds. Each of the 18 events were rated as either highly negative, negative, slightly negative, neutral, slightly positive, positive, or highly positive. As well, each of the events were rated as either appropriate to 3-year-olds, 6-year-olds, or both 3- and 6-year-olds. Subsequently, the story was reconstructed. Additional ratings of the final form, following the above procedure, showed that positive and negative events did not differ from each other on affect intensity and age appropriateness (see Appendix C for positive, negative, and neutral narrative events). Pilot work, including measures of several 3- and 6-year-olds' memory for a taped version of the narrative materials,



determined that the number of events was appropriate for the ages and comprehension level of the subjects tested in the present study.

The first two events of the story were counterbalanced across subjects, such that half of the subjects heard a positive event and half a negative event described first (see Appendices D and E for the narrative with a positive initial event and the narrative with a negative initial event).

Sex of story character may have had a variable effect on responses of different sexed subjects. For example, girls may have listened more attentively to a story about girls, resulting in the memory of girl subjects being artificially inflated. In order to control for such a possible effect, unisexual names were used in the narrative (i.e., Kerri, Terri).

Character names of the story may have had a variable effect on responses of subjects. For example, some subjects may have recalled more story events associated with a particular character in the story due to the familiarity or likeability of the character's name. In order to control for such possible effects, counterbalancing of character names across subjects was considered as a solution. However, a systematic counterbalancing of the character names across subjects would have required recruiting, at minimum, double the number of subjects. Thus, in an effort

to reduce any possible effect of character names on memory, the names of 'Kerri' and 'Terri' were also chosen for their similarity of sound.

### Procedure

Children participated individually in the 20-min experimental session. The 3-year-old children were tested in a quiet room or area of the children's daycare building, while the 6-year-olds were tested in a quiet room of the children's school building. Use of two experimental settings was required because some of the facilities of the daycares (i.e., Shepherd's Care Day Nursery, Seven Oaks Day Care Center, Maples Day Care Inc., Sunshine Day Nursery) did not provide for enclosed rooms. In each instance, the best arrangement was made in the buildings to approximate a quiet room. For example, in two of the daycares, children were seen in the library areas of the centers during regularly scheduled quiet times, and thus were removed in distance and activity from the large group. In the two other daycare centers, children were seen in a large entranceway separated from the daycare center by glass doors and in a front section of the daycare separated from the daycare center by the piano and bookshelves.

The 3-year-old children were escorted to the room or area by a daycare center staff, while the 6-year-old children were escorted to the room by the experimenter,

based on a prearranged schedule with the daycare staff and school teachers. Use of two escorts was considered warranted because of younger subjects' reaction to a stranger in the daycare. The interruption of the 3-year-old subjects' daily routine by a stranger might have provoked an unwillingness in the children to participate. Conversely, as this reaction was not anticipated in the older children, and as the teachers would be unable to leave the classrooms to escort individual children, the older children were initially treated differently than the younger children.

Within each of the two age groups, subjects were randomly assigned to one of three conditions, including: (a) happy-mood induction, (b) sad-mood induction, and (c) no-induction control group. There was an equal number of boys and girls in each of the three conditions.

Sex of the experimenter may have had a variable effect on the behaviour of different sexed subjects. For example, girls may have paid more attention to the experimental instructions given by a female experimenter, resulting in an artificial inflation of the girls' performance compared to the boys' performance. In order to control for such possible effects, for each of the three conditions in the study, half of the male and half of the female subjects were seen by a female experimenter, while the other half of the subjects were seen by a male experimenter.

Initially, each child was introduced to the experimenter. The experimenter conversed with the child for approximately one minute, exchanged names with the child, and then proceeded to give a brief explanation of the experiment to the child. The child was told that

The study concerns the kinds of things that children understand. First, you will be asked about one thing that happened to you before, either a happy thing, a sad thing, or something that didn't make any difference to you. We'll talk about it for a minute. Then, you will listen to a short story on a tape about two children. While you listen to the story I'll be standing (outside the room, at the door; over there) waiting for the tape to stop playing. When the story is over, I'll come back (inside the room; here) and ask you to tell me the story just like the (lady, man) did on the tape. The last part of the study is going to take a little longer than the other parts. I'm going to ask you 18 questions about what happened in the story. Okay? Do you think you want to try these things with me?

No children declined to participate. After children agreed to participate, they were seated at a small child's table with the experimenter and the initial mood induction appropriate to the child's assigned condition was then introduced.

The mood-induction procedure commonly employed in research with children has required children to generate a thought about a past emotion-inducing event, to dwell on this thought for a brief period, and to report the thought to the experimenter (Barden et al., 1981; Masters et al., 1979; Potts et al., 1986). Although this procedure has been validated using independent measures of affect (Masters et al., 1979), pilot work suggested that the procedure would not be successful when studying mood induction in 3-year-olds. Most of the 3-year-olds in the pilot-work sample demonstrated difficulty in delaying their reports of events, thus failing to dwell on the thoughts. Additional pilot work suggested that a revised mood-induction procedure, requiring children to generate a thought about a past emotion-inducing event, to report the thought to the experimenter, and then to dwell on this thought for a brief period, would be more successfully followed by 3-year-olds than the standard procedure. However, altering the elements of the mood-induction procedure encouraged the children to talk throughout the entire procedure. In effect, the results of the pilot work suggested that 3-year-olds interpret instructions to report a thought and to think a thought as requiring the same behaviour from them--talking.

Facial expressions measurements were not used because school and daycare center policy forbid taking children's pictures. If codable videotape recordings of subjects'

facial expressions were needed, talking by children would have to be minimized. Since only thought measurement was used, there did not seem to be a reason to minimize children's talking behaviour. Also, since the standard mood-induction procedure, involving a facial procedure, could not be used, a revised mood-induction procedure was used in the study.

Following the results of the pilot work, the instructions given to the subjects, adapted from Potts et al. (1986), were as follows:

Now comes the time where we talk about some things that have happened to us before. You know, sometimes things happen to us that make us feel really happy when we think about them, can't they? Or sometimes, things happen that make us sad, too, don't they? You know what I mean? What I want you to do today is to think for a minute, and think of something that happened to you before that would make you feel (happy, sad) inside. What is it you are thinking about? Now, let's talk for just a second longer about what makes you feel (happy, sad) inside.

Thus, one third of the children were instructed to think of a happy thought, and one third were instructed to think of a sad thought. They were then asked to report the thought and to talk about the thought for 30 s. During the

30 s the experimenter modeled the induction appropriate to the children's assigned mood condition through the use of facial expressions (happy or sad) and scripted responses (e.g., oh/ah, you are happy/sad when; tell me some more about how happy/sad that makes you feel). The purpose of the above procedure was to prevent the attenuation of the effect of the mood-induction by the experimenter's behaviours, and the differential effect of the procedure by experimenters.

Care was taken by the experimenters to give appropriate and equal emphasis to each mood statement of the mood-induction procedures across subjects. Each thought generated by a child in response to the induction instructions was recorded on paper by the experimenter. Pilot work suggested that some children would speak so quietly or inarticulately that the experimenter would not be able to hear or decipher the child's reported thought. Thus, the experimenter repeated the spoken thought of each subject in the form of a question to confirm the accuracy of the recording (e.g., your sister fights with you?).

Children were not prompted to report their thoughts to the experimenter. Results of previous studies (e.g., Barden et al., 1981) indicated that beyond a time limit of 60 s children are unlikely to produce a thought. One child (6-year-old girl) was not able to report a thought within 60 s. The session was not terminated in order not to

disappoint the child. However, the data were not included in the study.

The remaining one third of the sample made up a no-induction control group for the study. These children continued to converse with the experimenter about 'neutral' daily activities (e.g., how they got to daycare or school, and whether they brought their lunch from home or whether the daycare or school provided it for them). The mood-induction procedure of the session took approximately one minute for each of the happy, sad, and no-induction conditions.

Including a no-induction control group, rather than a neutral-induction group, was consistent with the work of Potts et al. (1986). In other studies (Barden et al., 1981; Duncan et al., 1985; Nasby & Yando, 1982), results suggested that the performance of a sad-induction group is often similar to that of a neutral-induction group. This sort of result probably reflects the difficulty in determining what constitutes a neutral event. With a no-induction group, differential effects of mood induction on performance should not be as ambiguous as effects would be if a neutral-induction group were used. To assess the neutrality of the control group, children rated their mood. Consequently, immediately following the mood-induction procedure, one half of the children were shown five schematic faces ranging from smiling to frowning; and one



half were shown five schematic faces ranging from frowning to smiling (see Appendices F and G for schematic drawings of faces, smiling to frowning and frowning to smiling). To indicate their mood, children then were asked to

Please point to the one face that shows how you are feeling right now.

Each choice of a face by a child was recorded on paper by the experimenter.

Following the self-rating of mood, the experimenter told the children

I am going to have you listen to a story while I wait outside/ over there.

If the experimenter were present while the tape was being played, the children might have assumed that the experimenter knew the story. The children might have then omitted details of the story that they assumed the experimenter knew about the story. The purpose of having the experimenter absent during the playing of the story was, then, to reduce any tendency on the part of the children to summarize rather than to recall, when later asked to retell the story to the experimenter. The experimenter inserted the appropriate taped narrative, counterbalanced across subjects, and then stated

Listen carefully, so later you can tell me the story.

The experimenter left the experimental room/area and watched, from outside the door of the room/area, to ensure the child's well-being during the playing of the 3-min tape recording of the narrative.

Coincident with the automatic offset of the recording, the experimenter reentered the room/area to begin the assessment of the child's memory for events in the narrative using free-recall, cued-recall, and recognition measures. A free-recall procedure, designed to maximize children's responding, was administered to both 3- and 6-year-old subjects. The children were asked to retell the story to the experimenter, as the experimenter had been out of the room/area when it was played, as well as were asked

Can you tell me the story like the lady/man on the tape told it?

If children were unable to recall anything, they were reminded that the story was played previously and were asked again if they could remember anything about it. If the children still were unable to respond they were asked to

Just think about it for a while, and see if you remember anything.

If children stopped after recalling information from only a few of the 18 events, they were asked if they could remember anything more about the story. No direct or indirect cues were used to prompt recall. Subjects who did not spontaneously recall something from the story were given scores of zero.

As school and daycare policy prohibited the tape recording of children's voices, the children's responses to the free-recall task were recorded on paper by the experimenter. In order to avoid experimenter interpretation of inarticulate responses from the younger subjects, each response of each subject was repeated by the experimenter while the experimenter recorded the response on paper. Appropriate corrections were made to the recording of the data only on the direction of the child (e.g., No, I said coat, not goat).

Immediately after the free-recall test, all subjects were given a cued-recall test for the 18 events in the story. The cued-recall items included 18 open-ended questions representing the six events for each mood, listed in the order of their presentation in the story (see Appendices H and I for cued recall for positive initial event narrative and cued recall for negative initial event narrative).

There was no random ordering of presentation of story items or counterbalancing of differentially ordered story items in the study. A number of studies, referred to previously, demonstrated that young children's memory performance was greater when recalling story materials. Maintaining story items in their original order of presentation from the story was intended to maximize the memory performance of the children.

There was no use of prompting during the presentation of the cued-recall items. If a child was unable to respond within 30 s, the experimenter scored the item as a no-response, and told the child

Okay, here's the next question.

The question was put to the child and the experimenter proceeded to await a response from the child. Each of the child's responses was recorded on paper by the experimenter.

Following cued recall, the recognition items were presented to each of the 6-year-old children. The children were read the 18 events which had been presented in the story and 18 distractor events which had not been previously presented (see Appendix J for distractor events), and were asked to indicate whether or not each event was from the previous story. As with the cued-recall test, no prompting occurred. Children's responses were recorded on paper by the experimenter (see Appendix K for the recognition task).

After completion of the memory tasks, sad-mood subjects were given a happy-mood induction as outlined above, and all children received a toy ring for participating in the experiment. As well, all children were informed that the study was an investigation of mood effects on children's memory. Children were asked if they had any questions about the study. All questions were answered as completely as possible. Thereafter, the children were asked to report their moods. When the children reported themselves as

experiencing a happy mood, they were escorted back to their respective rooms or areas by the experimenter.

Although all children reported a happy mood, the experimenter confirmed the children's happy mood with the daycare staff or school teachers later that same day. In no case was a child's happy mood disconfirmed.

## RESULTS

Demographics of the independent and dependent variables were calculated, including mean, range, standard deviation, and frequency. Examination of each dependent variable on a normal probability plot revealed significant departures from normality ( $p < 0.01$ ). By definition, the affective valence of the story event variable was a binomial variable (i.e., 6 positive, 6 neutral, 6 negative events). Accordingly, for the purpose of analyses of the measures of memory, the data were transformed in a manner explained in detail under each of the four sections of memory performance (i.e., free recall, cued recall, recognition, recognition distractors). To conform with the procedures of Potts et al. (1986), nontransformed scores were computed and analyzed for each of the measures of memory. An inspection of the data from the transformed and nontransformed scores showed that nontransformed results were similar to but less robust than the transformed results. Transformation of the data ensured greater robustness because the transformed data did not violate assumptions of normal distribution of errors, equal variance, and independence of errors required for the analysis of variance tests. Therefore, for the measures of memory, the transformed data are reported below. Means for

the nontransformed scores, and results of the analyses of variance of the nontransformed scores are available on request.

The results are presented in two sections. First, the results of the measures of mood are presented, including judges' assessments of the thoughts generated by the children, self-ratings of mood by the children, and judge's assessment of the appropriateness of self-ratings of mood by the children. Then, results of the measures of memory are discussed under the headings of free-recall, cued-recall, recognition, and recognition of distractors memory performance. Within each of the four sections on measures of memory, results are presented under the headings of main effects, two-way interactions, and higher-order interactions.

## RESULTS OF THE MEASURES OF MOOD

To assess the mood states of the children, and to provide convergent validation for the effectiveness of the mood-induction procedures, separate analyses of variance were performed on the reported thoughts generated by the children, and the children's own estimates of their moods. As the thought task of the no-induction group was standard across subjects, only the happy and sad thoughts were rated for validation purposes. (The thoughts generated by the children are presented in Appendices L and M.) For children's own estimates of their moods, the happy mood, sad mood, and no-induction scores were rated.

### Thoughts Generated by the Children

Two independent adult raters (1 female, 1 male), blind to the subjects' conditions, performed two rating tasks on each thought. Following the work of Potts et al. (1986), each rater first scored each thought for intensity on two mood dimensions, happy and sad. On these scales, a score of one was assigned to the highest intensity (strong) and a score of two to the lowest intensity (weak). Second, the raters scored each thought for appropriateness to each subject's assigned mood condition (happy, sad). A score of



one was assigned to the thought if it was appropriate to the assigned mood, and a score of two was assigned to the thought if it was inappropriate to the assigned mood.

The judges' ratings were subjected to three types of statistical examination. Following Potts et al. (1986), a descriptive statistic was calculated for the agreement between raters for 'appropriateness' of mood, defined simply in terms of the raters' agreement about the appropriateness of the affective valence of each subject's recorded thought to the assigned mood condition. Percentage agreement out of the 64 possible cases was calculated for each mood (happy, sad). That is, the percentage of agreements for appropriateness of thought for the 32 subjects in the happy-mood condition was calculated, and the percentage of agreements for appropriateness of thought for the 32 subjects in the sad-mood condition was calculated. The raters agreed with each other on 96.88% of the happy thoughts and 100% of the sad thoughts. The results thus indicated that judges agreed that children's happy and sad thoughts were appropriate to their assigned mood condition.

Although Potts et al. (1986) did not do so, the judges' ratings of appropriateness of children's thoughts were subjected to statistical test. The Kappa statistic (Cohen, 1960), a measure of agreement, was performed on the judges' ratings of appropriateness of thought for the 32 subjects in the happy-mood condition, and the judges' ratings of

appropriateness of thought for the 32 subjects in the sad-mood condition. For the happy-mood condition thoughts, Kappa was incalculable because there were no marginal scores. (In 32 cases, one judge rated 32 thoughts as appropriate and one judge rated 31 thoughts as appropriate. Marginal scores were both zero.) For sad-mood condition thoughts, Kappa was calculable ( $\underline{K} = 1.0$ ).

According to Bangdiwala (1985), kappa-like statistics have a drawback; that is, the negative lower bound depends on the observed marginal totals. Consequently, Bangdiwala proposed an alternate statistic for measuring observer agreement that accounts for chance agreement. Following Bangdiwala's argument, the judges' ratings of the children's thoughts were also tested using his statistic. The raters were found perfectly to agree on the appropriateness of the children's sad thoughts as to their condition ( $\underline{B} = 1.0$ ) and highly to agree on the appropriateness of the children's happy thoughts as to their condition ( $\underline{B} = 0.97$ ). These latter results provide strong support for the results of the percentage agreements. That is, judges agreed that children's sad and happy thoughts were highly appropriate to their assigned mood condition.

The second descriptive statistic, also following Potts et al. (1986), was for agreement between raters for intensity of mood, as explained above. The percentage agreement out of the 64 possible cases was calculated for

each mood on each dimension. That is, the percentage of agreements for the happy dimension for the 32 subjects in the happy-mood condition and the percentage of agreements for the happy dimension for the 32 subjects in the sad-mood condition were calculated. Similar calculations were performed for the sad dimension. The raters agreed with each other on 50% and 100% of the intensity of the happy thoughts on the happy and sad dimensions, respectively. The results indicated that judges' agreement on the intensity of children's happy thoughts on a happy dimension was moderate, and agreement on the intensity of happy thoughts on a sad dimension was perfect. For the intensity of sad thoughts, raters agreed with each other 100% on the happy dimension and 63.75% on the sad dimension. The results indicated that judges' agreement on the intensity of children's sad thoughts on a happy dimension was perfect, and agreement on the intensity of sad thoughts on a sad dimension was moderately high.

Although Potts et al. (1986) did not do so, the statistical significance of the judges' ratings of intensity of thought was assessed. Two measures of agreement were used: the Kappa and the Bangdiwala statistics. The Kappa statistic indicated that, for the intensity of thoughts in the happy-mood condition, raters had no agreement on the happy dimension ( $K = 0.055$ ). Kappa was incalculable for the sad dimension because there were no marginal means. (In 32

cases, both judges rated 32 thoughts as weak. Marginal scores were zero.) The Bangdiwala statistic showed that for the intensity of thoughts in the happy-mood condition, raters agreed moderately on the happy dimension ( $\underline{B} = 0.47$ ) and agreed perfectly on the sad dimension ( $\underline{B} = 1.0$ ). The results thus indicated that the agreement of the judges about the intensity of thoughts in the happy-mood condition was moderate on a happy dimension, and perfect on a sad dimension.

The Kappa statistic indicated that, for the intensity of thoughts in the sad-mood condition, raters had weak agreement on the sad dimension ( $\underline{K} = 0.2$ ) and perfect agreement on the happy dimension ( $\underline{K} = 1.0$ ). Since the percentage agreement of raters for the intensity of thoughts in the sad-mood condition on a sad dimension was 63.75%, the result of the Kappa statistic was hard to reconcile with the obtained values for percentage of agreements. The Bangdiwala statistic showed that for the intensity of thoughts of the sad-mood condition, raters agreed moderately on the sad dimension ( $\underline{B} = 0.57$ ) and agreed perfectly on the happy dimension ( $\underline{B} = 1.0$ ). The results of the Bangdiwala statistic seem more nearly to approximate the actual data. The results thus indicated that the agreement of the judges about the intensity of thoughts in a sad-mood condition was moderate on a sad dimension, and perfect on a happy dimension.

The third method for evaluating the judges' ratings, one new to the area, consisted of analyses of variance of the judges' scores for each of the two dimensions. Since the judges were in high overall agreement (i.e.,  $\underline{B} = 0.63$  for intensity of happy and sad thoughts on a happy dimension, and  $\underline{B} = 0.72$  for intensity of happy and sad thoughts on a sad dimension), the analyses were run on one judge's ratings. Therefore,  $2 \times 2 \times 2 \times 2$  (Mood x Age x Sex of subject x Experimenter) factorial analyses of variance were performed on one judge's ratings of intensity of thought on the happy dimension and the sad dimension. The results of the analysis of variance for the judge's ratings of the intensity of thought on a happy dimension are presented in Table 1.

The judge's ratings seemed to show that intensity of thought of happy- and sad-mood condition children on a happy dimension was affected by mood. That is, the judge seemed to rate the intensity of thoughts of sad-mood condition children weaker on a happy dimension ( $\underline{M} = 1.97$ ) than the happy-mood condition children ( $\underline{M} = 1.03$ ). In support, the analysis yielded a highly significant effect for mood of subject ( $\underline{F} (1,48) = 450.00, \underline{p} < 0.0001$ ). The results thus indicated that thoughts generated by the sad-mood condition children were not as strong on a happy dimension as the thoughts of the happy-mood condition children, as judged by adults.

Table 1

Summary of Analysis of Variance for the Judge's Ratings  
of Intensity of Thought on a Happy Dimension

Variable(s)	<u>F</u>	<u>p</u>
Mood (M)	450.00	0.0001
Age (A)	2.00	0.1638
Sex of Subject (S)	0.00	1.0000
Experimenter (E)	2.00	0.1638
MxA	0.00	1.0000
MxS	2.00	0.1638
MxE	0.00	1.0000
AxS	2.00	0.1638
AxE	0.00	1.0000
SxE	2.00	0.1638
MxAxS	0.00	1.0000
MxAxE	2.00	0.1638
MxSxE	0.00	1.0000
AxSxE	0.00	1.0000
MxAxSxE	2.00	0.1638

Note: degrees of freedom for each test were 1 and 48.

The judge's ratings of intensity of happy- and sad-mood condition children's thoughts on a happy dimension were unaffected by other variables and their interactions.

In Table 2, the results of the analysis of variance that tested the effects of the independent variables on the judge's ratings of the intensity of thought of happy- and sad-mood condition children on a sad dimension are presented.

The judge's ratings of intensity of thought of happy- and sad-mood condition children on a sad dimension seemed to be affected by mood of subject. That is, the judge appeared to rate the intensity of thoughts of happy-mood condition children as weaker on a sad dimension ( $\bar{M} = 2.0$ ) than the sad-mood condition children ( $\bar{M} = 1.13$ ). In support, the analysis yielded a highly significant effect for mood of subject ( $F(1,48) = 196.00, p < 0.0001$ ). The results thus indicated that thoughts generated by the happy-mood condition children were weaker on a sad dimension than the thoughts of the sad-mood condition children, as judged by adults.

The judge's ratings of intensity of thought of happy- and sad-mood condition children on a sad dimension were unaffected by other variables and their interactions.

Table 2

Summary of Analysis of Variance for the Judge's Ratings  
of Intensity of Thought on a Sad Dimension

Variable(s)	<u>F</u>	<u>p</u>
Mood (M)	196.00	0.0001
Age (A)	1.00	0.3223
Sex of Subject (S)	0.00	1.0000
Experimenter (E)	1.00	0.3223
MxA	1.00	0.3223
MxS	0.00	1.0000
MxE	1.00	0.3223
AxS	1.00	0.3223
AxE	0.00	1.0000
SxE	1.00	0.3223
MxAxS	1.00	0.3223
MxAxE	0.00	1.0000
MxSxE	1.00	0.3223
AxSxE	0.00	1.0000
MxAxSxE	0.00	1.0000

Note: degrees of freedom for each test were 1 and 48.



### Children's Own Estimates of Mood

For children's own estimates of mood, a choice of the happiest face was scored as a 5.0 response, a choice of the second happiest face was scored as a 4.0 response and so on through to the choice of the saddest face, which was scored as a 1.0 response (Bartlett et al., 1982). Children were given one score based on their self-rating of mood made immediately following the mood-induction procedure. In order to assess the validity of the mood-induction procedure, a 3 x 2 x 2 x 2 (Mood x Age x Sex of subject x Experimenter) factorial analysis was performed on the mean self-rated mood scores. The results are presented in Table 3. Scheffe tests were employed for post-hoc comparisons.

Children's estimates of their own moods seemed to be affected by mood of subject. Happy-mood condition children appeared to rate their mood as highly happy ( $\bar{M} = 4.47$ ); and no-induction condition children appeared to rate their mood as happy ( $\bar{M} = 3.90$ ), while sad-mood condition children appeared to rate their mood as mildly happy or neutral ( $\bar{M} = 3.40$ ). In support, the analysis yielded a significant effect for mood of subject ( $F(2,72) = 7.55, p < 0.0011$ ). Post-hoc comparisons were used further to examine the differences between the means of the groups. The results of the Scheffe tests were not conclusive. Although significant differences were found between the happy- and sad-condition groups ( $p < 0.05$ ), the happy- and no-induction condition

Table 3

Summary of the Analysis of Variance for the  
Children's Estimates of Their Own Moods

Variable(s)	<u>df</u>	<u>F</u>	<u>p</u>
Mood (M)	2,72	7.55	0.0011
Age (A)	1,72	32.36	0.0001
Sex of Subject (S)	1,72	0.22	0.6424
Experimenter (E)	1,72	3.14	0.0807
MxA	2,72	0.45	0.6380
MxS	2,72	3.17	0.0481
MxE	2,72	0.97	0.3825
AxS	1,72	0.01	0.9260
AxE	1,72	1.47	0.2294
SxE	1,72	0.08	0.7805
MxAxS	2,72	1.50	0.2310
MxAxE	2,72	0.66	0.5195
MxSxE	2,72	0.42	0.6603
AxSxE	1,72	0.22	0.6424
MxAxSxE	2,72	0.03	0.9658

groups and the sad- and no-induction condition groups were only significantly different on average. To provide a more conclusive interpretation of the results, additional comparisons were performed using the Least Squares Differences (LSD) method, a more conservative test of the differences between means. Significant differences were found between the happy- and sad-condition groups, and the happy- and no-induction condition groups ( $p < 0.05$ ). A nonsignificant difference was found for the comparison between sad- and no-induction condition groups ( $p > 0.05$ ). Thus, the results indicated that happy-condition children rated their mood highly happy, while sad- and no-induction condition children rated their mood mildly happy.

Children's self-rating of mood was apparently affected by age of subject. Six-year-old children seemed to rate their mood as highly happy ( $M = 4.56$ ), whereas 3-year-old children seemed to rate their mood as neutral ( $M = 3.22$ ). The analysis supported this suggestion, yielding a significant effect for age of subject ( $F(1,72) = 32.36, p < 0.0001$ ).

In Figure 1, children's estimates of their own mood are illustrated as a function of mood of subject and sex of subject. The figure suggests that the effect of mood changed differentially with sex. That is, subjects' self-ratings of mood did not seem to progress in the same direction for both sexes. The analysis of variance

supported this suggestion, yielding a significant mood x sex of subject interaction ( $F(2,72) = 3.17, p < 0.0481$ ). A closer examination of the figure suggests that happy-mood condition boys seemed to rate their mood as highly happy, while no-induction condition boys seemed to rate their mood as mildly happy. Girls' ratings of their moods did not seem to vary with these two mood conditions. That is, happy- and no-induction condition girls seemed to rate their moods as happy. In addition, the self-ratings of boys and girls in a sad-mood condition did not seem to vary from the ratings of the boys in a no-induction condition, and appeared mildly happy. Post-hoc comparisons did not support these notions. All pairwise comparisons of the differences between the means of the groups were nonsignificant ( $p > 0.05$ ). Therefore, the strength of the interaction of mood and sex of subject should be considered marginal.

Children's estimates of their own mood were unaffected by other variables and their interactions.

Figure 1: Children's estimates of their own mood as a function of mood and sex of subject.



### Judge's Ratings of the Children's Self-ratings of Mood

Consistent with the procedure of judging the appropriateness of children's generated thoughts to their assigned mood condition, children's estimates of their own mood were judged for appropriateness to the assigned mood condition. One adult judge performed one rating task on each child's self-rating of mood. For each subject, self-rating of mood response was scored for appropriateness to mood condition (happy, sad, no induction). A score of one was assigned to the self-rating response if it was appropriate to the mood condition, and a score of two was assigned if the self-rating response was inappropriate to the mood condition. In order to assess the validity of the mood-induction procedure, a 3 x 2 x 2 x 2 (Mood x Age x Sex of subject x Experimenter) factorial analysis was performed on the judge's ratings of appropriateness of the children's self-ratings to their mood condition. The results of the analysis are shown in Table 4. Scheffe tests were employed for post-hoc comparisons.

The judge's ratings of the appropriateness of the children's self-ratings seemed to be affected by mood of subject. That is, the judge appeared to rate the self-ratings of the happy-mood condition children as highly appropriate to their mood ( $\bar{M} = 1.16$ ), and the sad-mood and no-induction condition children as mildly appropriate ( $\bar{M}_s = 1.72, 1.75$ ). In support, the analysis yielded a main effect

Table 4

Summary of the Analysis of Variance for the Judge's Ratings  
of Appropriateness of the Children's Self-ratings of Mood

Variable(s)	<u>df</u>	<u>F</u>	<u>p</u>
Mood (M)	2,72	22.37	0.0001
Age (A)	1,72	0.26	0.6111
Sex of subject (S)	1,72	6.52	0.0128
Experimenter (E)	1,72	2.35	0.1298
MxA	2,72	5.15	0.0081
MxS	2,72	0.07	0.9369
MxE	2,72	2.35	0.1298
AxS	1,72	0.00	1.0000
AxE	1,72	4.17	0.0447
SxE	1,72	0.00	1.0000
MxAxS	2,72	1.37	0.2608
MxAxE	2,72	0.46	0.6353
MxSxE	2,72	0.59	0.5587
AxSxE	1,72	0.26	0.6111
MxAxSxE	2,72	1.63	0.2030

for mood of subject ( $F(2,72) = 22.37, p < 0.0001$ ).

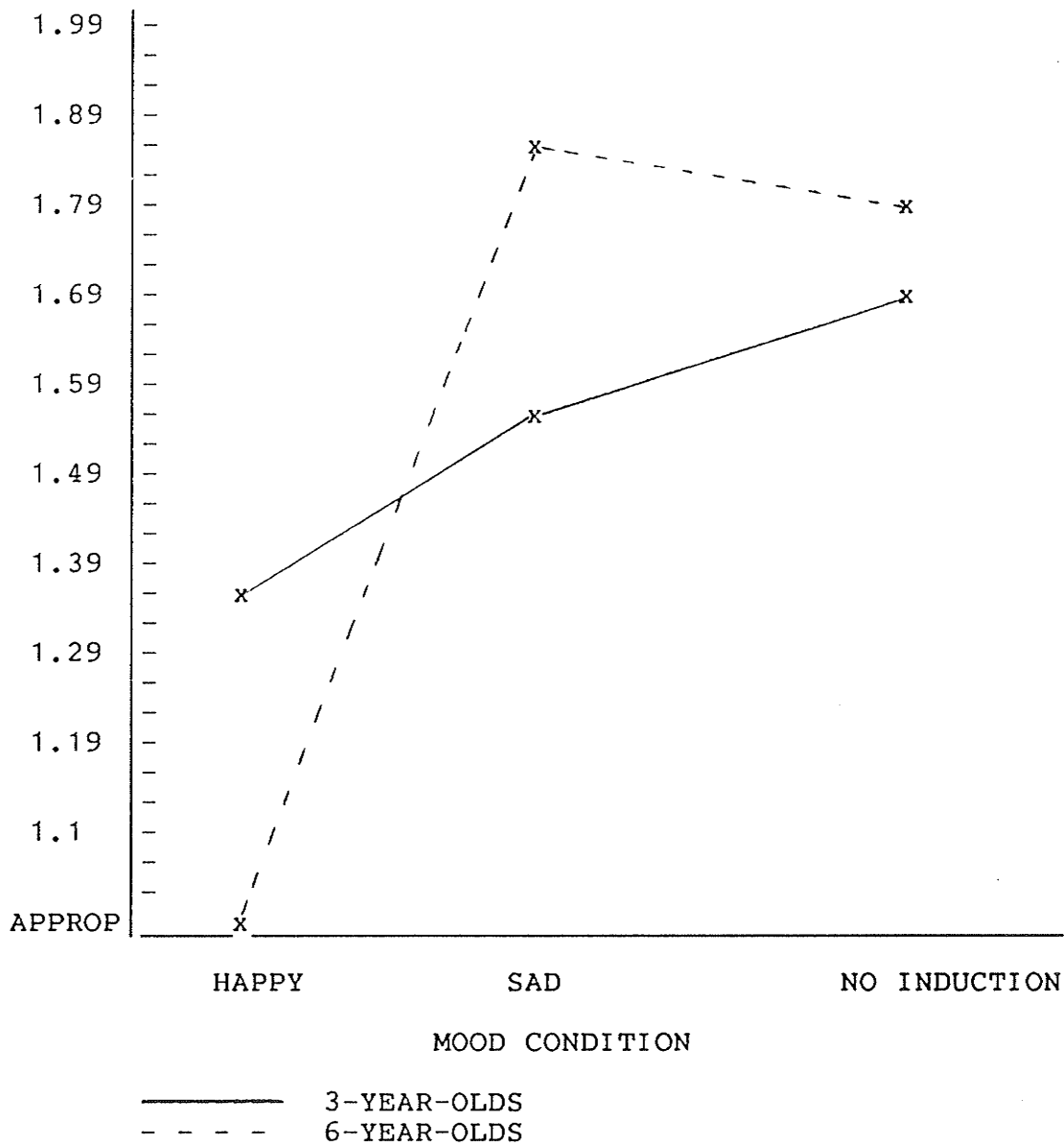
Post-hoc comparisons of means between the groups (happy, sad, no induction) yielded significant differences between the happy and sad, and happy and no-induction groups ( $p < 0.05$ ); and nonsignificant differences between the sad and no-induction groups ( $p > 0.05$ ). Thus, the results indicated that appropriateness of happy-mood condition children's ratings of their mood was high, and greater than that for no-induction and sad-mood condition children. In addition, the appropriateness of no-induction and sad-mood condition children's ratings to their condition was moderately low.

The judge's ratings of children's self-ratings of mood seemed to be affected by sex of subject. The judge seemed to rate boys' self-ratings ( $M = 1.44$ ) as more appropriate than girls' ( $M = 1.65$ ). The analysis supported this suggestion, yielding a significant effect for sex of subject ( $F(1,72) = 6.52, p < 0.0128$ ). The results indicated that boys rated their moods more appropriately than girls.

Figure 2 illustrates the judge's ratings of appropriateness of children's self-ratings of mood as a function of age and mood of subject. The figure suggests that the effect of the three moods (happy, sad, no induction) on the appropriateness of self-rating of mood changed differentially with age. That is, subjects' appropriateness of self-rating of mood did not seem to progress with age in the same fashion for all three moods.



Figure 2: Judge's ratings of appropriateness of self-ratings as a function of age and mood of subject.

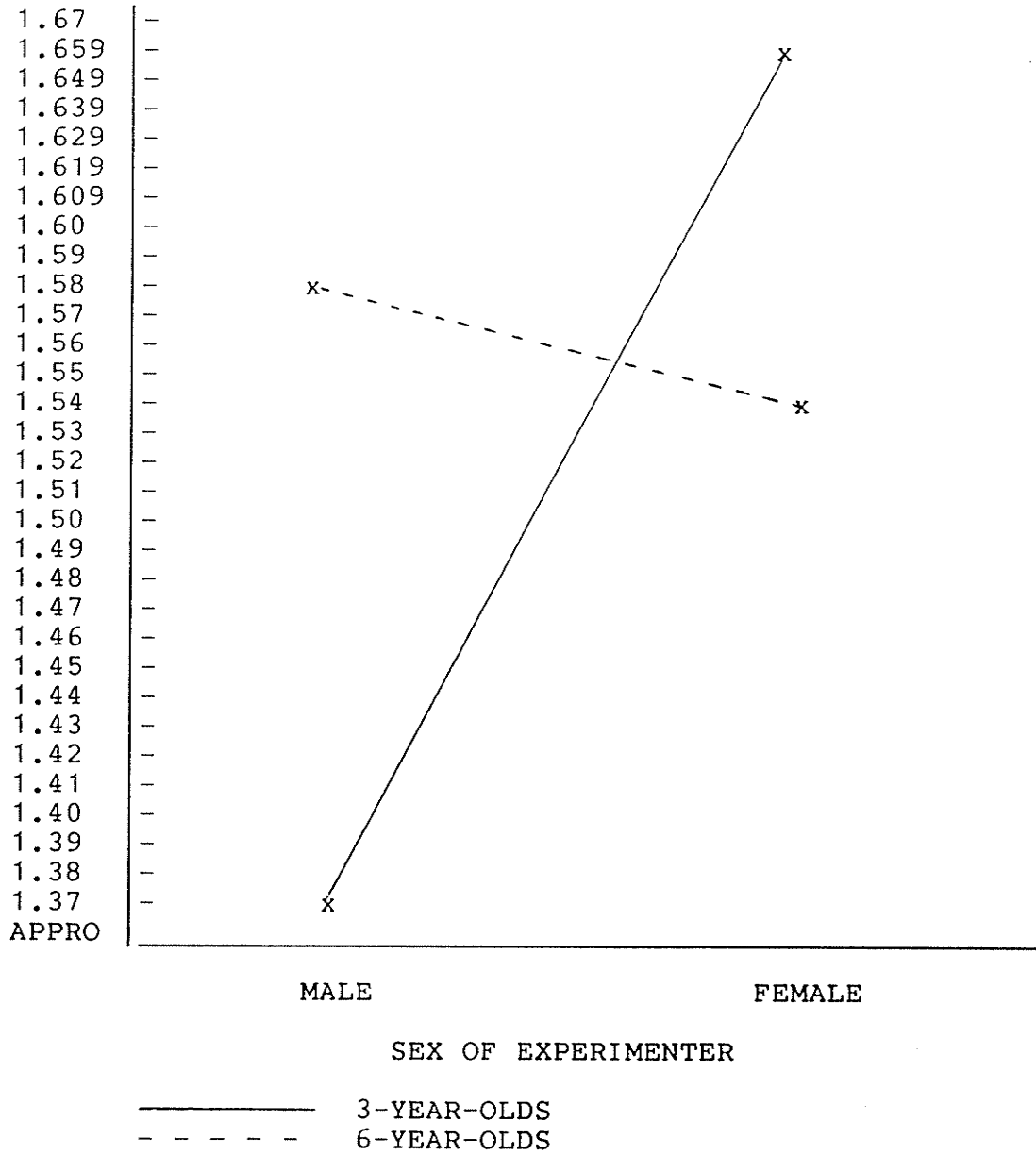


The analysis of variance supported this notion, yielding a significant age x mood of subject interaction ( $F(1,72) = 5.15, p < 0.0081$ ).

In the figure, appropriateness of self-rating of mood appears to increase between the youngest and oldest subjects under the happy-mood condition, while the appropriateness of self-rating of mood appears to decrease between the oldest and youngest subjects under the sad-mood condition. Post-hoc comparisons of means between the 3-year-olds and 6-year-olds for each of the mood conditions yielded significant differences between the happy condition 3- and 6-year-olds, the sad condition 3- and 6-year-olds, the happy and sad condition 6-year-olds, and the happy and sad condition 3-year-olds ( $p < 0.05$ ). The exceptions were the no-induction condition 3- and 6-year-olds, the sad condition 6-year-olds and no-induction condition 3-year-olds, the sad and no-induction condition 6-year-olds, and the sad and no-induction condition 3-year-olds, which yielded nonsignificant differences between the means ( $p > 0.05$ ). Thus, the interaction between age and mood of subject indicated that the appropriateness of the children's ratings were as follows: For the 6-year-olds, appropriateness of happy-condition subjects' ratings was high; sad mood and no induction low. For the 3-year-olds, appropriateness of happy-condition subjects ratings was moderately high; sad and no induction moderate.

Figure 3 illustrates the judge's ratings of children's appropriateness of self-rating as a function of age of subject and sex of experimenter. The figure suggests that 3- and 6-year-olds did not rate their moods with the same degree of appropriateness when self-rating of mood was administered by a female as compared to a male. The analysis of variance supported this suggestion, yielding a significant age of subject x sex of experimenter interaction ( $F(1,72) = 4.17, p < 0.0447$ ). The figure suggests that 3-year-old children's self-ratings were more appropriate in the presence of a male experimenter than a female. In addition, appropriateness of self-rating of 3-year-old children in the presence of a male experimenter appeared to be high, and greater than that of children in all other conditions. Appropriateness of self-rating of mood did not seem to vary for 6-year-olds in the presence of a male or female experimenter, and appeared moderate. Appropriateness of self-rating of mood appeared low for 3-year-olds in the presence of a female experimenter. Post-hoc comparisons supported these suggestions. That is, significant differences were found between the means of the 3-year-olds with a male and female experimenter, and 6- and 3-year-olds with a male experimenter as well as female experimenter ( $p < 0.05$ ). Nonsignificant differences were found between the means for 6-year-olds with a male and female experimenter, and for 6-year-olds with a male experimenter and 3-year-olds

Figure 3: Judge's ratings of appropriateness of children's self-ratings of mood as a function of age of subject and sex of experimenter.



with a female experimenter ( $P > 0.05$ ). Thus, the results indicated that the appropriateness of the 3-year-old children's self-ratings of mood in the presence of a male experimenter was high, while the appropriateness of the 3-year-old children's self-ratings of mood in the presence of a female experimenter was low. For the 6-year-olds, the appropriateness of their self-ratings of mood did not vary with sex of experimenter and was moderate.

No other effects were found for the judge's ratings of the appropriateness of the children's self-ratings of mood.

## RESULTS OF THE MEASURES OF MEMORY

### Free-recall Memory Performance

Children's free-recall responses were scored for presence or absence of story events, not for structural characteristics of the narrative (e.g., 'ladder was gone' conveys the event 'ladder was missing' and the 'party didn't do' conveys the event 'the party was ruined').

Although Potts et al. (1986) did not do so, the scoring in the present study was performed by two independent judges blind to the subjects' conditions. For scoring purposes, judges assigned a score of 1.0 to events deemed to be present in the story, and a score of zero to events deemed to be absent from the story. In the four instances that the judges did not agree, the assigned score for the recorded response was the lower value (zero). This procedure was used to yield conservative data working against the hypothesis that moods would facilitate overall recall performance.

For each child's responses, the coder tallied the number of responses scored by the judges as 1.0 (i.e., presence of event) to determine the number of events recalled. (Examples of 3- and 6-year-old children's

free-recall responses are presented in Appendices N and O.) Then, the coder scored each event recalled for type of affect (positive, neutral, negative).

As previously mentioned under Results, the affect of story content variable was a binomial variable. To ensure assumptions of normal distribution of errors, equal variance, and independence of errors, the responses for positive, neutral, and negative events were transformed as follows: For the positive events recalled, the transformation was

$$\text{ARCPositive events recalled} = 2 \text{ ARSIN}(\text{Positive events recalled}/6)$$

(Neter & Wasserman 1974, p. 508). Similar transformations were conducted for the neutral events recalled, and negative events recalled. For each subject, mean responses for the total transformed positive, neutral, and negative events were determined. Effects of the independent variables on 3- and 6-year-old children's recall of the transformed scores were tested by a 2 x 3 x 2 x 2 x 3 x 2 (Age x Mood x Sex of subject x Experimenter x Type of affective content of story x Affective valence of initial story event) mixed analysis of variance. The results are presented in Table 5. Scheffe tests were employed for post-hoc comparisons.

Table 5

## Summary of Analysis of Variance for the Free-recall Scores

Variable(s)	<u>df</u>	<u>F</u>	<u>p</u>
Age (A)	1,144	147.63	0.0001
Mood (M)	2,144	2.73	0.0683
Sex of subject (S)	1,144	0.04	0.8406
Experimenter (E)	1,144	2.67	0.1044
Type (T)	2,144	1.85	0.1606
Initial event (I)	1,144	10.66	0.0014
AxM	2,144	5.46	0.0052
AxS	1,144	3.31	0.0711
AxE	1,144	0.38	0.5402
AxT	2,144	2.26	0.1082
AxI	1,144	13.91	0.0003
MxS	2,144	0.03	0.9740
MxE	2,144	1.88	0.1569
MxT	4,144	2.53	0.0429
MxI	2,144	6.58	0.0018
SxE	1,144	2.33	0.1295
SxT	2,144	0.87	0.4191
SxI	1,144	0.07	0.7920
ExT	2,144	0.29	0.7519
ExI	1,144	1.00	0.3178



TxI	2,144	0.17	0.8404
AxMxS	2,144	0.74	0.4792
AxMxE	2,144	1.60	0.2057
AxMxT	4,144	3.15	0.0161
AxMxI	2,144	7.20	0.0010
AxSxE	1,144	0.41	0.5248
AxSxT	2,144	0.02	0.9828
AxSxI	1,144	2.30	0.1312
AxExT	2,144	0.16	0.8499
AxExI	1,144	0.01	0.9030
AxTxI	2,144	0.85	0.4314
MxSxE	2,144	2.22	0.1124
MxSxT	4,144	0.27	0.8990
MxSxI	2,144	1.44	0.2412
MxExT	4,144	0.94	0.4403
MxExI	2,144	5.85	0.0036
MxTxI	4,144	3.12	0.0169
SxExT	2,144	0.07	0.9325
SxExI	1,144	0.00	0.9825
SxTxI	2,144	0.81	0.4461
ExTxI	2,144	0.74	0.4775
AxMxSxE	2,144	3.78	0.0252
AxMxSxT	4,144	0.76	0.5499
AxMxExT	4,144	1.95	0.1057
AxMxSxI	2,144	1.27	0.2832
AxMxExI	2,144	5.00	0.0080
AxMxTxI	4,144	2.08	0.0858

AxSxExT	2,144	0.16	0.8547
AxSxExI	1,144	2.52	0.1143
AxSxTxI	2,144	1.53	0.2197
AxExTxI	2,144	1.79	0.1706
MxSxExT	4,144	0.93	0.4472
MxSxExI	2,144	0.56	0.5724
MxSxTxI	4,144	1.28	0.2789
MxExTxI	4,144	1.26	0.2895
SxExTxI	2,144	0.30	0.7402
AxMxSxExT	4,144	2.35	0.0571
AxMxSxExI	2,144	0.77	0.4628
AxMxSxTxI	4,144	0.27	0.8982
AxMxSxTxI	4,144	2.03	0.0938
AxSxExTxI	2,144	0.36	0.7002
MxSxExTxI	4,144	0.61	0.6553
AxMxSxExTxI	4,144	2.20	0.0715

---

Main effects. Free-recall scores seemed to be affected by age of subject, with 6-year-old children recalling more story events ( $\underline{M} = 0.33$ ) than 3-year-old children ( $\underline{M} = 0.08$ ). In support, the analysis of variance yielded a highly significant effect for age ( $\underline{F} (1,144) = 147.64, \underline{p} < 0.0001$ ). The results indicated that recall varied directly with age.

Free-recall scores were unaffected by mood of subject ( $\underline{F} (2,144) = 2.73, \underline{p} < 0.0683$ ). However, certain tendencies that are of interest in the Discussion are worth noting. Children in the happy-mood condition tended to recall more ( $\underline{M} = 0.24$ ) than the children in the no-induction and sad-mood conditions ( $\underline{M}_s = 0.20, 0.18$ ).

Free-recall scores were unaffected by sex of subject ( $\underline{F} (1,144) = 0.04, \underline{p} < 0.8406$ ). Girls ( $\underline{M} = 0.21$ ) and boys ( $\underline{M} = 0.20$ ) recalled virtually the same number of story events.

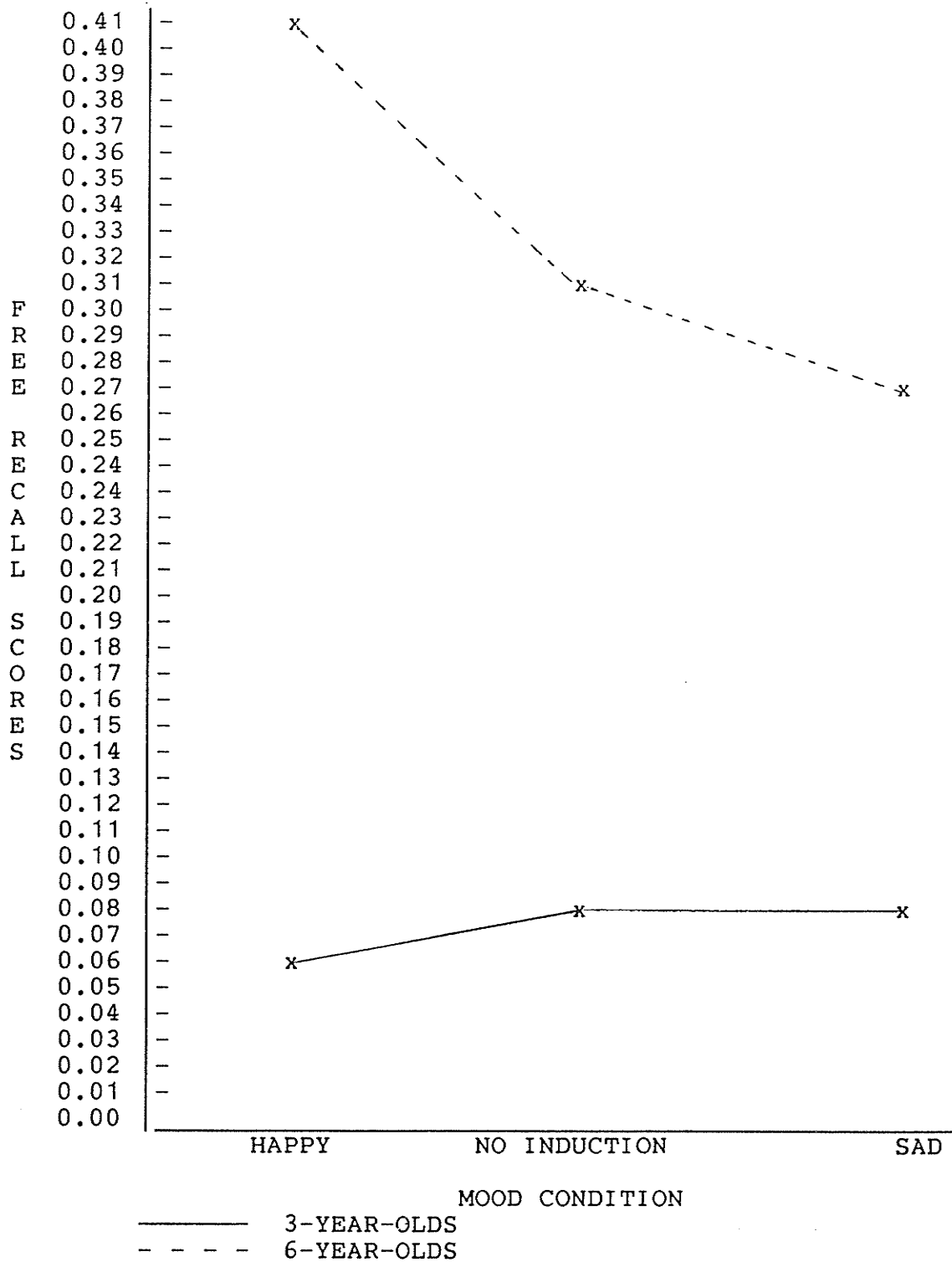
Free-recall scores were unaffected by sex of experimenter ( $\underline{F} (1,144) = 2.67, \underline{p} < 0.1044$ ). Children tested by a female experimenter ( $\underline{M} = 0.22$ ) and a male experimenter ( $\underline{M} = 0.19$ ) had similar recall performance.

Free recall was unaffected by type of affective content of story ( $\underline{F} (2,144) = 1.85, \underline{p} < 0.1606$ ). Certain tendencies that are of interest in the Discussion are worth noting. Children tended to recall more negative story events ( $\underline{M} = 0.23$ ) than neutral and positive story events ( $\underline{M}_s = 0.21, 0.18$ ).

Free recall appeared to be affected by affective valence of initial story event, with children who heard a story with a positive initial story event recalling more ( $\underline{M} = 0.24$ ) than children who heard a story with a negative initial story event ( $\underline{M} = 0.17$ ). The analysis of variance supported this suggestion, yielding a significant effect for affective valence of initial story event ( $\underline{F} (1,144) = 10.66$ ,  $\underline{p} < 0.0014$ ). The results thus indicated that children recalled more when they heard a story with a positive initial event than one containing a negative initial event.

Two-way interactions. Figure 4 illustrates the children's free-recall scores as a function of age of subject and mood of subject. The figure suggests that 6-year-old children recalled more than 3-year-old children. In addition, recall of 6-year-olds' appeared to be high in a happy-mood condition, and appeared greater than in no-induction or sad-mood conditions. Recall of no-induction and sad-mood children seemed to be moderate. In addition, three-year-olds' recall did not seem to vary with mood condition, and seemed to be low. The analysis of variance supported these suggestions, yielding a significant age x mood interaction ( $\underline{F} (1,144) = 5.46$ ,  $\underline{p} < 0.0052$ ). Post-hoc comparisons of the differences between the means of groups also provided support for these suggestions. Nonsignificant differences were found between the means of the sad-mood and

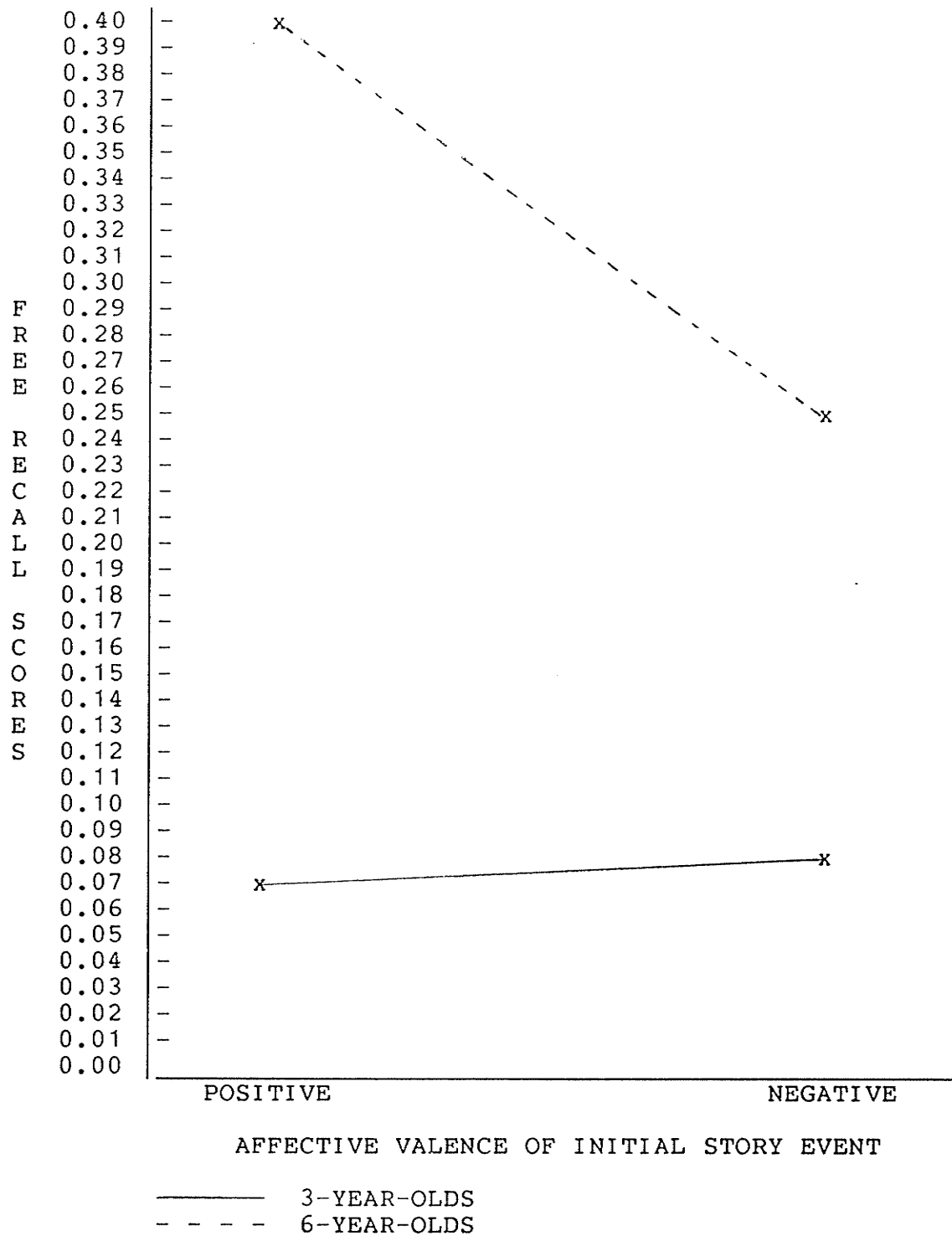
Figure 4: Free-recall scores as a function of age and mood of subject



no-induction condition 6-year-olds, and for the means of all groups of 3-year-olds ( $p > 0.05$ ). All other comparisons of differences between group means were found to be significant ( $p < 0.05$ ). The results thus indicated that happy-mood condition 6-year-olds' recall was high, while no-induction and sad-mood condition 6-year-olds' recall was moderate. Three-year-old children's recall did not vary by mood of subject, and was low.

Figure 5 illustrates the free-recall scores as a function of age of subject and affective valence of the initial story event. The figure suggests that the recall of 6-year-old children was greater than that of 3-year-old children. Further, the recall of 6-year-old children who heard a story with a positive initial story event appeared to be greater than that of 6-year-olds who heard a story with a negative initial event. Recall of 3-year-old children appeared to be low and did not seem to vary with affective valence of initial story event. The analysis of variance supported these suggestions, yielding a significant age of subject  $\times$  affective valence of initial story event interaction ( $F(1,144) = 13.91, p < 0.0003$ ). Post-hoc comparisons also supported these suggestions. Significant differences were found for all groups ( $p < 0.05$ ) except the differences between the means of the 3-year-old groups ( $p > 0.05$ ). Thus, the results indicated that recall of 6-year-old children who heard a story with a positive

Figure 5: Free-recall scores as a function of age and affective valence of initial story event.

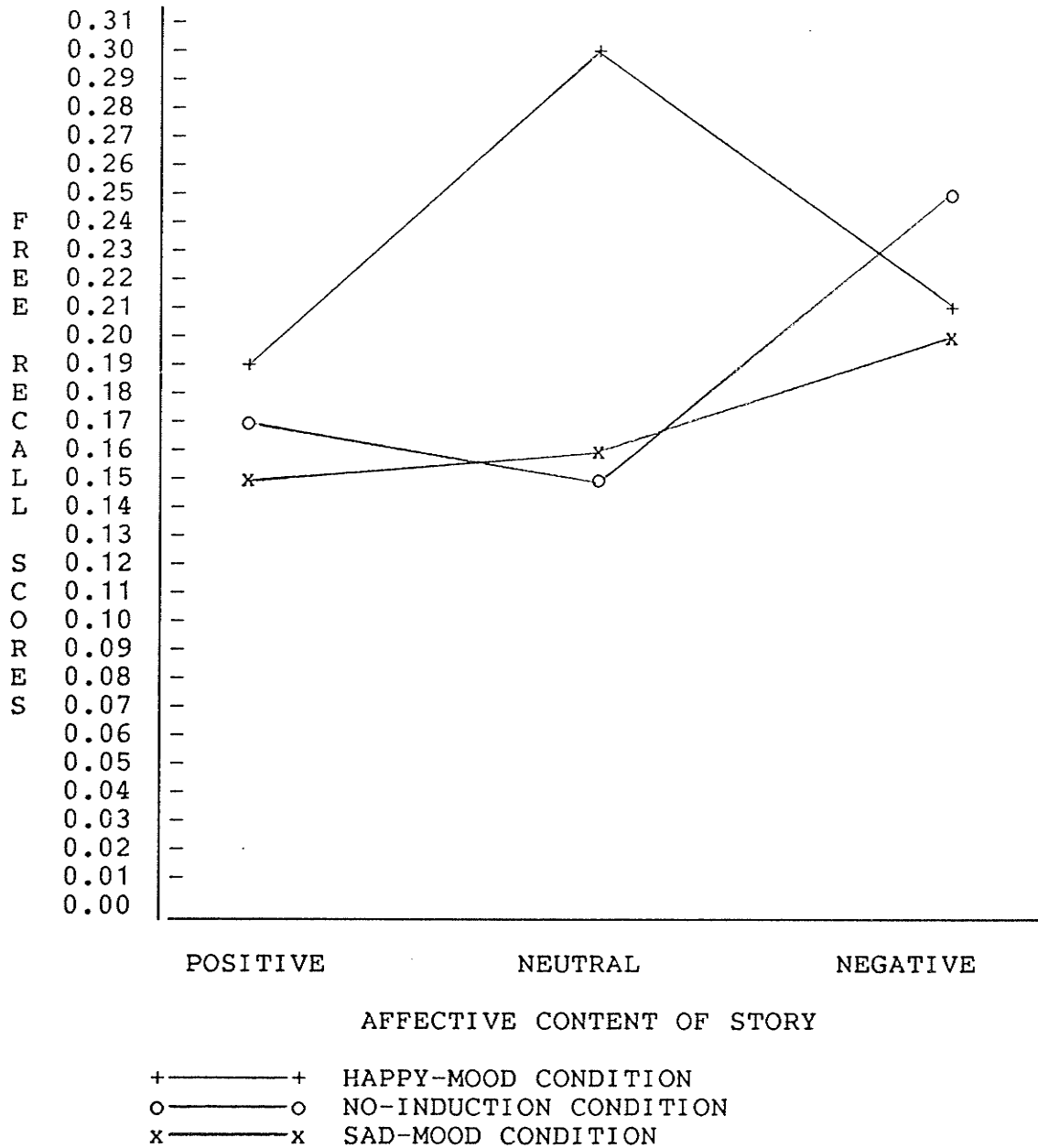


initial event was high, while recall of 6-year-old children who heard a story with a negative initial event was moderate. Recall of 3-year-old children was low, and did not vary with affective valence of the initial story event.

Figure 6 illustrates the free-recall scores as a function of mood of subject and affective content of story. The figure suggests that happy-mood condition children's recall of neutral story events was high, while their recall of positive and negative events was moderate. Further, no-induction condition children's recall of negative story events appeared to be moderately high, while their recall of positive and neutral events appeared to be moderate. Finally, sad-mood condition children's recall of negative story events seemed to be moderate, while their recall of positive and neutral events seemed to be moderately low. The analysis of variance supported these suggestions, yielding a significant mood of subject x affective valence of story content interaction ( $F(4,144) = 2.53, p < 0.0429$ ). Post-hoc comparisons of the differences between the means of groups did not fully support the suggestions. Significant differences were found only between the mean of the happy-mood condition for neutral events and the means of all other groups, and between the mean of the no-induction condition for negative events and the means of all the other groups ( $p < 0.05$ ). The results thus indicated that happy-mood condition children's recall of neutral events was



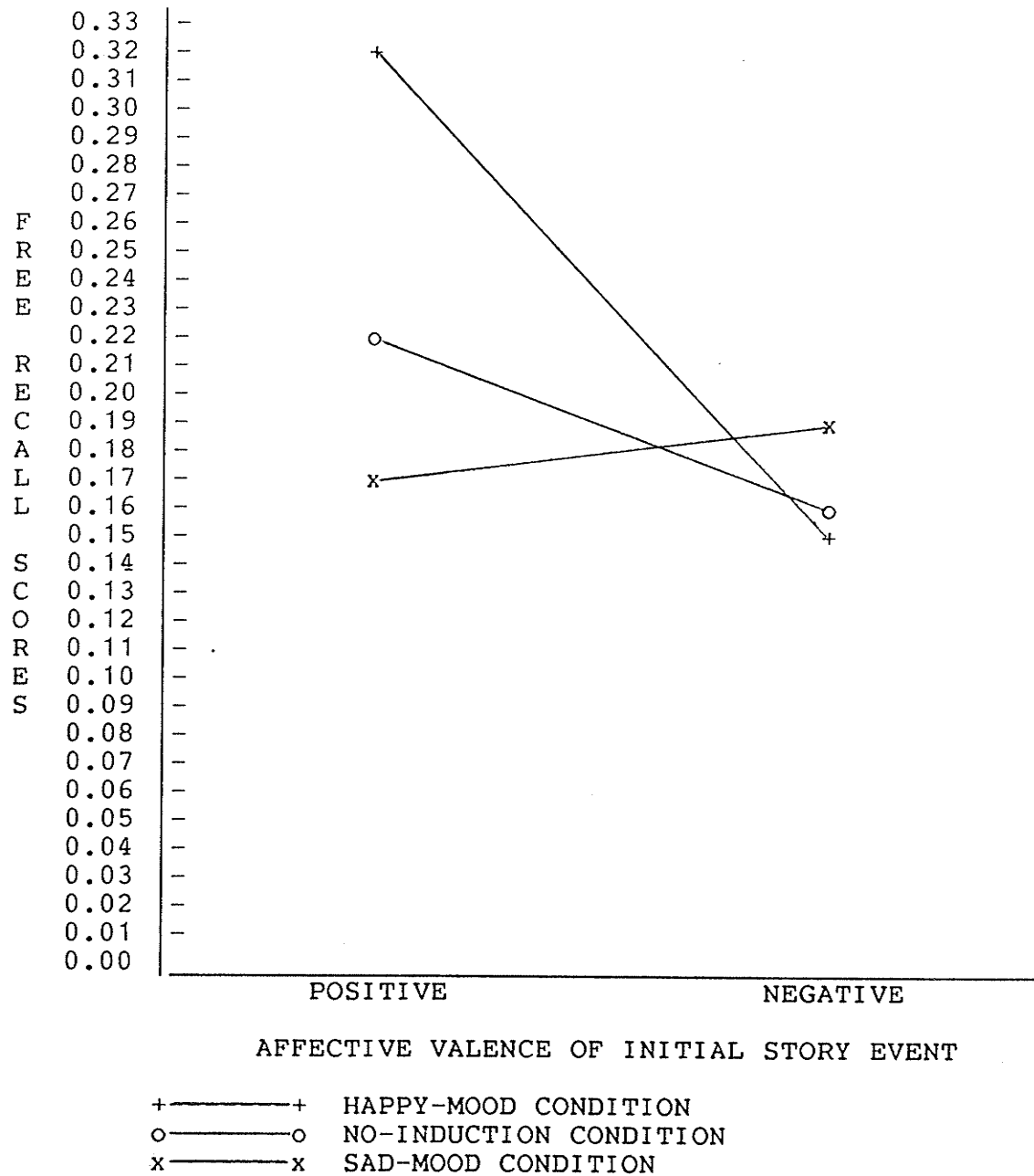
Figure 6: Free-recall scores as a function of mood of subject and affective content of story.



high. No-induction condition children's recall of negative events was moderately high. Recall of all other children for affective story content was moderate, and did not vary with mood of subject.

Figure 7 illustrates free-recall scores as a function of mood of subject and affective valence of initial story event. The figure suggests that recall of happy-mood condition children who heard a positive initial story event was high, while recall of happy-mood condition children who heard a negative initial story event was moderately low. Recall of no-induction condition children who heard a positive initial story event seemed moderate, while recall of no-induction condition children who heard a negative initial story event seemed moderately low. Finally, sad-mood condition children's recall did not seem to vary according to the affective valence of initial story event, and appeared moderately low. In support, the analysis yielded a significant effect of mood of subject x affective valence of initial story event ( $F(1,144) = 6.58, p < 0.0018$ ). Post-hoc comparisons did not clearly support these suggestions. Significant differences were found only between the mean of the happy-mood condition group who heard a story with a positive initial event and the means of all other groups ( $p < 0.05$ ). The results thus indicated that happy-mood condition children who heard a story with a positive initial event had high recall, which was greater

Figure 7: Free-recall scores as a function of mood of subject and affective valence of initial story event.



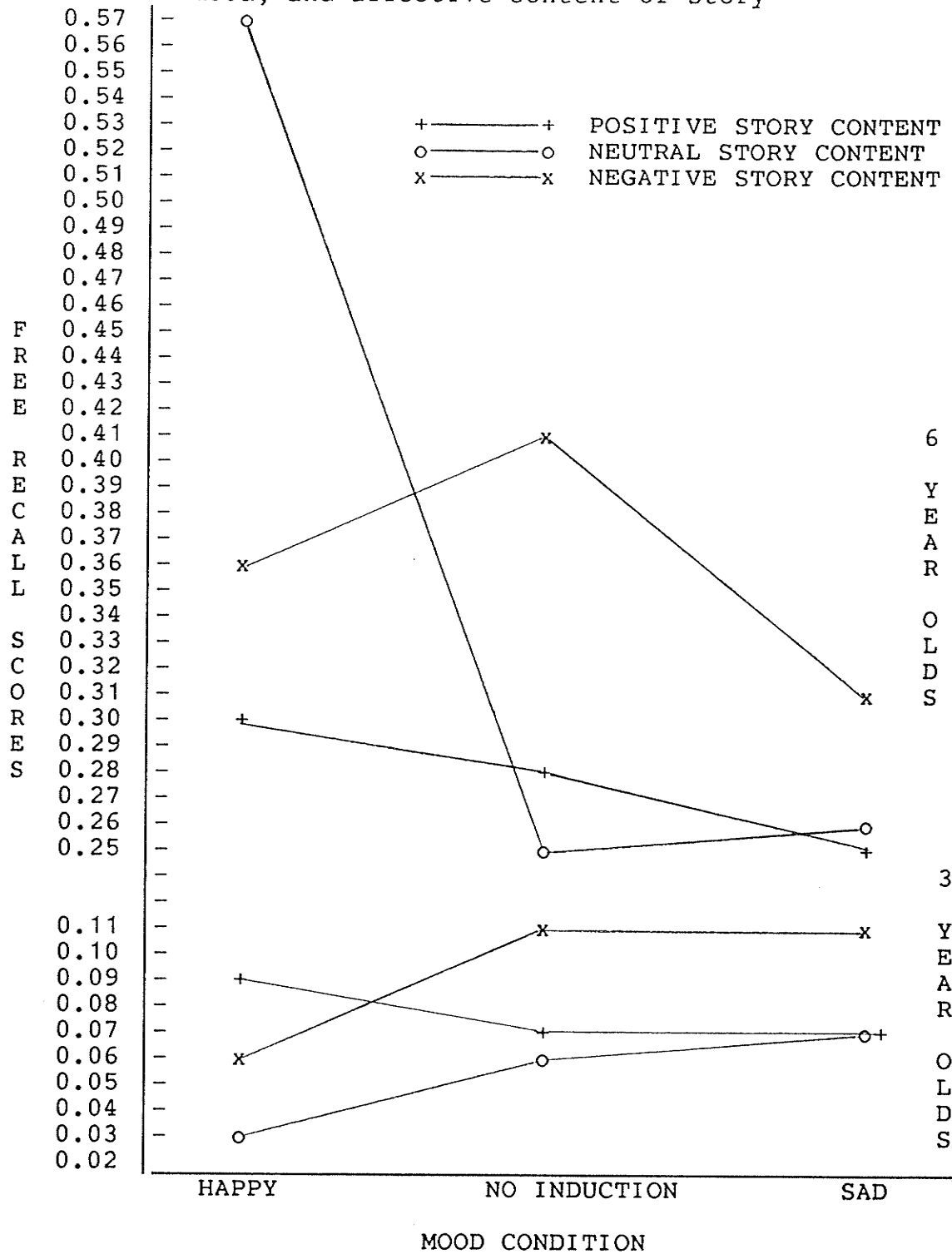
than children in all other conditions. Recall of children in all other conditions was moderate.

Free-recall scores were unaffected by any other two-way interactions.

Higher-order interactions. Figure 8 illustrates free recall as a function of age of subject, mood of subject, and type of affective story content. Although the interaction was significant ( $F(4,144) = 7.20, p < 0.0010$ ), it was complex. From inspection of the figure, it would appear that older children recalled more than younger children. Furthermore, 3-year-olds' recall did not vary for affective content of story across the mood-condition variable. For all mood conditions, 6-year-olds' recall of negative events was moderate, and greater than their recall of positive and neutral events. The one exception was for the happy-mood 6-year-olds' recall of neutral events, which was high. The above effects would be difficult to interpret. Accordingly, the interaction is not discussed further.

Figure 9 illustrates free recall as a function of age of subject, mood of subject, and affective valence of initial story event. Although the interaction was significant ( $F(1,144) = 7.20, p < 0.0010$ ), it was complex. For example, the figure suggests that older children recalled more than younger children. More specifically, younger children who heard a positive or negative initial

Figure 8: Free-recall scores as a function of age, mood, and affective content of story



story event seemed to have low recall across the mood-condition variable. Although recall of 6-year-old children seemed to vary across the mood-condition variable for positive initial event, it did not seem to for negative initial event and appeared moderately low. Furthermore, recall of 6-year-olds who heard a positive initial event seemed to decrease across moods from high recall in a happy-mood condition to moderately high in a no-induction condition, to moderately low in a sad-mood condition. Such effects would be difficult to interpret. Accordingly, this interaction is not discussed further.

Figure 10 illustrates free-recall scores as a function of mood of subject, sex of experimenter, and affective valence of initial story event. Although the interaction was significant ( $F(2,144) = 5.85, p < 0.0036$ ), it was complex. For negative initial story event, it would appear that recall did not vary across mood condition. Further, recall in the presence of a female experimenter was greater than that in the presence of a male. For positive initial event, it would appear that happy-mood children in the presence of a male experimenter had high recall. Happy-mood and no-induction children in the presence of a female experimenter had moderate recall. Recall of all other children was moderately low. Such effects would be difficult to interpret. Accordingly, this interaction is not discussed further.

Figure 9: Free-recall scores as a function of age, mood, and affect of initial story event.

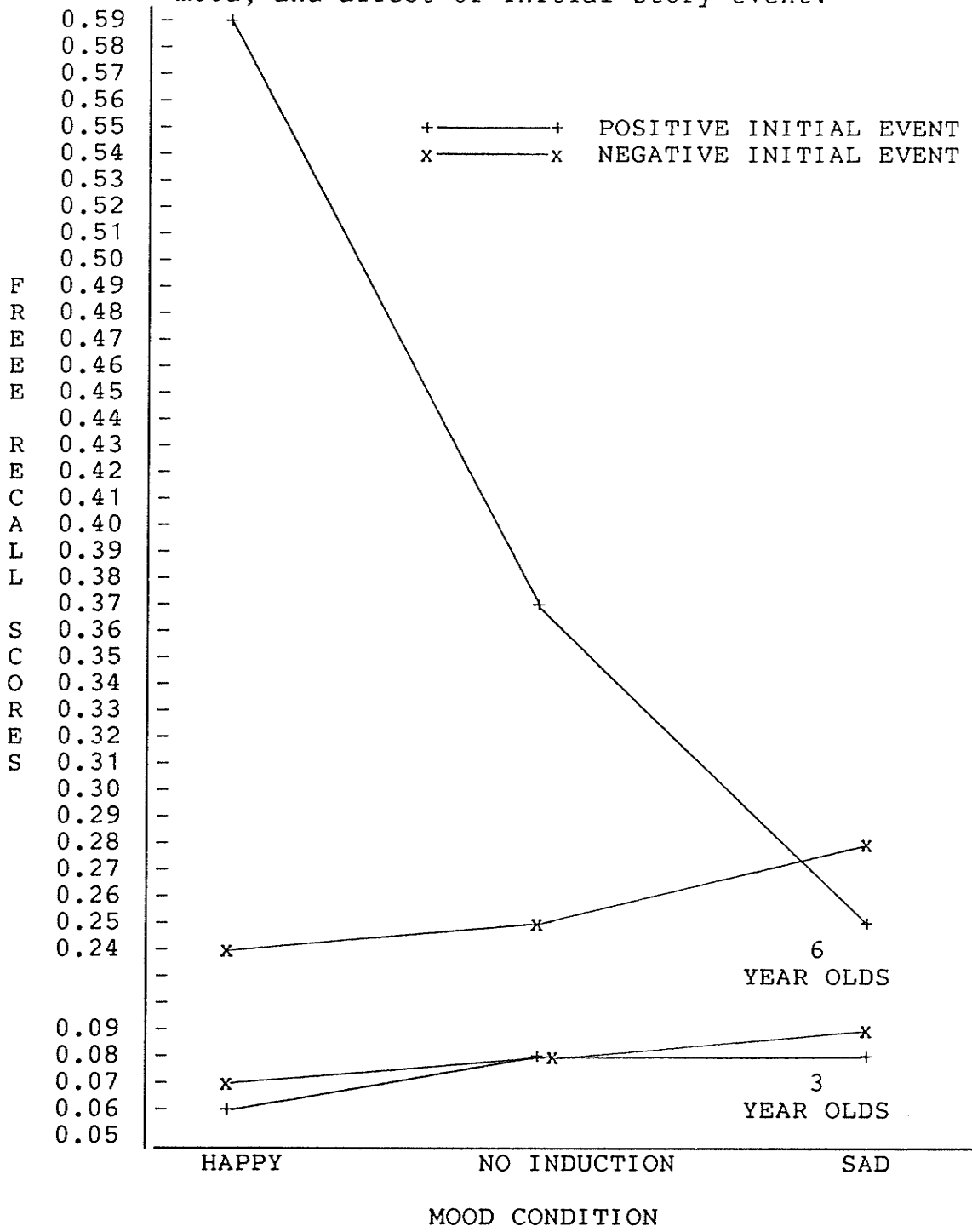


Figure 10: Free-recall scores as a function of mood, sex of experimenter, and affect of initial event

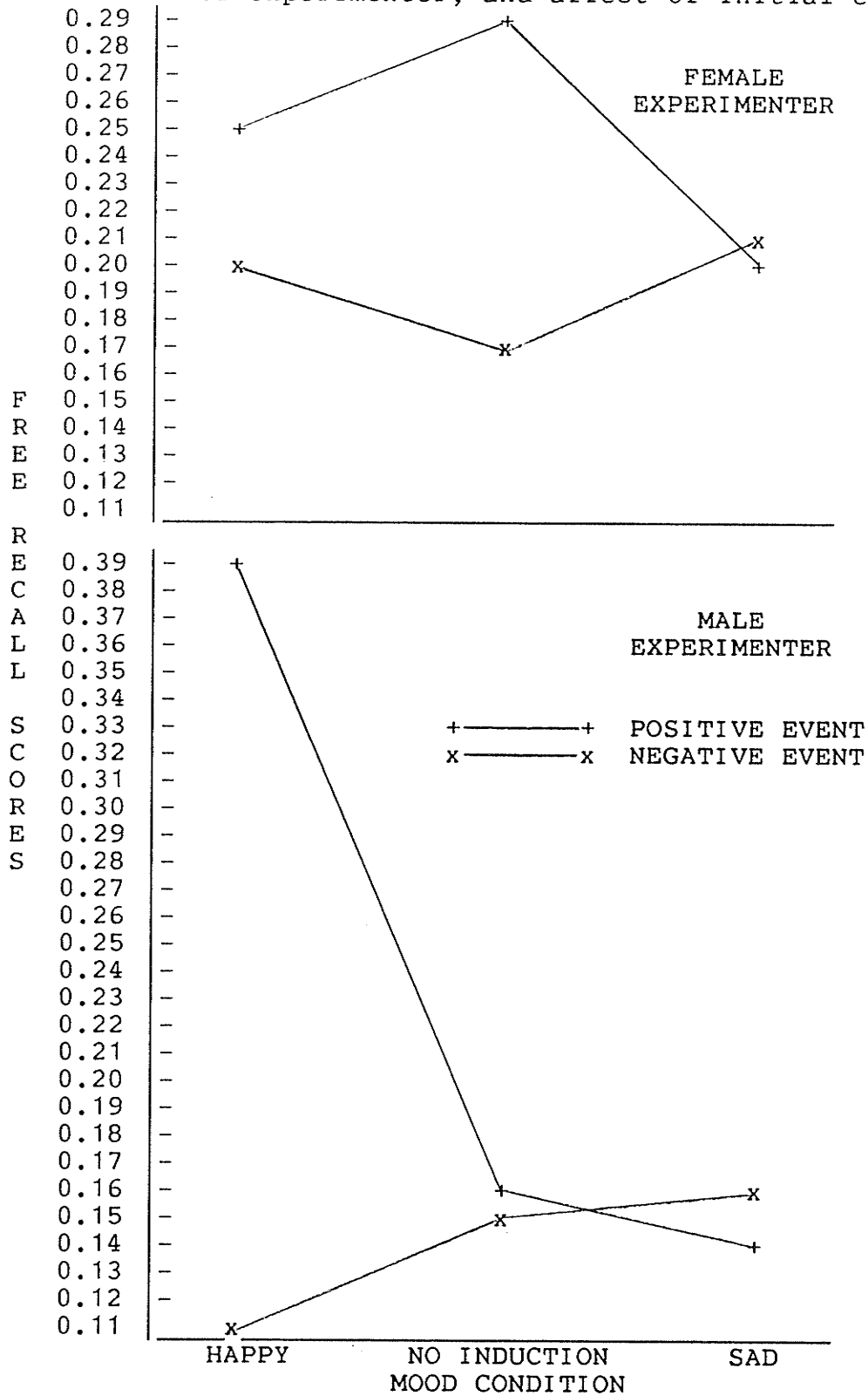
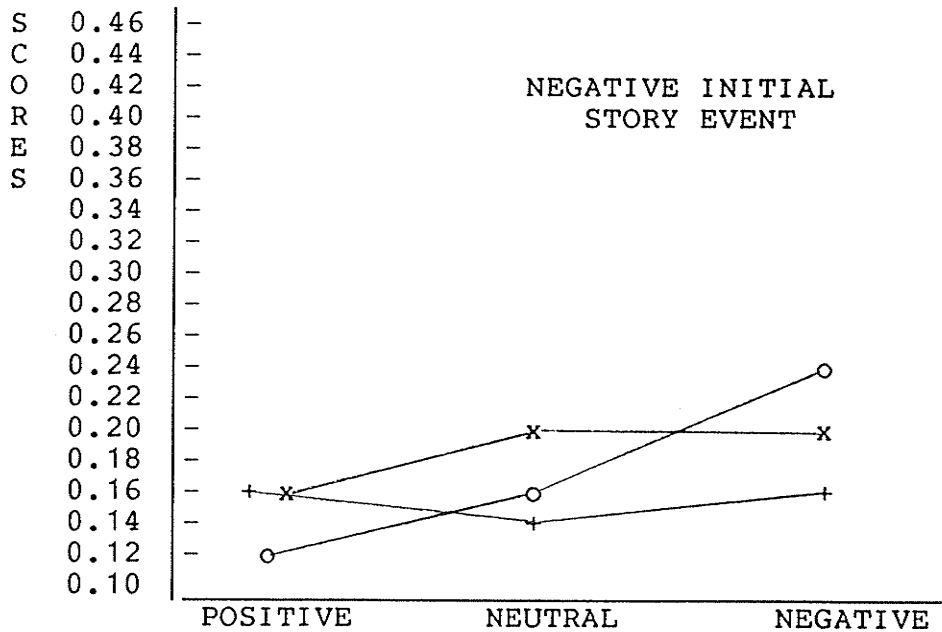
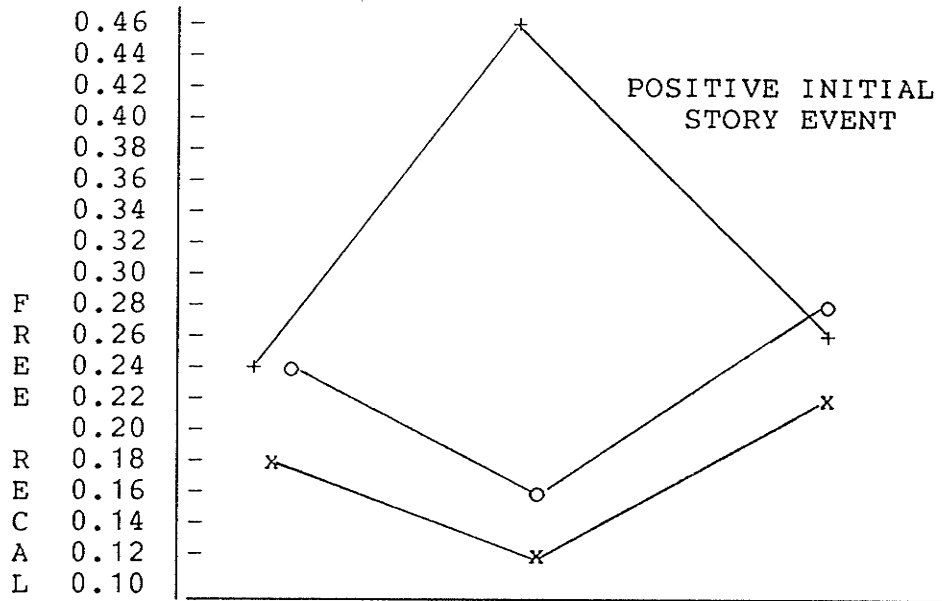




Figure 11 illustrates free recall as a function of mood of subject, type of affective story content, and affective valence of initial event. Although the interaction was significant ( $F(4,144) = 3.12, p < 0.0169$ ), it was complex. For the affect of story content variable, it would appear that an inverted U-shaped function was produced by happy-mood condition children who heard a positive initial story event. A weak U-shaped function seemed to be produced by happy-mood condition children who heard a negative initial story event. Further, a U-shaped function seemed to be produced by no-induction condition children who heard a positive initial story event, whereas a linear-shaped function seemed to be produced by no-induction condition children who heard a negative initial story event. Finally, a U-shaped function appeared to be produced by sad-mood condition children who heard a positive initial story event; while a linear- to inverted U-shaped function seemed to be produced by sad-mood condition children who heard a negative initial story event. Such effects would be difficult to interpret. Accordingly, this interaction is not discussed further.

Free-recall scores were unaffected by any other higher-order interactions among variables.

Figure 11: Free-recall scores as a function of mood, affect of story content, and affect of initial event



AFFECT OF STORY CONTENT

- + ——— + HAPPY MOOD
- o ——— o NO INDUCTION
- x ——— x SAD MOOD

### Cued-recall Memory Performance

The cued-recall test included 18 open-ended questions representing the six positive, six negative, and six neutral events that occurred in the narrative. From each subject's response sheet, the coder tallied the number of correct responses to each of the questions in each of the three story item valences (positive, neutral, negative) to derive a total cued-recall score. Incorrect responses, such as no-response (e.g., 'I don't know'), and events that were not presented in the taped narrative (e.g., the children were fighting), were not included as scores. For each subject, number of responses for positive, neutral, and negative events were determined. Then, as for the free-recall data, the scores were transformed as follows: For the positive events recalled when a cue was given, the transformation was

$$\text{ARCPositive events recalled when a cue was given} = 2 \text{ ARSIN} (\text{Positive events recalled when a cue was given}/6)$$

(Neter & Wasserman, 1974, p. 508). Similar transformations were conducted on the neutral and negative scores. Means for the total transformed positive, negative, and neutral events were determined. Effects of the independent variables on 3- and 6-year-old children's transformed scores were tested by a 2 x 3 x 2 x 2 x 3 x 2 (Age x Mood x Sex of subject x Experimenter x Type of affective story content x Affective valence of initial story event) mixed analysis of

variance. The results are presented in Table 6. Scheffe tests were employed for post-hoc comparisons.

Main effects. Cued-recall scores seemed to be affected by age of subject. Six-year-old children appeared to recall more ( $\underline{M} = 0.63$ ) than 3-year-old children ( $\underline{M} = 0.27$ ). In support, the analysis of variance yielded a highly significant effect for age of subject ( $\underline{F} (1,144) = 104.10, p < 0.0001$ ). The results thus indicated that children's cued-recall performance varied directly with age.

Children's cued-recall scores were unaffected by mood ( $\underline{F} (1,144) = 1.10, p < 0.3359$ ). Sad-mood ( $\underline{M} = 0.48$ ) and happy-mood ( $\underline{M} = 0.45$ ) condition children recalled similar numbers of story events as the no-induction ( $\underline{M} = 0.41$ ) condition children.

Cued-recall scores were unaffected by sex of subject ( $\underline{F} (1,144) = 1.07, p < 0.3034$ ). Girls ( $\underline{M} = 0.47$ ) and boys ( $\underline{M} = 0.43$ ) recalled similar numbers of story events when cues were given.

Children's cued-recall scores were unaffected by sex of experimenter ( $\underline{F} (1,144) = 3.64, p < 0.0584$ ). Means were 0.48 for children in the presence of a female experimenter and 0.41 for children in the presence of a male experimenter.

Table 6

## Summary of the Analysis of Variance for the Cued-recall Scores

Variable(s)	<u>df</u>	<u>F</u>	<u>p</u>
Age (A)	1,144	104.10	0.0001
Mood (M)	2,144	1.10	0.3359
Sex of subject (S)	1,144	1.07	0.3024
Experimenter (E)	1,144	3.64	0.0584
Type (T)	2,144	26.26	0.0001
Initial event (I)	1,144	1.06	0.3058
AxM	2,144	0.20	0.8216
AxS	1,144	0.20	0.6521
AxE	1,144	5.02	0.0265
AxT	2,144	9.66	0.0001
AxI	1,144	1.06	0.3058
MxS	2,144	0.86	0.4258
MxE	2,144	0.47	0.6280
MxT	4,144	0.23	0.9237
MxI	2,144	1.91	0.1517
SxE	1,144	0.44	0.5094
SxT	2,144	2.40	0.0945
SxI	1,144	0.00	0.9687
ExT	2,144	0.05	0.9474
ExI	1,144	1.55	0.2155

TxI	2,144	0.08	0.9201
AxMxS	2,144	0.07	0.9332
AxMxE	2,144	0.56	0.5740
AxMxT	4,144	0.13	0.9711
AxMxI	2,144	0.00	0.9996
AxSxE	1,144	2.12	0.1478
AxSxT	2,144	0.18	0.8340
AxSxI	1,144	3.42	0.0663
AxExT	2,144	0.79	0.4562
AxExI	1,144	3.20	0.0758
AxTxI	2,144	0.16	0.8505
MxSxE	2,144	1.70	0.1861
MxSxT	4,144	1.88	0.1177
MxSxI	2,144	2.83	0.0623
MxExT	4,144	0.10	0.9824
MxExI	2,144	1.01	0.3670
MxTxI	4,144	0.46	0.7683
SxExT	2,144	0.45	0.6377
SxExI	1,144	4.48	0.0359
SxTxI	2,144	0.23	0.7937
ExTxI	2,144	1.56	0.2128
AxMxSxE	2,144	2.95	0.0556
AxMxSxT	4,144	0.97	0.4281
AxMxSxI	2,144	1.28	0.2812
AxMxExT	4,144	0.22	0.9270
AxMxExI	2,144	1.34	0.2645
AxMxTxI	4,144	0.20	0.9362

AxSxExT	2,144	0.77	0.4631
AxSxExI	1,144	4.66	0.0325
AxSxTxI	2,144	0.07	0.9307
AxExTxI	2,144	0.52	0.5939
MxSxExT	4,144	0.94	0.4408
MxSxExI	2,144	2.24	0.1098
MxSxTxI	4,144	0.60	0.6600
MxExTxI	4,144	0.23	0.9239
SxExTxI	2,144	1.05	0.3519
AxMxSxExT	4,144	0.39	0.8129
AxMxSxExI	2,144	6.59	0.0018
AxMxSxTxI	4,144	0.05	0.9947
AxMxExTxI	4,144	0.05	0.9950
AxSxExTxI	2,144	1.42	0.2455
MxSxExTxI	4,144	0.60	0.6602
AxMxSxExTxI	4,144	1.48	0.2108

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Cued-recall scores seemed to be affected by the affective valence of story content. Children's recall of negative story events seemed high ( $\underline{M} = 0.59$ ), and appeared greater than their recall of neutral events ( $\underline{M} = 0.47$ ), which appeared moderately high. In addition, children's recall of both negative and neutral events seemed greater than their recall of positive events ( $\underline{M} = 0.28$ ), which appeared moderate. The analysis of variance supported these suggestions, yielding a significant effect for affective valence of story content ( $\underline{F} (2,144) = 26.26, \underline{p} < 0.0001$ ). Post-hoc comparisons further supported the suggestions. All comparisons of the differences between the means of groups were significant ( $\underline{p} < 0.05$ ). Thus, the results indicated that children's cued recall increased from moderate for positive events to moderately high for neutral events, to high for negative events.

Cued-recall scores were unaffected by affective valence of initial story event ( $\underline{F} (1,144) = 2.41, \underline{p} < 0.1226$ ). Means were 0.47 for children who heard a story with a positive initial event, and 0.42 for children who heard a story with a negative initial event.

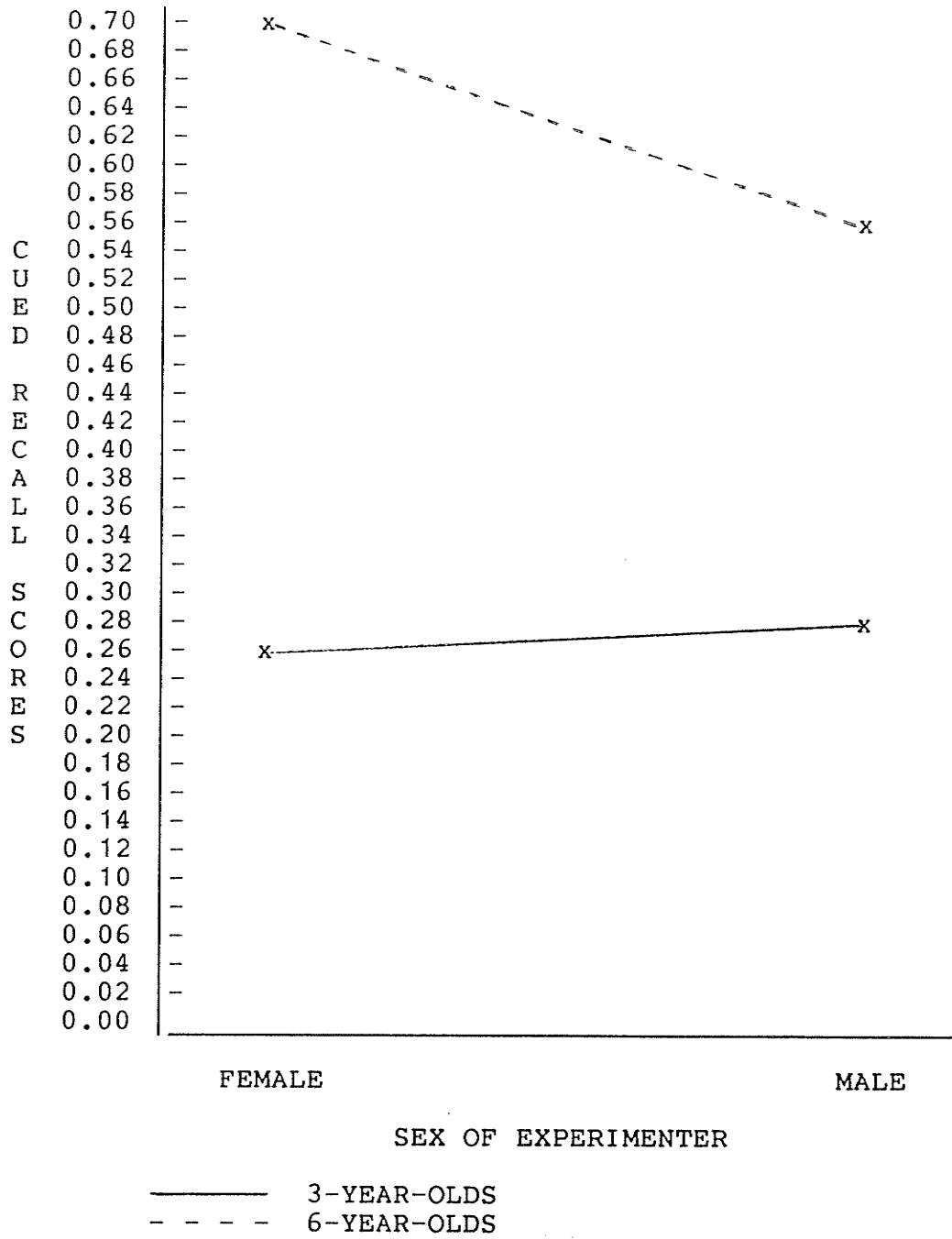
Two-way interactions. Figure 12 illustrates the cued-recall scores as a function of age of subject and sex of experimenter. The figure suggests that 6-year-old children recalled more than 3-year-old children. In



addition, it suggests that 6-year-old children recalled more when in the presence of a female experimenter than a male experimenter. Further, 3-year-old children's cued-recall scores did not seem to vary with sex of experimenter. The analysis of variance supported these suggestions, yielding a significant effect of age of subject x sex of experimenter interaction ( $F(1,144) = 5.02, p < 0.0265$ ). Post-hoc comparisons of the differences between the means of groups further supported these suggestions. A nonsignificant difference was found between the means of the 3-year-old children with a male experimenter and the 3-year-old children with a female experimenter ( $p > 0.05$ ). Comparison of all other means of the groups were significant ( $p < 0.05$ ). The results thus indicated that recall of 6-year-old children in the presence of a female experimenter was high. Recall of the 6-year-old children in the presence of a male experimenter was moderately high. Three-year-old children's recall did not vary with sex of experimenter, and was moderately low.

Figure 13 illustrates cued-recall scores as a function of age of subject and affective valence of story content. The figure suggests that 6-year-old children's recall of neutral and negative story events was high, while their recall of positive events was moderate. Three-year-old children's recall of negative story events seemed moderate, while their recall of neutral and positive events did not

Figure 12: Cued-recall scores as a function of age of subject and sex of experimenter.

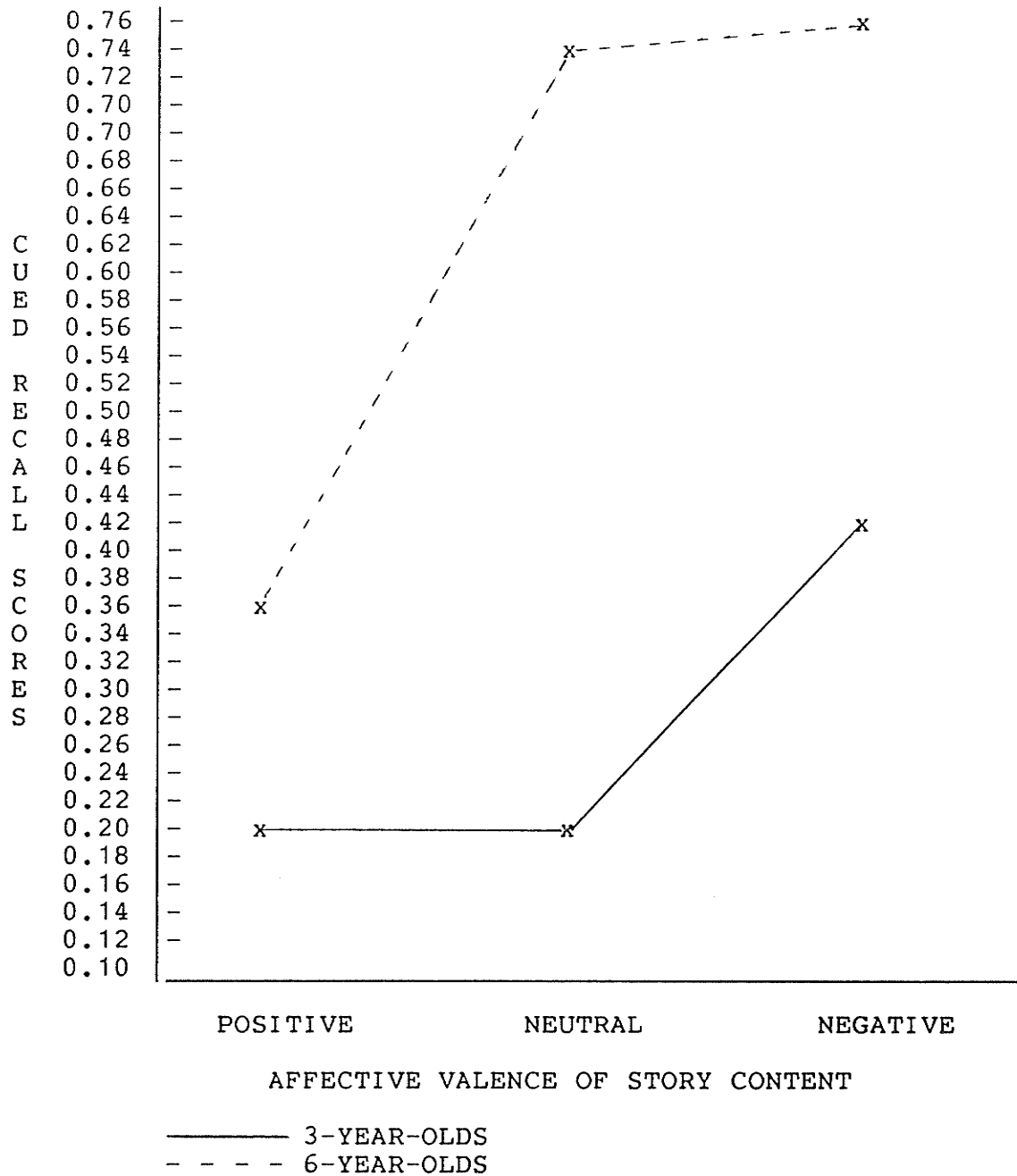


seem to vary, and appeared low. In support, the analysis of variance yielded a significant effect of age of subject x affective valence of story content interaction ( $F(2,144) = 9.66, p < 0.0001$ ). Post-hoc comparisons further supported these suggestions. Nonsignificant differences were found between the means for the 6-year-olds on recall of negative and positive events ( $p > 0.05$ ). For the 3-year-olds, mean recall scores for the positive and neutral events did not differ. When the means of the two age groups were compared, the 3-year-olds' recall of negative events did not differ from the 6-year-olds' recall of positive events. Significant differences were found between all other differences between the means of the groups ( $p < 0.05$ ). Thus, the results indicated that 6-year-olds' recall was high for both neutral and negative story content, while their recall of positive story content was moderate. Recall of 3-year-olds was moderate for negative story content, and low for positive and neutral story content.

Children's cued-recall scores were unaffected by any other two-way interactions.

Higher-order interactions. Figure 14 illustrates cued-recall scores as a function of sex of subject, sex of experimenter, and affective valence of initial event. Although the interaction was significant ( $F(1,144) = 4.48, p < 0.0359$ ), it was complex. For example, boys' recall when

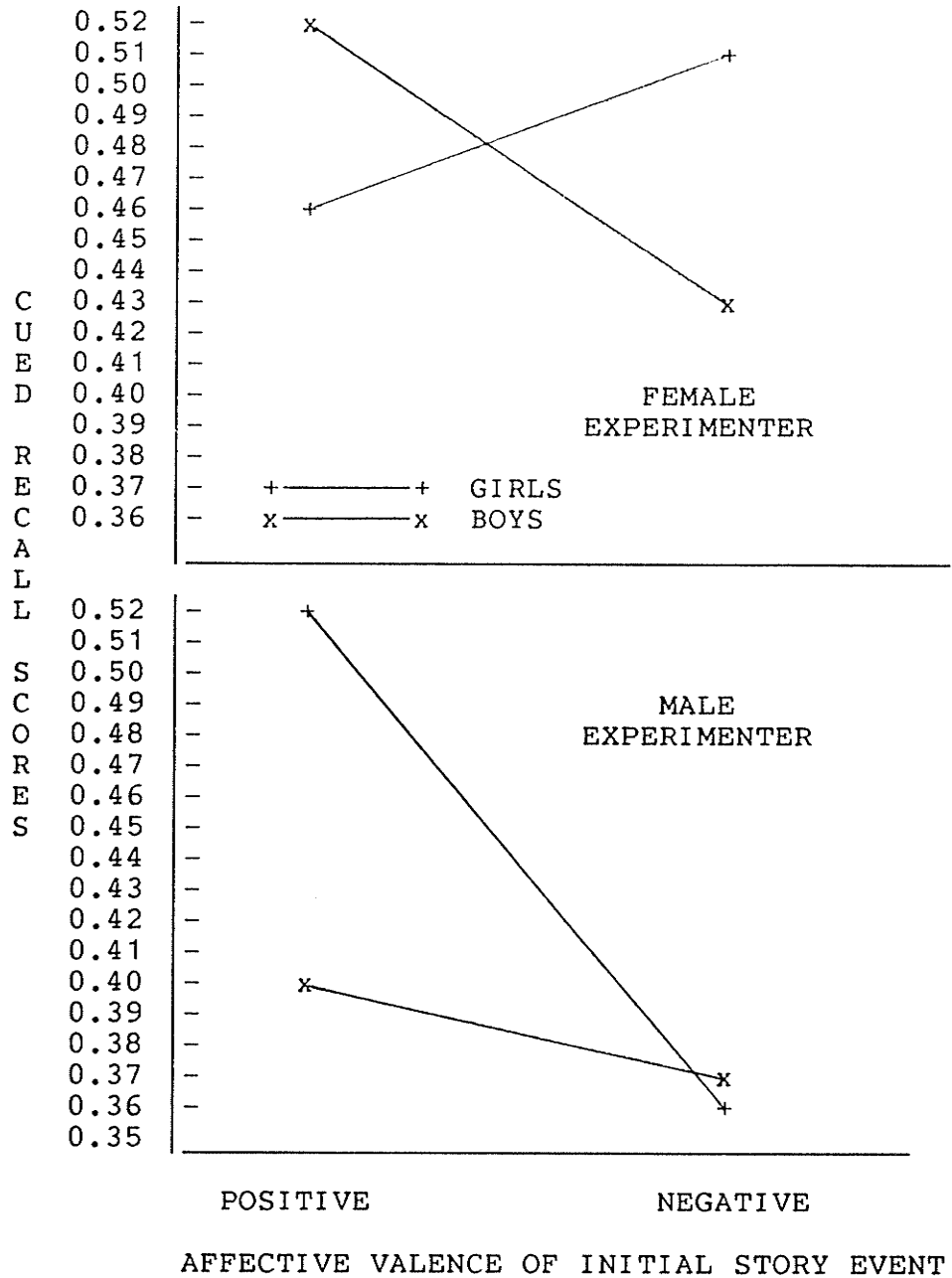
Figure 13: Cued-recall scores as a function of age of subject and affective valence of story content



in the presence of a male experimenter did not seem to vary according to the affective valence of initial story event, whereas it did in the presence of a female experimenter. Girls' recall when in the presence of a female or male experimenter did seem to vary according to affective valence of initial story event. However, girl's recall with a female experimenter seemed to follow a reverse pattern of that obtained with a male experimenter. Such effects would be difficult to interpret. Accordingly, this interaction is not discussed further.

The following significant effects were also obtained: a four-way interaction (Age x Sex of subject x Experimenter x Affective valence of initial story event),  $F(1,144) = 4.66$ ,  $p < 0.0325$ , and a five-way interaction (Age x Mood x Sex of subject x Experimenter x Affective valence of initial story event),  $F(1,144) = 6.59$ ,  $p < 0.0018$ . These effects were complex and uninterpretable. Therefore, they are not dealt with further.

Figure 14: Cued-recall scores as a function of sex of subject, sex of experimenter, and affective valence of initial story event



### Recognition Memory Performance

The recognition task included the 18 positive, neutral, and negative events in the story. From each 6-year-old child's response sheet, the coder tallied the number of correct responses. A correct response was defined as the recognition of an event present in the story when in fact the event had been presented previously in the story. Then, the coder scored each response for story valence. For each subject, as for the free- and cued-recall data, positive, neutral, and negative events were transformed as follows:

For the positive events data, the transformation was

$$\text{ARCPositive events recognized} = 2 \text{ ARSIN}(\text{Positive events recognized}/6)$$

(Neter & Wasserman, 1974, p. 508). Similar transformations were conducted on the neutral and negative correct responses. Means for the total transformed positive, negative, and neutral events were determined. Effects of the independent variables on 6-year-old children's recognition of the mean transformed scores were tested by a 3 x 2 x 2 x 3 x 2 (Mood x Sex of subject x Experimenter x Type of affective story content x Affective valence of initial story event) mixed analysis of variance. The results are presented in Table 7. Scheffe tests were employed for post-hoc comparisons.

Table 7

## Summary of the Analysis of Variance for the Recognition Scores

Variable(s)	<u>df</u>	<u>F</u>	<u>p</u>
Mood (M)	2,72	0.19	0.8272
Sex of subject (S)	1,72	0.14	0.7131
Experimenter (E)	1,72	1.65	0.2036
Type (T)	2,72	12.70	0.0001
Initial event (I)	1,72	5.76	0.0190
MxS	2,72	0.16	0.8517
MxE	2,72	0.26	0.7743
MxT	4,72	0.56	0.6928
MxI	2,72	0.55	0.5818
SxE	1,72	0.03	0.8737
SxT	2,72	0.39	0.6785
SxI	1,72	0.88	0.3507
ExT	2,72	0.04	0.9642
ExI	1,72	5.79	0.0187
TxI	2,72	0.60	0.5511
MxSxE	2,72	2.92	0.0603
MxSxT	4,72	0.21	0.9310
MxSxI	2,72	2.35	0.1022
MxExT	4,72	0.81	0.5227
MxExI	2,72	1.90	0.1577
MxTxI	4,72	0.95	0.4398



SxExT	2,72	0.68	0.5103
SxExI	1,72	0.97	0.3281
SxTxI	2,72	0.34	0.7163
ExTxI	2,72	1.38	0.2594
MxSxExT	4,72	0.42	0.7921
MxSxExI	2,72	1.16	0.3180
MxSxTxI	4,72	0.36	0.8388
MxExTxI	4,72	0.15	0.9625
SxExTxI	2,72	0.11	0.8939
MxSxExTxI	4,72	0.07	0.9904

---

Main effects. Children's recognition memory was unaffected by mood of subject ( $F(2,72) = 0.19, p < 0.8272$ ). Sad- and happy-mood condition children recognized a similar number of story events ( $M_s = 1.01, 1.00$ ) as that of the no-induction condition children ( $M = 0.96$ ).

Recognition scores were unaffected by sex of subject ( $F(1,72) = 0.14, p < 0.7131$ ). Girls ( $M = 1.00$ ) and boys ( $M = 0.98$ ) recognized a similar number of events.

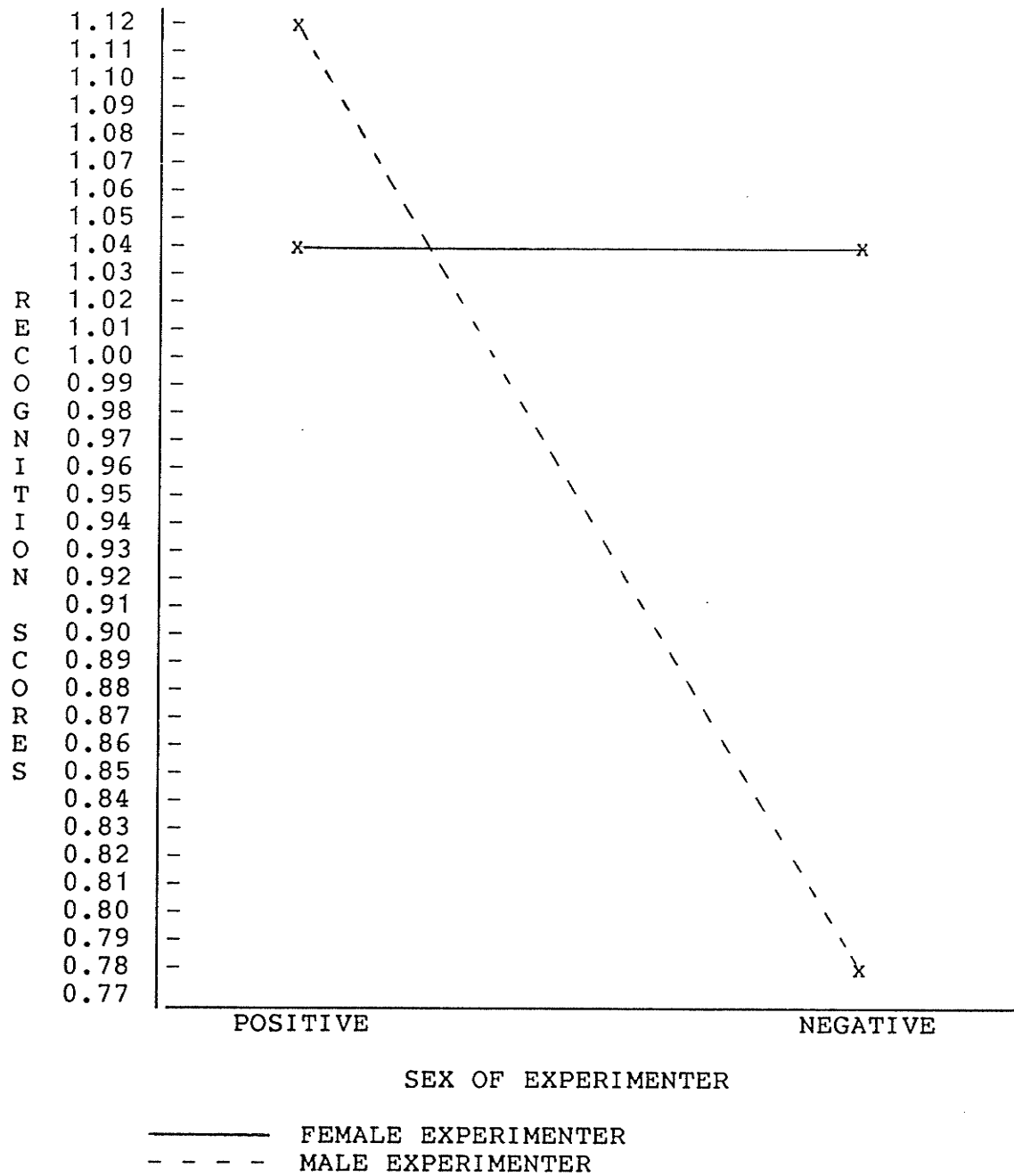
Children's recognition scores were unaffected by sex of experimenter ( $F(1,72) = 1.65, p < 0.2036$ ). Children recognized a similar number of events in the presence of a female experimenter ( $M = 1.04$ ) as in the presence of a male experimenter ( $M = 0.95$ ).

Recognition memory among 6-year-old children seemed to be affected by affective valence of story content. That is, children appeared to recognize more negative ( $M = 1.17$ ) and neutral ( $M = 1.07$ ) events than positive events ( $M = 0.75$ ). The analysis of variance supported this suggestion, yielding a significant effect for affective valence of story content ( $F(2,72) = 12.70, p < 0.0001$ ). Post-hoc comparisons were performed on the differences between the means of the groups. Significant differences were found between the means of the negative and positive, and neutral and positive groups ( $p < 0.05$ ). The other comparison, between the negative and neutral groups, proved nonsignificant ( $p > 0.05$ ). Thus, the results indicated that children recognized more negative and neutral events than positive events.

Children's recognition scores seemed affected by the affective valence of the initial story event. Children who heard a story with a positive initial event appeared to recognize more story events ( $\underline{M} = 1.08$ ) than children who heard a story with a negative initial event ( $\underline{M} = 0.91$ ). In support, the analysis yielded a significant effect for affective valence of initial story event ( $\underline{F} (1,72) = 5.76, \underline{p} < 0.0190$ ). The results indicated that recognition of events was greater in children who heard a story with a positive initial event than one containing a negative initial event.

Two-way interactions. Figure 15 illustrates recognition scores as a function of sex of experimenter and affective valence of initial story event. The figure suggests that recognition performance in children who heard a story with a positive initial event, and were in the presence of a male experimenter, was high. Children who heard a story with a negative initial event and were in the presence of a male experimenter seemed to have low recognition memory. In addition, children's recognition scores did not seem to vary by affect of the initial event, when in the presence of a female experimenter. Further, in the presence of a female experimenter, children's recognition of events appeared high. The analysis supported these suggestions, yielding a significant effect for sex of experimenter x affect of initial story event interaction ( $\underline{F} (1,72) = 5.79, \underline{p} <$

Figure 15: Recognition scores as a function of sex of experimenter and affective valence of the initial story event



0.0187). Post-hoc comparisons of the differences between the means of the groups further supported the suggestions. Significant differences were found between the means of the scores for negative events in the presence of a female and a male ( $p < 0.05$ ). In addition, the means of the scores for the negative and positive events recognized in the presence of a male experimenter differed. Finally, the means of scores for the positive events in the presence of a female experimenter differed from the mean of scores of the negative events in the presence of a male experimenter. Nonsignificant differences were found for the comparisons between the means of the scores for the male experimenter with positive events and the female experimenter with negative events; and for the male experimenter with positive events and the female experimenter with positive events ( $p > 0.05$ ). The results thus indicated that children who heard a story with a positive initial event and were seen by a female or a male had high recognition memory. Similarly, children who heard a story with a negative initial event and were in the presence of a female experimenter had high recognition memory. Children who heard a story with a negative initial event, and were in the presence of a male experimenter, had low recognition memory.

Children's recognition scores were unaffected by any other two-way interactions.

Higher-order interactions. Children's recognition scores were unaffected by any higher-order interactions among variables.

#### Recognition of Distractors Performance

In the recognition task, 18 distractor items were presented to the 6-year-old children, representing positive, neutral, and negative events that had not been presented previously in the story. From each subject's response sheet the coder tallied the number of 'false alarms' made to distractor items. False alarms were defined as distractor items recognized by the children as previously present in the story when they had not been previously presented. For each subject, the number of positive, neutral, and negative distractors was determined. Then, as for free-recall, cued-recall, and recognition data, the positive, neutral, and negative distractor scores were transformed as follows: For the positive distractors, the transformation was

$$\text{ARCPositive distractors} = 2 \text{ ARSIN}(\text{Positive} \\ \text{distractors}/6)$$

(Neter & Wasserman, 1974, p. 508). Similar transformations were conducted on the negative and neutral distractor scores. Means for the total transformed positive, negative, and neutral distractor scores were determined. Effects of the independent variables on the 6-year-old children's mean transformed scores were tested by a 3 x 2 x 2 x 3 x 2 (Mood

x Sex of subject x Experimenter x Type of affective story content x Affective valence of initial story event) mixed analysis of variance. The results are presented in Table 8. Scheffe tests were employed for post-hoc comparisons.

Main effects. Children's distractor scores seemed to be affected by mood of subject. That is, children in a sad-mood condition appeared to recognize more distractors ( $\underline{M} = 0.94$ ) than children in a happy-mood ( $\underline{M} = 0.25$ ) and a no-induction ( $\underline{M} = 0.21$ ) condition. The analysis of variance supported this suggestion, yielding a significant effect for mood of subject ( $\underline{F} (2,72) = 11.48, \underline{p} < 0.0001$ ). Post-hoc comparisons further supported the suggestion. Significant differences were found between the means of the sad- and happy-mood conditions, and the sad and no-induction conditions ( $\underline{p} < 0.05$ ). Nonsignificant differences were found between the means of the happy and no-induction conditions ( $\underline{p} > 0.05$ ). The results thus indicated that sad-mood condition children's recognition of distractors was high, while no-induction and happy-mood children's recognition of distractors was low.

Children's recognition of distractors was unaffected by sex of subject ( $\underline{F} (1,72) = 0.49, \underline{p} < 0.4883$ ), with boys ( $\underline{M} = 0.51$ ) and girls ( $\underline{M} = 0.42$ ) recognizing a similar number of distractors.

Table 8

## Summary of Analysis of Variance for the Distractors Scores

Variable(s)	<u>df</u>	<u>F</u>	<u>p</u>
Mood (M)	2,72	11.48	0.0001
Sex of subject (S)	1,72	0.49	0.4883
Experimenter	1,72	0.01	0.9210
Type (T)	2,72	0.07	0.9331
Initial event (I)	1,72	8.33	0.0052
MxS	2,72	1.73	0.1841
MxE	2,72	1.73	0.1841
MxT	4,72	0.02	0.9988
MxI	2,72	1.97	0.1469
SxE	1,72	0.49	0.4883
SxT	2,72	0.37	0.6946
SxI	1,72	0.49	0.4883
ExT	2,72	1.38	0.2591
ExI	1,72	1.20	0.2774
TxI	2,72	0.37	0.6946
MxSxE	2,72	0.90	0.4107
MxSxT	4,72	0.23	0.9191
MxSxI	2,72	1.02	0.3658
MxExT	4,72	0.20	0.9360
MxExI	2,72	6.72	0.0021
SxExT	2,72	0.37	0.6946



SxExI	1,72	7.22	0.0090
SxTxI	2,72	0.43	0.6549
ExTxI	2,72	0.96	0.3876
MxSxExT	4,72	0.83	0.5125
MxSxExI	2,72	5.73	0.0049
MxSxTxI	4,72	0.29	0.8822
MxExTxI	4,72	0.20	0.9360
SxExTxI	2,72	0.03	0.9707
MxSxExTxI	4,72	0.37	0.8284

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Recognition of distractors in 6-year-old children was unaffected by sex of experimenter ( $F(1,72) = 0.01$ ,  $p < 0.9210$ ), with children in the presence of a female ( $M = 0.47$ ) recognizing virtually the same number of distractors as the children in the presence of a male ( $M = 0.46$ ).

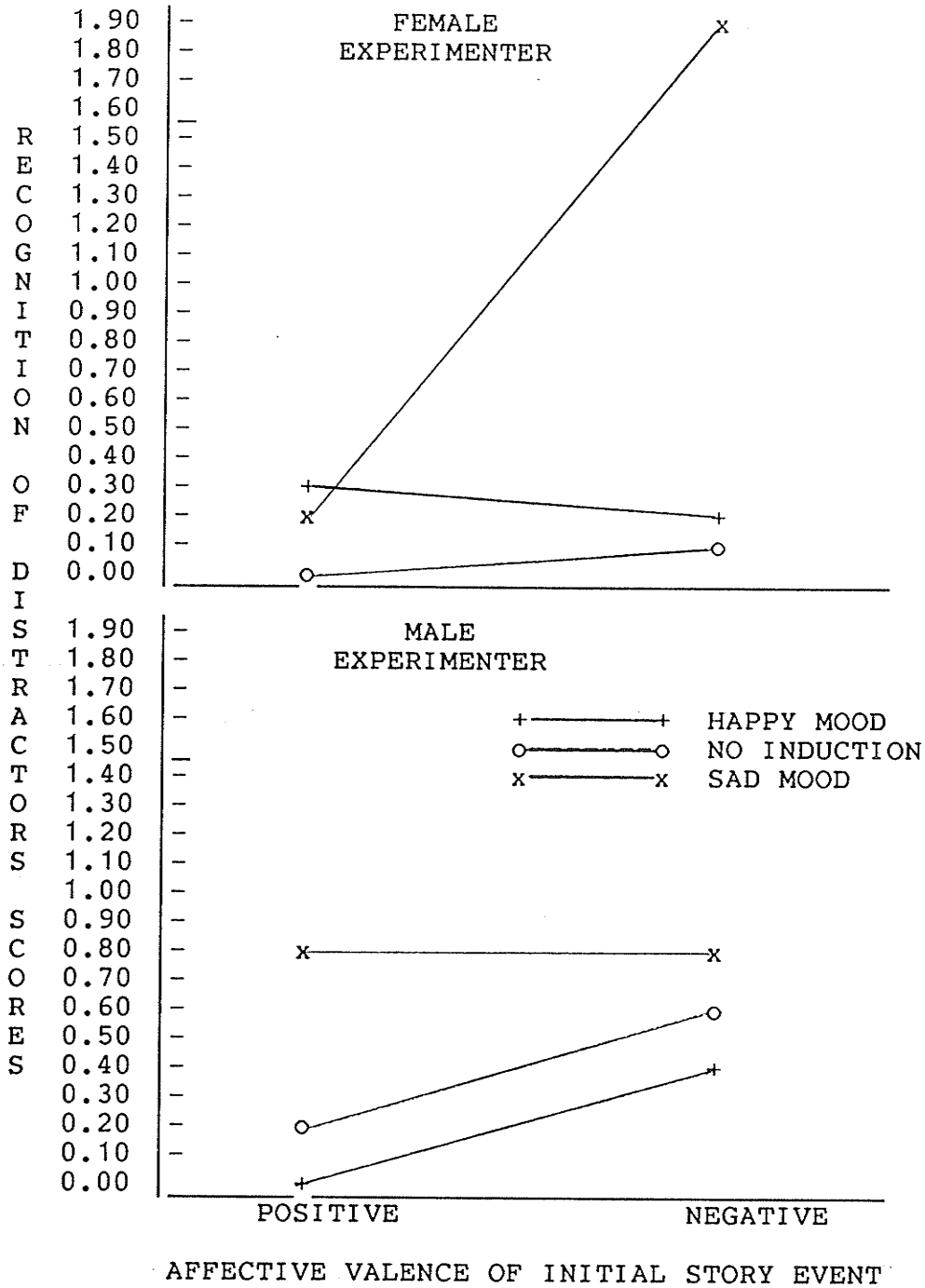
Children's recognition of distractors was also unaffected by affective valence of story content ( $F(2,72) = 0.07$ ,  $p < 0.9331$ ). However, certain tendencies of interest to the Discussion are worth noting. Children tended to recognize more neutral distractors ( $M = 0.50$ ) than positive ( $M = 0.46$ ) and negative ( $M = 0.44$ ) distractors.

Six-year-old children's recognition of distractors seemed to be affected by the affective valence of initial story event. Children who heard a story with a negative initial event appeared to recognize more distractors ( $M = 0.67$ ) than children who heard a story with a positive initial event ( $M = 0.26$ ). The analysis of variance supported this suggestion, yielding a significant effect for affective valence of initial event ( $F(1,72) = 8.33$ ,  $p < 0.0052$ ). Thus, the results indicated that children's recognition of distractors varied directly with affective valence of initial story event.

Two-way interactions. Children's recognition of distractors was unaffected by two-way interactions.

Higher-order interactions. Figure 16 illustrates distractors scores as a function of mood of subject, sex of experimenter, and affective valence of initial story event. Although the interaction was significant ( $F(2,72) = 6.72, p < 0.0021$ ), it was complex. For example, sad-mood condition children's recognition of distractors in the presence of a male experimenter did not seem to vary. For both positive and negative initial events, children seemed to recognize a moderately low number of distractors. Moreover, sad-mood condition children who heard a negative initial event and were in the presence of a female experimenter seemed to have high recognition of distractors, whereas sad-mood condition children who heard a positive initial event and were in the presence of a female experimenter seemed to have low recognition of distractors. Further, happy-mood condition children's recognition of distractors in the presence of a female experimenter did not seem to vary across affective valence of initial story event. For both positive and negative initial event, recognition seemed to be low. Happy-mood condition children who heard a negative initial story event and were in the presence of a male experimenter appeared to have moderate recognition of distractors. As well, happy-mood condition children who heard a story with a positive initial event and were in the presence of a male experimenter appeared to recognized no distractors. Similarly, no-induction condition children's recognition of

Figure 16: Recognition of distractor scores as a function of mood, sex of experimenter, and affective valence of initial event



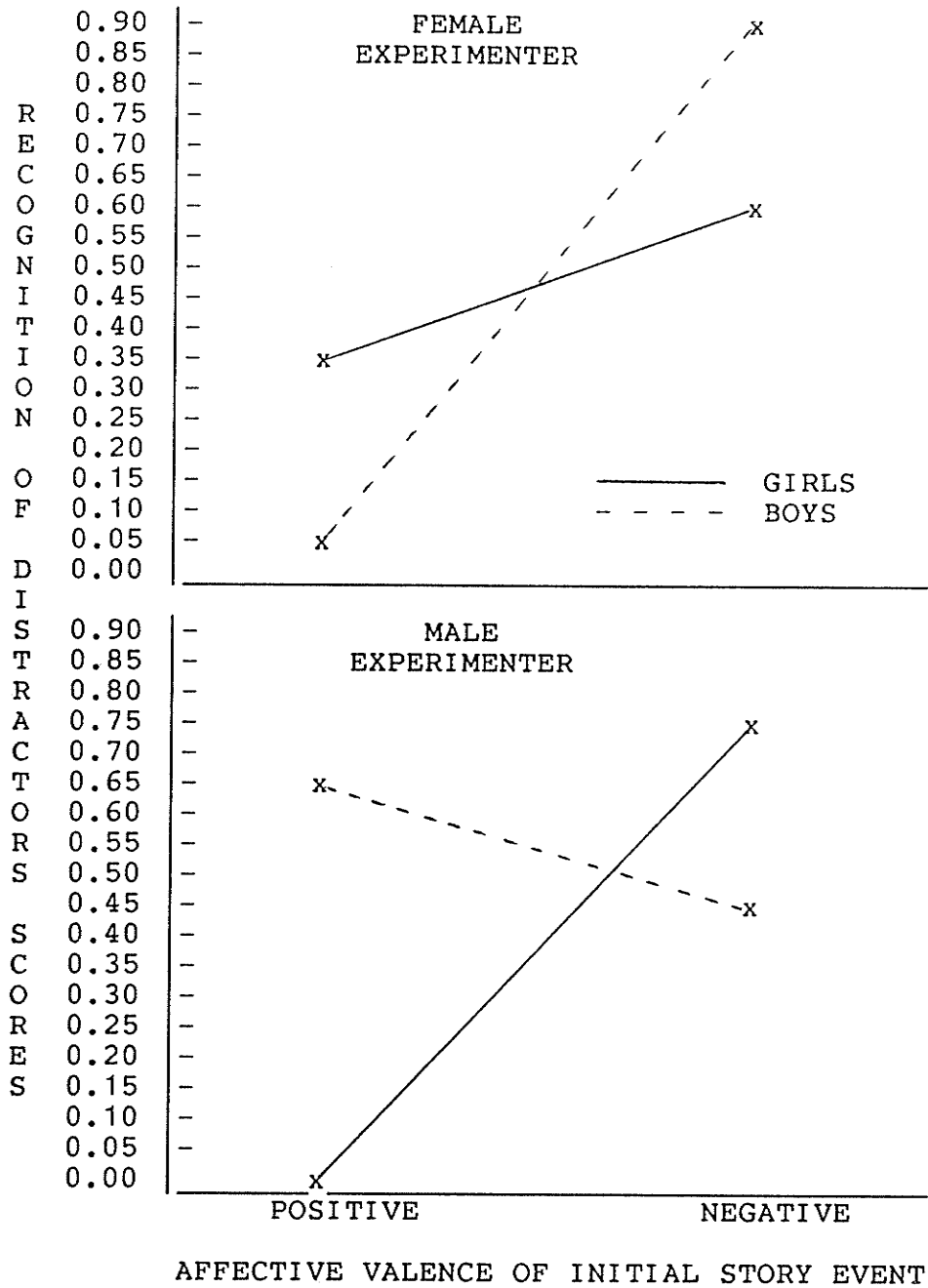
distractors in the presence of a female experimenter did not seem to vary across the affective valence of initial event variable. The no-induction condition children appeared to recognize no distractors in the presence of a female experimenter. Finally, no-induction condition children who heard a positive initial event and were in the presence of a male experimenter also seemed to recognize no distractors, whereas the no-induction condition children who heard a negative initial event and were in the presence of a male experimenter seemed to recognize a moderate number of distractors. Such effects would be difficult to interpret. Therefore, this interaction will not be discussed further.

Figure 17 illustrates distractor scores as a function of sex of subject, sex of experimenter, and affective valence of initial story event. Although the interaction was significant ( $F(1,72) = 7.22, p < 0.0090$ ), it was complex. For example, boys' recognition of distractors seemed to increase across the affective valence of initial event in the presence of a female experimenter, whereas girls' recognition of distractors seemed to increase across the affective valence of initial event in the presence of a male experimenter. Moreover, girls' recognition of distractors appeared to increase across the affective valence of initial event variable, regardless of sex of experimenter. However, boys' recognition of distractors appeared to decrease across the affective valence of initial

event variable in the presence of a male experimenter. Such effects would be difficult to interpret. Accordingly, this interaction is not discussed further.

One other significant effect was obtained, as follows: a four-way interaction (Mood x Sex of subject x Experimenter x Affective valence of initial story event),  $F(2,72) = 5.73$ ,  $p < 0.0049$ . The effect was complex and uninterpretable. Thus, it will not be dealt with further.

Figure 17: Recognition of distractor scores as a function of sex of subject, sex of experimenter, and affective valence of initial event.



## DISCUSSION

The main objective of the present study was to examine the effect of induced mood on memory for affective narrative content in children. The effect of mood on memory is the most heavily researched topic in the literature on the relationship between mood and cognition (see Blaney, 1986 for a review). However, the facilitating effect of positive mood on memory has received very little attention in adult research (Isen & Daubman, 1985), compared to research on the effects of mood congruence and state dependence on memory. In theory, the facilitating effect of positive mood on memory implies that positive mood facilitates overall recall performance compared to negative mood. More often, however, in adult studies it has been reported that positive mood influences the recall of positively-valenced material, such that positive-mood subjects recall positive words more efficiently (e.g., Isen et al., 1978), and negative-mood subjects recall negative words more efficiently (e.g., Bower, 1981).

In the only published child study of the facilitating effects of positive mood on children's memory, Potts et al. (1986) demonstrated a facilitating effect of both positive and negative mood on children's memory for



affectively-valent material. However, this finding was not supported by main effects of positive and negative mood on the overall amount of information recalled, but rather, by interactions among mood and other variables. Consequently, findings on the effects of mood on children's memory were not as robust as they might be. Furthermore, the findings of studies on state dependence and mood congruence on children's memory (i.e., Bartlett et al., 1982; Bartlett & Santrock, 1979; Duncan et al., 1985; Nasby & Yando 1982) are mixed, and inconsistent with findings in the adult studies. In sum, data from various sources, and limited data on the effects of mood on memory have provided no clear picture of the relationship between these two variables in children. It was hoped that the present study would provide more substantive information on the effects of mood on children's memory for affective narrative content by extending the finding of Potts et al. (1986), using procedures to increase the probability of finding such effects. Furthermore, it was hoped that the present study would also shed light on the effects of induced mood on children's memory with younger children than have been previously studied in the literature. As well, younger children of two different ages were employed in order to determine if a study of the effects of mood on memory would be useful in isolating components of developmental changes in memory.

In the present study, 3- and 6-year-old boys and girls first participated in a happy-, sad-, or no-induction procedure. For the happy- and sad-mood induction, children were asked to think, to report, and to talk about a happy or sad past experience. Subsequently, adult judges rated the children's generated thoughts for intensity of affect and appropriateness of thought to mood condition. Immediately after administration of the mood inductions, children were asked to rate their own moods. For the happy-, sad-, and no-induction conditions, an adult judge rated the children's estimates of their own moods for appropriateness to mood condition. Then, in an intentional-learning paradigm, children heard six positive, neutral, and negative events evenly distributed throughout a 3 min-taped children's story. Sex of experimenter, sex of voice recording of the taped narrative, and affective valence of the initial story event were counterbalanced across subjects within each age group. Free- and cued-recall memory were measured in all children, while recognition memory was only assessed in 6-year-old children.

Discussion of the results of the above procedures are presented under the headings of mood-induction effects, and memory effects. Within each section, the hypotheses of the study are discussed. Wherever appropriate, additional findings are integrated in the discussion of the hypotheses. Otherwise, additional findings follow the order of the

hypotheses. A general discussion of the effects of mood on children's memory is presented, with an overview of the current theories on the relationship between mood and memory. Then, the findings are briefly summarized, and conclusions are drawn about the need for additional research on the effect of mood on memory for affective narrative content in children.

#### Mood-induction Effects

Hypothesis one was as follows: the appropriateness of the happy-mood condition children's self-ratings of mood would be moderately high; sad-mood condition children's self-rating would be low; and appropriateness of the no-induction condition children's self-ratings would be high. Results of the present study did not support this hypothesis. Rather, it was found that the appropriateness of the happy-mood condition children's self-ratings of mood was high, while no-induction and sad-mood condition children's self-ratings were moderately low. Although this result is contrary to the prediction of the present study, it is not entirely inconsistent with the literature. Recall that the prediction was based on the one child study (Bartlett & Santrock, 1979), wherein investigators demonstrated the success of the procedure of self-rating of mood by children. In that study, Bartlett and Santrock (1979) found that happy-mood condition children rated their

mood more appropriately than sad-mood children. The magnitude of the difference between the two groups was not reported. In an evaluation of the results of the present study, happy-mood condition children rated their mood more appropriately than sad-mood condition children. Without information about the magnitude of the difference between the groups in Bartlett and Santrock (1979), it is difficult to compare the effectiveness of the mood-induction procedures in their study and the present one.

It remains to be explained why the appropriateness of ratings of the happy-mood and sad-mood condition children were higher than predicted. And further, why the appropriateness of the no-induction condition children's self-rating of mood was lower than predicted. Perhaps these effects occurred for one of several reasons, or a combination.

First, in the present study, self-ratings of mood seemed to have been limited to the dimension of happiness. It may be that for young children, there are only two categories of mood, happy and not-so-happy. The children's estimates of their own moods support this idea. Happy-mood condition children rated themselves highly happy, while sad- and no-induction condition children rated themselves mildly happy. Thus, in terms of self-judgements, young children may have rated themselves highly happy when in a happy mood, and mildly happy when in a sad- or no-induction condition.

Second, in the present study, some children could not identify the affect portrayed in some of the five faces used for self-rating. For example, several of the younger children indicated that the 'neutral' face was either 'angry' or 'sad'. Thus, children may have chosen a neutral face to indicate a sad mood, or disregarded a neutral face because it was perceived as an angry mood.

Third, the range of faces portrayed in the scale may have been too great for young children. Consequently, children may have discounted some of the choices of faces because there were too many for them to process. The faces that the children could have discounted would have been those less familiar or credible to them, that is, no-induction and sad mood. If this inference from observation were accurate, then differences between the groups would have been reduced. The reduction may thus have accounted for the similarity in ratings between the sad- and no-induction condition children.

Fourth, the scale of faces may have been inappropriate for accurate self-rating of the no-induction condition. That is, of the five faces, two depicted happy mood and two depicted sad mood, while only one depicted no induction. An absence of a second choice for the no-induction condition may have made the single no-induction face less salient to the children. Therefore, during self-rating, no-induction children may have had less opportunity to rate their mood appropriately.

Fifth, age may have accounted for most of the contrary findings. Happy 3-year-olds' appropriateness of self-rating of mood was moderately high, whereas happy 6-year-olds' appropriateness was high. Sad 3-year-olds' appropriateness of self-rating was moderate, whereas sad 6-year-olds' was low. Thus, happy 3-year-olds' appropriateness of self-rating was consistent with the hypothesis, whereas happy 6-year-olds' was not. In addition, sad 6-year-olds' appropriateness of self-rating was consistent with the hypothesis, whereas sad 3-year-olds' was not. Thus, the higher appropriateness of self-rating of happy mood may have been a function of the older age of children, while the higher appropriateness of self-rating of sad mood may have been a function of the younger age of children.

Finally, these age effects may have been a function of the children's moods prior to participating in the experiment. That is, in the present study, 6-year-olds appeared happier than the 3-year-olds. In an estimation of their own moods, older children rated their mood as highly happy, while younger children rated their mood as mildly happy. Such an effect may be explained by the observation, during data collection, that older children appeared motivated to enjoy the experience of the study because it was an opportunity for them to be absent from their teacher and classroom. However, 3-year-old children seemed unwilling to participate in the study. The experience may,

therefore, not have been as enjoyable as for the 6-year-old children. Thus, the higher appropriateness of self-rating of happy mood may have been a function of the 6-year-old children's natural mood, while the higher appropriateness of self-rating of sad mood may have been a function of the 3-year-old children's natural mood.

Hypothesis two was as follows: the appropriateness of the happy-condition boys' and girls' self-ratings of mood would be moderately high; and appropriateness of the sad-condition boys' self-ratings of mood would be moderate; but appropriateness of sad-condition girls' self-ratings of mood would be low. Also, appropriateness of no-induction children's self-ratings of mood would not differ between boys and girls. No such effect was found. The finding that sex and mood did not affect children's appropriateness of self-ratings of mood is inconsistent with the finding of Bartlett & Santrock (1979). However, sex differences in appropriateness of self-ratings did occur, but were not explained by mood of subject. That is, boys' self-ratings of mood were more appropriate to their mood condition than girls'. An effect of sex on subjects' appropriateness of self-ratings of mood is consistent with Bartlett & Santrock (1979). They reported an effect for sex, as well as for both sex and mood on children's memory.

It remains, then, to account for the finding of no effect for sex and mood on children's appropriateness of

self-rating of mood in the present study. As was the case with hypothesis one, the discrepancy in the findings between the present study and Bartlett and Santrock (1979) may have been due to the factors discussed above. These include children's perceptions of categories of mood, inability to identify the affect of the test faces, artifacts of the scale, and age of subject.

Hypothesis three was as follows: for raters' reports of children's intensity of thought, happy-mood condition children would report moderately high intense thoughts, and sad-mood condition children would report low intense thoughts. Results of the present study did not support this hypothesis. In the present study, it was found that the intensity of both happy and sad thoughts were high on a congruent dimension of affect, and both low on an incongruent dimension of affect. The discrepancy in findings between the present study and Bartlett and Santrock (1979) may be attributed to two factors. First, in the studies, two different mood-induction procedures were used. In Bartlett and Santrock (1979), mood was induced by having children listen to affectively-toned stories illustrated by affectively-valent pictures. In the present study, mood was induced by having children generate a happy or sad thought. The use of a different procedure may have had a differential effect on the children's moods.



Second, in the studies, two different mood-induction assessments were used. In Bartlett and Santrock (1979), children rated their own moods. In the present study, adult judges rated the thoughts generated by the children. It may have been that a different mood assessment provided differential data on children's moods.

Hypothesis four was as follows: for raters' reports of children's intensity of thought, happy-condition boys and girls would report moderately high intense thoughts; sad-condition boys would report moderately intense thoughts; and sad-condition girls would report low intense thoughts. However, the results in the present study yielded no such effect--a result inconsistent with the finding of Bartlett and Santrock (1979). The discrepancy in findings between the present study and that of Bartlett and Santrock (1979) again may be attributed to the use of different types of mood induction and assessment procedures. That is, the use of different mood induction and assessment procedures may have had a differential effect on boys' and girls' moods.

No hypothesis was entertained for an effect of age of subject and sex of experimenter on the appropriateness of children's self-ratings of mood. The results indicated that the appropriateness of the 3-year-old children's self-ratings was high in the presence of a male experimenter, and low in the presence of a female experimenter. The appropriateness of 6-year-old children's

self-rating of mood was moderate in the presence of a male or female experimenter. This finding is new to the area. A number of explanations may account for it. First, as was mentioned previously, situational differences for the two age groups of subjects may have been a factor. For example, the female experimenter tested some 3-year-old children during the summertime. She observed that these children seemed more unwilling to participate in the experimental situation than the children tested during the springtime. The male experimenter only tested children during the springtime. Thus, it may have been that 3-year-old children's appropriateness of ratings were inflated in the presence of a male experimenter because of an effect of time of testing.

Although the time of testing may have contributed to the effect of sex of experimenter on children's appropriateness of self-rating, it does not seem fully to explain the findings. What remains to be explained is why appropriateness of self-rating of mood of 3-year-olds' in the presence of a male was greater than for all other groups of children. One possible explanation concerns social factors. That is, 3-year-old children may have tended to rate their moods more appropriately in the presence of a male adult because of the greater perceived authority of the male adult figure than the female. However, for this argument to be correct, the effect of greater

appropriateness of children's self-rating of mood should have been found in both age groups. Therefore, a second explanation may be in order.

It may have been that the effect of sex of experimenter on 3-year-old children's appropriateness of self-rating was a procedural artifact. The presence of a male in the daycare settings was far less frequent than the presence of males in the school settings. Thus, the novelty of being in the presence of a male for the 3-year-old children may have resulted in an effect for demand of sex of experimenter on children's self-ratings.

Finally, although care was taken to ensure that the experimenters' administration of the procedures was standardized, the idiosyncratic characteristics of the younger group may have generated differences between the way the experimenters treated the 3- and 6-year-old children. Thus, it is not exactly clear why the effect outlined above occurred in the present study. Any interpretation of the effect of age of subject and sex of experimenter should be made cautiously, however, because an attempt was made to control for effects of experimenter in the design of the study.

### Memory Effects

Hypothesis five was as follows: overall recall of story events would be high for happy-mood children, moderately high for sad-mood children, and moderate for no-induction children. Contrary to prediction, no such effect was found. For free recall, the data demonstrated that overall recall of story events was moderately high for happy-mood condition children. Further, children's recall increased somewhat across mood conditions from moderately low to moderately high for the sad-mood, no-induction, and happy-mood conditions. Although the lack of finding of an effect for mood on children's recall is consistent with Potts et al. (1986), some possible explanations for the lack of effect of positive and negative mood are in order.

First, in the present study, age of subject studied may have prevented finding an effect of mood on children's memory. The children in the present study were much younger than the subjects in the Potts et al. (1986) study. It may have been that effects of mood on children's memory are different for younger children. Theoretically, according to Piaget, children in the present study were in a period of intellectual development called the preoperational stage (Baldwin, 1980). The preoperational stage is primarily a transitional one. Therefore, children of the preoperational stage typically would have been unequilibrated in their conceptual thinking, and thus would have displayed failures

at simple logical problems. According to Piaget, children in the Potts et al. (1986) study would have been in a period of intellectual development called concrete operations. The concrete operations stage is a stage marked by stable equilibrium. Children would have had stable thought processes, and have acquired a rudimentary conception of time, space, number, and logic. Therefore, older children may have been able to demonstrate a superior understanding of events, and how events were ordered in terms of affect, compared to younger children. Thus, the differences in intellectual development between the two age groups of children may have resulted in the differences in performance.

In addition, the use of two different ages of children may account for the discrepancy in findings between the present study and that of Potts et al. (1986). In the present study, the performance of the 3-year-old children may have masked an effect of mood on children's free recall. One finding of the present study would indicate this to be so. The effect of age and mood on children's memory demonstrated that overall recall was high for happy-mood condition 6-year-old children. In addition, the overall recall of the happy-mood condition 6-year-old children was greater than that of both the sad-mood and no-induction condition 6-year-old children. Moreover, mood did not affect the overall recall of the 3-year-old children, which

was low. Thus, very young children's memory was not affected by mood, while young children's memory was facilitated by a positive mood.

Furthermore, it is possible that children's recall was not influenced by both positive and negative moods because of the choice of type of material. More specifically, for 3-year-olds, the materials may have been too complex for an effect of mood on memory to be demonstrated. Similarly, for 6-year-old children, the materials may have been too complex for an effect of sad mood on memory to be demonstrated. That is, the use of complex materials may have attenuated the effect of sad mood on children's memory. Thus, performance of happy-condition children was facilitated, whereas performance of sad-mood condition children was not.

Another possible explanation concerns the type of learning paradigm used in the present study. In the present study, to maximize the memory performance of children, an intentional-learning paradigm was used, rather than an incidental paradigm as in the Potts et al. (1986) study. This procedural difference may have resulted in the discrepancy between the present study and Potts et al. (1986). More specifically, giving instructions to encourage recall may have only affected the performance of happy-mood condition children.

Although no one reason seems clearly to explain the discrepancy between the current finding and that of Potts et

al. (1986), it seems most reasonable that a combination of them does. That is, the use of complex materials in an intentional-learning paradigm with younger children than have been studied before may have resulted in finding an effect for positive mood on children's memory, but not negative mood.

Hypothesis six was as follows: children would recall more positive and negative story events than neutral story events during free-recall, cued-recall, and recognition measures for affectively-valenced narrative content. For a measure of free recall, no effect was found. The tendency was for recall to increase across negative to neutral to positive story events. The finding in the present study of an effect of age, mood, and affective content of story suggested that something complex may have been happening with 6-year-old children's free-recall memory. On a measure of cued recall, there was an effect of type of affective story content on children's recall. Recall increased from moderately low for positive story events to moderate for neutral events, to high for negative events. For the recognition measure, children recognized more negative and neutral events than positive.

Thus, the findings for the effects of affective valence of narrative content on memory were inconsistent with the findings of the Potts et al. (1986) study. Children in the present study recalled more negative and neutral story

events than positive events on all three types of memory tasks. In Potts et al. (1986), children recalled more negative and positive story events than neutral events for all memory tasks. The discrepancies in the findings between the present study and those of Potts et al. (1986) may have been due to several factors. First, in the present study, younger children than have previously been studied served as subjects. For younger subjects, the negatively-valenced story events may have been more salient, and thus more readily available to free recall than neutral and positive events. As cues increased for measures of cued-recall and recognition memory, neutral events may have become as salient to the children as negative events.

Second, it may have been that neutral events were more salient to young children than positive events because of their familiarity with this type of event. For example, children may have perceived neutral events in the story as events of day to day life, and positive events as 'unreal'.

Third, age may have accounted for some of the findings. Six-year-old children recalled more neutral and negative than positive story events, whereas 3-year-old children recalled more negative than neutral and positive events. Therefore, it may be that children's memory was influenced more by the concrete content of story events than by the positive affect of the story events with increasing age. Again, according to Piaget's theory of intellectual



development (Baldwin, 1980), children of the present study were in the preoperational stage. Consequently, children may not have perceived the story events in order of affect because of their inability fully to understand relationships between classes of objects or events.

Hypothesis seven was as follows: older children would recall moderately more story events than younger children on a free-recall measure of memory. The results of the present study partially supported the hypothesis. That is, older children recalled more than younger children. This result is consistent with the general learning and memory literature (e.g., Kail & Hagen 1977). However, the difference in performance was somewhat greater than predicted. This effect is contrary to the more recent memory literature with young children. In this literature, it has been proposed that young children's performance is a function of the type of task. In the present study, an attempt was made to maximize children's memory by using ecologically-valid stimuli. That is, the story events were familiar and natural to the children. One explanation for the discrepancy between the present finding and others may be that for the 3-year-old children the choice of task was appropriate, but the narrative was too difficult for their comprehension. More specifically, the maximization of 3-year-old children's memory performance, through the use of an ecologically-valid procedure, may have been attenuated by

the use of material too difficult or complex for their comprehension.

A second explanation may be that the method of presentation of the narrative was inappropriate for the younger children. The use of a tape, and the temporary absence of the experimenter during tape playing, may have allowed 3-year-old children to be distracted from the task.

A third consideration for the difference in children's age-related performance may concern the type of learning paradigm used in the present study. In the present study, an intentional-learning paradigm was used. For age of subject, it may have been that instructions were understood by the 6-year-old children, but were not always understood by the 3-year-olds. Thus, the use of an intentional-learning paradigm could easily have inflated the performance of older children compared to younger children.

Finally, the effect of age on children's free-recall performance may be explained in reference to differences in strategies used by the children to perform memory tasks. More specifically, 6-year-old children appeared to have better and more developed strategies on the free-recall task than 3-year-old children. For example, some 6-year-olds rehearsed the story during tapeplaying, whereas 3-year-olds did not. The notion that 6-year-olds rehearsed story events was inferred from observation. That is, 6-year-olds were observed to use their hands and heads in a counting-like

procedure during tapeplaying, whereas 3-year-olds did not. Three-year-olds often were observed to be attending to where the experimenter was standing, rather than the playing of the story. In addition, during examination of the children's free-recall memory, 6-year-olds appeared to retell the story in its order of presentation, whereas 3-year-olds appeared to retell the story without adherence to order. Therefore, the strategies of the 6-year-olds to order and rehearse the story events may have provided them with more cues than the 3-year-olds, and thus their free-recall performance may have been enhanced.

Hypothesis eight was as follows: children's recall of story events would not vary with age on a cued-recall measure of memory. The results of the present study did not support the hypothesis. It was found that older children recalled more story events than younger children when cues were given. This finding is inconsistent with the studies of Cole & Scribner (1977) and Stein & Glenn (1975). In these studies, investigators found that the use of external cues and ecologically-valid materials attenuated age differences in recall. The discrepancy between the present finding and others may have been due to a performance effect for the 6-year-old children. As previously mentioned, the use of an intentional-learning paradigm may have enhanced the free-recall performance of the 6-year-old children, but not the 3-year-olds. For cued-recall memory, the use of an

intentional-learning paradigm may have had a similar effect. Therefore, it may have been that the use of cues enhanced the memory performance of 3-year-olds, but the use of cues and an intentional-learning paradigm greatly enhanced the performance of 6-year-olds.

In addition, as mentioned previously, one explanation may reside in the use of narrative materials as the stimuli to be remembered. That is, the use of narrative materials may have been too difficult for the 3-year-old children. Therefore, when cues were given, 3-year-old children's memory may not have been enhanced because they previously did not comprehend the story.

Finally, again, different aged children may have differently developed strategies for performance on memory tasks. For example, 6-year-olds' recall of the story events in the order of presentation may have enhanced their cued recall compared to the 3-year-olds'.

Hypothesis nine was as follows: boys would recall more story events than girls on a free-recall measure of memory. No such effect was found. This result is contradictory to the findings for the effects of mood on children's memory for affectively-valenced words (Nasby & Yando, 1982), and for affective narrative content (Potts et al., 1986). For both types of affective material, researchers found that boys recalled more than girls. The discrepancy between the present finding and the others may have been due to the use

of younger children in the present study. In Potts et al. (1986), the memory of 8-year-old children was studied; and in Nasby and Yando (1982), the memory of 10-year-old children was studied.

A second explanation may reside in varying of sex of experimenter in the present study. No other studies have varied sex of experimenter. It may be that the use of different sexed experimenters attenuated sex differences among the children. For example, in other studies, the use of one experimenter may have inflated the performance of boys' recall as compared to girls'. In the present study, the possibility of this effect was controlled for by the use of experimenters of two sexes.

Hypothesis ten was as follows: first, recognition accuracy for story events would be high for girls in a sad-mood condition, and moderate for girls in a happy-mood and no-induction condition; and second, boys' recognition accuracy would not vary with their mood condition. No such effects were found. This result is inconsistent with the finding of Potts et al. (1986). Three factors may account for the discrepancy between the present study and that of Potts et al. (1986). First, as previously mentioned, sex differences in memory may not have been found because of the young age of the subjects. Second, also as previously mentioned, sex of subject effects may have been attenuated by the use of experimenters of two sexes. Finally, as

discussed under hypothesis five, mood may not have affected younger children in the same manner as older children. Therefore, for the above reasons, in the present study, mood and sex of subject may not have affected children's recognition accuracy.

No hypothesis was entertained for an effect of mood on children's recognition of distractors. The results indicated that 6-year-old children's recognition of distractors was greatest when children were in a sad-mood condition, compared to a happy-mood or no-induction condition. In the one child study, Bartlett & Santrock (1979) found that happy-at-input condition children recognized more events and distractors on a recognition test. Therefore, the finding of the present study contradicts the finding of Bartlett & Santrock (1979). In the present study, a sad-mood condition accentuated children's recognition of distractors, while in Bartlett & Santrock (1979) a happy-mood condition did. Several explanations may account for the present effect of mood on children's recognition memory.

First, mood in children may affect their comprehension of stories. For example, it may have been that a happy or sad mood in a child induces storage of a less detailed representation of the story, so that children are more likely to recognize anything that is consistent with the general plot (Bartlett & Santrock, 1979).

An alternate interpretation of the findings is that children in a happy- or sad-mood condition recognized more distractors in a direct effort to improve their performance of recognition of events. That is, the effect of moods on children's recognition of distractors may be a reflection of the effect of demand to perform. Thus, children would have responded positively when distractors were presented.

Finally, moods may be associated with different strategies for self-regulation of behaviour. For example, sad-mood condition children may have responded positively to distractor items in an effort to improve their mood from sad to happy, whereas happy-mood condition children may have responded positively to distractor items in an effort to maintain a happy mood.

No hypothesis was entertained for an effect of affective valence of initial story event on children's free-recall and recognition memory. The results indicated that children who heard a story with a positive initial event recalled and recognized more events than children who heard a story with a negative initial event. Although Potts et al. (1986) did not find a main effect for valence of initial event on children's memory performance, the findings of their study demonstrated that valence of initial event in interaction with other variables, including sex of subject and mood of subject, affected children's memory. In the present study, the finding for affect of initial event was

more robust. The difference in strength of the findings may be due to the lack of sex of subject effect found in the present study. As discussed previously, the lack of a sex of subject effect in the present study may have been because the subjects of the study were much younger than the subjects in the Potts et al. (1986) study or because of the use of experimenter of two sexes.

A second reason for the more robust finding in the present study may have been the use of an intentional-learning paradigm, compared to an incidental-learning paradigm in Potts et al. (1986). Instructing the subjects to remember the events of the story may have encouraged the children to remember the initial event. If this were so, the affect of the initial event may have influenced their recall performance in a positive way.

No hypothesis was entertained for the effect of affective valence of initial story event on children's recognition of distractors. The results demonstrated that children who heard a story with a negative initial event recognized more distractors than children who heard a story with a positive initial event. This finding is in contrast to the effect of affect of initial story event on children's free- and cued-recall memory, as discussed above. That is, children's recall and recognition memory were facilitated by a positive initial event, but not a negative one. The result is somewhat puzzling, but perhaps may be attributed



to the influence of other variables on children's recognition of distractors scores. For example, in a higher-order interaction among mood, sex of experimenter, and affective valence of initial story event, sad-mood children who heard a negative initial story event, and were in the presence of a female experimenter had greater recognition of distractors than all other children. In addition, in a higher-order interaction among sex of subject, sex of experimenter, and affective valence of initial story event, girls in the presence of a female experimenter recognized more distractors than any other groups of children. These effects highlight the complexity of the effect of valence of initial event on children's recognition of distractors.

No hypothesis was entertained for an effect of age of subject and sex of experimenter on children's cued-recall performance. The results indicated that 6-year-old children's recall was greater with a female experimenter than a male. For 3-year-old children, recall did not vary as a function of sex of experimenter. This effect again may be attributed to situational factors. It may be that 6-year-old children recalled more in the presence of a female than a male because of the similarity of sex of experimenter to sex of teachers in elementary schools. Again, caution is urged in interpreting the effects of sex of experimenter on children's recall memory because efforts

were made to control for its effect through the design of the study.

No hypothesis was entertained for an effect of age of subject and affective valence of initial story event on children's free-recall memory performance. The results indicated that 6-year-old children's recall was greater when they heard a story with a positive initial event, as compared to a negative initial event. Recall of 3-year-old children did not vary with the affect of initial event. As previously discussed, the finding of an effect for valence of initial story event in the 6-year-olds, but not 3-year-olds, may have been due to the use of an intentional-learning paradigm. Instructing the 6-year-olds to remember the events of the story may have encouraged them to remember the initial event, and thus influenced their recall in a positive way. Contrary to this, instructing the 3-year-olds to remember the events of the story may not have had an effect on their memory because they may not have understood the instruction.

No hypothesis was entertained for an effect of mood of subject and affect of story content on children's free-recall memory performance. The results indicated that happy-mood condition children's recall for neutral story events was high, and greater than their recall of positive and negative events. No-induction and sad-mood condition children's recall for affectively-valenced narrative

material was moderate, and did not vary with the type of affect of material. This finding is inconsistent with the existing adult literature on the effects of mood on memory. In this literature, the findings generally have indicated that positive-mood subjects recall positive words more efficiently (e.g., Isen et al, 1978), and negative-mood subjects recall negative words more efficiently (e.g., Bower, 1981). In one child study, Nasby and Yando (1982) found an effect for positive mood on children's memory for positive words. No effect for sad mood on children's memory for negative words was found.

The discrepancy between the findings of the present study and others may be attributed to the use of younger children than have been previously studied. It may have been that the 3- and 6-year-old subjects preferred the more familiar, real, or concrete events in the story. Thus, their recall of these types of materials would have been enhanced.

In addition, young children may have less developed, and thus less efficient, strategies for recall than older children. For example, young children may not be able to code their mood in memory according to the situation. Rather, young children may code other aspects of the situation in memory. Thus, their recall of materials to be remembered may have been enhanced by other aspects of the situation than by mood.

No hypothesis was entertained for an effect of mood of subject and affect of initial event on children's free-recall memory performance. The results indicated that happy-mood condition children who heard a story with a positive initial event had high recall. Recall performance was greater than that of all other children. In the Potts et al. (1986) study only higher-order interactions among initial event and other variables were found. These were complex and uninterpretable. One plausible explanation for the present finding might be that the positive initial event may have worked as a 'primer' among the happy-mood condition children, and thus strengthened their happy mood. That is, 6-year-old children's memory may have been facilitated by a positive mood, and further by a positive initial story event.

No hypothesis was entertained for an effect of sex of experimenter and valence of initial event on children's recognition performance. The results indicated that children who heard a story with a positive initial event and were in the presence of a male or female experimenter had high recognition of events. Similarly, children who heard a story with a negative initial event in the presence of a female experimenter had high recognition of events. Finally, children who heard a story with a negative initial event in the presence of a male experimenter had low recognition of events. Again, the effect of sex of

experimenter is puzzling. However, one explanation for the above effect may be that the children perceived the pairing of a negative initial event and the male experimenter as incongruent, and thus confusing. Consequently, the recognition performance of the children may have been reduced as compared to that of the other children.

### Theoretical Underpinnings

Little theoretical progress in understanding moods has been made since the time of the ancient Greeks (Diener, 1984). A closer connection between theory and research would promote theoretical advances. Therefore, in this section of the thesis, an effort is made to seek explanations of the effects of mood on children's memory found in the present study with reference to cognitive theories.

Recall from the Introduction that specific models in cognitive psychology have been suggested as ways in which the processing of moods may be conceptualized (Bower, 1981; Bower et al., 1978, 1981; Clark & Isen, 1982; Isen et al., 1978). These include an associative network and spreading activation theory, automatic and controlled processes, and a contextualist position.

In associative network and spreading activation theories (Bower, 1981; Clark & Isen, 1982), it is proposed that memories of events are recorded into a semantic

network, and that different moods can be represented by different units or nodes in this same network. When active, a mood will become associated with coincident events. Memories, concepts, and perceptual categories are retrieved by the spreading of activation from the current mood unit as well as from the units corresponding to the explicitly presented retrieval cues (Bower, 1981). Generally, from this model one would expect that positive moods would activate memory nodes associated with positive feelings, while negative moods would activate memory nodes associated with negative feelings. These relationships were not found in the present study. Mood of the subject did not influence the recall of affectively-valenced material. In young children, it may be that context effects, such as the familiarity of the material to be remembered, alters the effect of mood on memory. In addition, social or cultural factors may be superimposed on the processes postulated by this model. For example, sex of experimenter seemed to influence the memory of young children to as great an extent as mood.

In the automatic and controlled processes theory, Clark & Isen (1982) distinguished between automatic and controlled processing strategies to account for the apparent asymmetry between the effects of positive and negative moods. More specifically, the processing of moods is viewed as automatic, while behaviour that accompanies a mood may be a

controlling process used to achieve or maintain a positive mood. Thus, positive and negative moods would have different effects on memory. This theory accounts for the findings of the present study in a general way. That is, positive mood children recalled more than negative mood children. It also suggests a specific explanation for the finding that negative mood influenced children's recall of distractors. Theoretically, sad-mood condition children may have responded more to distractors than happy-mood condition children in an effort at 'mood-repair'. That is, children may have tried to feel happier. However, the theory is incomplete because it does not address why such an effect for mood would only occur during recognition of distractors. In the present study, it may be that free-, cued-, and recognition-memory tasks did not provide the opportunity that was necessary for the children to improve their mood from sad to happy. In the recognition of distractors task, children were allowed to respond more freely (i.e., yes or no responses to 36 items) than during other tasks (i.e., specific answers to 18 questions, instructions to tell the story). Thus, sad-mood condition children may have been able to regulate their mood by responding positively to distractors. Therefore, in young children, self-regulation of moods may be dependent on the availability of a context conducive to the repair of a sad mood.

Additionally, Clark & Isen (1982) proposed an alternate view, within a schema or contextualist theory, for understanding mood-congruency effects and the facilitating effects of positive moods on overall performance. Theoretically, a positive mood is expected to invoke a semantic context that is more extensive than that invoked by a negative mood state. This larger context should then facilitate more efficient processing than contexts induced by other moods. Generally, the finding that happy-mood condition 6-year-old children recalled more overall than did sad or no-induction condition children is explained by this model.

#### Summary and Conclusions

The present study dealt with several factors relating to mood that would be likely to affect children's memory for affective narrative content. Some had been studied before, including sex of subject, type of affective narrative content, and affective valence of initial story event. Two had not been studied before, including age of subject and sex of experimenter. Furthermore, the present study examined the effects of these factors on the memory of younger children than had been studied before.

In a study of the effects of mood on memory, it is crucial that assessments be made of the moods to verify that differences in memory effects between groups are due to



differences in the mood of the groups. Predictions about the assessments of the mood-induction procedure were made. These were as follows: The appropriateness of happy-mood children's self-rating of mood would be moderately high; no-induction children's would be high; and sad-mood children's would be low. The intensity of children's happy thoughts would be moderately high, while the intensity of their sad thoughts would be low. In addition, sex and mood of subject was hypothesized to interact and affect children's self-ratings of mood and thoughts generated. None of the predictions was supported. The appropriateness of children's self-ratings of mood was high for happy-mood condition children, and moderately low for sad-mood and no-induction children. The intensity of children's happy thoughts was high on a happy dimension, and low on a sad dimension; the intensity of children's sad thoughts was high on a sad dimension, and low on a happy dimension. Sex affected children's appropriateness of self-rating of mood, but it did not vary with mood of subject.

Discrepancies were attributed to children's perceptions of categories of mood, inability to identify the affect of the test faces, artifacts of the scale, age of the subject, and differences in mood induction procedures and assessments. For children's perceptions of the affect portrayed by the faces in the self-rating scale, it was suggested that the children chose the happier faces to

identify themselves, not the sad and neutral faces. The question may be asked whether young children have the ability voluntarily to identify affect, other than positive expressions. Additional study on the utility of the self-rating of mood procedure is required.

Children were well able to generate both happy and sad thoughts when asked to do so. In contrast to findings for self-rating, young children generated and reported strong happy and sad thoughts. Further, in contrast to findings for self-rating, sex of subject did not affect the thoughts generated by the children.

Findings new to the area were demonstrated for children's self-ratings and thoughts. Children were able to generate happy and sad thoughts appropriate to their mood conditions. Age affected children's ratings of mood. In older children, appropriateness of ratings was high for a happy mood, and low for a sad mood. In younger children, appropriateness of ratings was moderately high for a happy mood, and moderate for a sad mood or no-induction condition. In addition, the appropriateness of younger children's ratings was higher in the presence of a male than a female. Sex of experimenter did not affect the appropriateness of ratings of older children.

Thus, the findings of the present study allow us to conclude that the mood-induction procedure was highly successful for happy- and sad-mood condition children on a

measure of thoughts generated. According to this assessment, the mood-induction procedures were effective for both happy and sad moods. In terms of children's own estimates of their moods and the appropriateness of their ratings, there is less support for the effectiveness of the mood-induction procedures. More specifically, the happy-mood induction procedure was highly successful, while the sad-induction procedure was moderately successful.

Of particular interest was the finding that the mood-induction procedure was successful with both 3- and 6-year-old children. However, the results of the study indicated that mood induction of young children was somewhat controlled by other factors prior to mood induction (e.g., natural mood) and during the induction procedure (e.g., sex of experimenter). Implications of these findings may be that moods of young children are more intense, of a greater duration, and subject to more influences than those of older children.

Predictions were made about children's memory for affective narrative content. They were as follows: Children in a happy- or sad-mood condition would recall more overall than children in a no-induction condition. Children would recall more positive and negative story events than neutral events. Older children would recall moderately more than young children on a free-recall task, while recall between the two age groups would not differ on a cued-recall

task. Boys would overall recall more than girls; and sex by mood of subject would affect children's recall performance. None of the predictions was supported. Six-year-old happy-mood condition children recalled more overall, while 3-year-old children's memory was not affected by mood. Six-year-old children recalled more neutral and negative story events than positive events; and 3-year-old children recalled more negative than neutral and positive events. Older children's recall was greater than younger children on free- and cued-recall tasks. Boys' and girls' recall performance did not differ; and sex by mood of subject did not affect children's recall performance.

Discrepancies between the predictions and findings were discussed in terms of age of subject, type of material to be remembered, type of learning paradigm, salience of story events, and sex of experimenter.

Findings new to the area were demonstrated for children's memory. Mood affected children's recall and recognition memory. In older children, recall was greatest when in a happy mood, and recognition of distractors greatest in a sad mood. Affect of initial story event affected children's recall and recognition. Older children who heard a positive initial story event recalled and recognized more events than children who heard a story with a negative initial story event. Recall of 3-year-olds did not vary with affect of initial event. Children who heard a

negative initial story event recognized more distractors than children who heard a positive initial story event. Sex of experimenter and age of subject affected children's recall. Six-year-olds recalled more in the presence of a female than a male; 3-year-olds' recall did not vary with sex of experimenter. Mood and affective story content affected children's recall, such that happy-mood children recalled more neutral events than positive and negative events. No-induction and sad-mood children's recall did not vary with affect of story content. Older children recalled more negative and neutral story events when cues were given. Younger children recalled more negative than neutral and positive events when cues were given. Mood and affect of initial story event affected children's recall. Happy-mood children who heard a story with a positive initial event recalled more than children who heard a story with a negative initial event. Sex of experimenter and affect of initial story event affected children's recognition memory. Children who heard a negative initial event and were in the presence of a male experimenter had lower recognition of events than that of all other children.

The present study had two purposes: first, to confirm the findings of Potts et al. (1986), and second to extend the findings to younger children than had been studied before. The results of the study did not confirm the findings of Potts et al. (1986). However, the results were

somewhat consistent with the general mood and memory literature. That is, a facilitative effect of positive mood on 6-year-old children's memory was found. This finding is particularly significant for two reasons. First, it was found for complex stimuli (i.e., narrative). In other research, an effect for mood on children's memory for narrative material has not been demonstrated. This discrepancy might be explained by the use of an intentional-learning paradigm rather than an incidental-learning paradigm. In the use of an intentional-learning procedure, the material to be remembered gains a distinctiveness. It may be that mood may only affect children's memory when the material to be remembered is distinctive. Second, an effect for mood on children's memory for narrative content was found in younger children than Potts et al. (1986) studied. Unfortunately, the results did not extend to the 3-year-old children. The absence of an effect for mood on 3-year-old children's memory must be viewed in terms of their performance on the memory tasks. The materials chosen to test the memory of 3-year-olds may have been inappropriate to their cognitive and interest level. In addition, the method of presentation (i.e., taped story) further may have limited their performance. Therefore, one conclusion of this study is that a study of the effects of mood on memory in younger children has to include age-appropriate methods. For

example, in future research with preschoolers, the use of lists of affectively-valenced words may be a more effective way to assess the effects of mood on their memory.

In addition, future studies of the effect of mood on younger children's memory for affective narrative content must consider the possibility of the effects of confounding variables masking the effect of mood. For example, an age-appropriate procedure might include the telling of a story by an experimenter, supplemented by story-book pictures. However, mood of subject may be confounded with affect portrayed in the pictures. That is, affect in the pictures of the narrative material might intensify or attenuate children's mood.

A common finding concerning the influences of induced mood on memory is mood congruency (Nasby & Yando, 1982). That is, subjects have tended to learn more material that is congruent with their mood state than material that is incongruent. This pattern of memory was not found in the present study. Potts et al. (1986) found that children recalled more positive and negative material than neutral material, regardless of mood condition. This effect also was not found in the present study. The discrepancy in the findings between studies might be explained by the young age of the subjects in the present study, as compared to Potts et al. (1986) and Nasby and Yando (1982). That is, younger children's memory for affective narrative content may not be

affected by mood in the same manner as older children. Additional research is necessary to replicate the finding in order to tests its robustness.

A factor that affected children's memory was affective valence of the initial story event. Six-year-old children's free and recognition memory were facilitated by a positive initial story event. Moreover, happy-mood condition 6-year-old children's memory was greatly facilitated by a positive initial story event. In addition, 6-year-old children's recognition of distractors was facilitated by a negative initial story event. Consistent with the findings of Potts et al. (1986), interactions among the affective valence of initial story event and other variables suggest that the influence of the affect of the initial story event on children's memory is complex. As was noted in the Introduction, although it is clear how this variable could be effectively examined, such an examination would be complex and laborious.

Although positive mood did not facilitate children's recognition of story events, a negative mood facilitated children's recognition of distractors. Sad-mood condition 6-year-old children recognized more distractors than happy-mood or no-induction condition children. This is not an entirely new finding in the literature on the effects of mood on children's memory. Bartlett & Santrock (1979) demonstrated that happy mood influenced children to



recognize more distractors, as compared to a sad mood. Thus, similar effects for mood on children's recognition of distractors have appeared twice in the literature. Both were of substantial magnitude. Thus, it may be an important issue for further investigation. For example, young children's attention processes in a learning situation may be influenced by their mood state. situation.

In conclusion, although many procedures were used in the present study to increase the probability of finding effects for mood on children's memory, only an effect of happy mood on older children's memory was demonstrated. Thus, it may be that mood is not reliably related to children's memory for affective narrative content.

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Appendix A

PARENTAL CONSENT FORM FOR DAYCARE CENTERS

To: Parents of 3-Year-Old Children  
From: Debby Boyes, Graduate Student, Developmental  
Psychology  
Re: Master's Thesis Research on Mood and Memory

Please consider this an invitation to have your child be 1 of 50 participants in my research, recruited from 7 West Kildonan daycare centers.

During the month of May, my male assistant and I will be seeing 3-year-old children individually in their daycares. For one 20-minute period, each child will be asked to think and report a happy or a sad thought, and then listen to a 3-minute tape of a story about 2 children and their adventures together over the course of a day. When the story is over, the child's memory will be measured by a free-recall and cued-recall task.

For the free-recall measure, the child will be asked to retell the story the way it was presented on the tape. For the cued recall, the child will be asked 18 open-ended questions about the events of the story (e.g., What did Terri do with Kerri's beach ball?). At the end of the session, each child will receive a small toy ring in appreciation of his/her help in the research.

Upon completion of the analyses of the data, I look forward to informing the daycare directors and the parents of the results of the study.

I consent to my child's participation in Debby Boyes' research during the month of May. If at the time my child does not want to participate, he/she will not have to do so.

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Parent's Signature

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Date

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Director's Signature

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Date

Appendix B

PARENTAL CONSENT FORM FOR ELEMENTARY SCHOOLS

To: Parents of 6-Year-Old Children  
From: Debby Boyes, Graduate Student, Developmental  
Psychology  
Re: Master's Thesis Research on Mood and Memory

Please consider this an invitation to have your child be 1 of 50 6-year-old participants in my research, recruited from 3 West Kildonan schools.

During the month of May, my male assistant and I will be seeing 6-year-old children individually in their schools. For one 20-minute period, each child will be asked to think and report a happy or a sad thought, and then listen to a 3-minute tape of a story about 2 children and their adventures together over the course of a day. When the story is over, the child's memory will be measured by a free-recall, cued-recall, and recognition task.

For the free-recall measure, the child will be asked to retell the story the way it was presented on the tape. For the cued recall, the child will be asked 18 open-ended questions about the events of the story (e.g., What did Terri do with Kerr's beach ball?). For the recognition measure, the child will be asked if the 18 events and 18

distractors were presented in the story. At the end of the session, each child will receive a small toy ring in appreciation of his/her help in the research.

Upon completion of the analyses of the data, I look forward to informing the school principles and the parents of the results of the study.

I consent to my child's participation in Debby Boyes' research during the month of May. If at the time my child does not want to participate he/she will not have to do so.

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Parent's Signature

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Date

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School Authority

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Date

## Appendix C

### POSITIVE, NEGATIVE, AND NEUTRAL EVENTS

#### Positive Events

1. Terri, laughing and running towards the old apple tree, kicked Kerri's beach ball high into the air.
2. Kerri giggled as Terri climbed the ladder like a monkey at the zoo.
3. The children had a delicious treat of all the apples they could eat.
4. Terri liked the idea and gave Kerri a hug.
5. Terri and Kerri, jumping up and down, shouted and waved excitedly at the bakery.
6. At the bakery, Grandma took out the icecream and cookies, and they all had a party.

#### Negative Events

1. Kerri was very upset because the beach ball disappeared into the branches of the apple tree.
2. Terri slipped off the ladder and fell onto Kerri, making both children cry.
3. When the neighbour came outside and saw that the ladder was missing, he scolded Kerri and Terri.
4. The wagon started to roll down the hill so fast that all the apples dumped out into the mud, breaking into



pieces.

5. Other children passing by made fun of Kerri's and Terri's dirty clothes and faces.
6. Then, it began to rain so hard that Terri and Kerri got all wet, and the party was ruined.

#### Neutral Events

1. The two children saw a ladder against the neighbour's garage and decided to borrow it to get Kerri's ball down out of the tree.
2. At the same time, the beach ball and a great many apples fell onto the ground.
3. After awhile, Kerri got the idea that they should take the rest of the apples to 'Grandma's Bakery'.
4. The children loaded the apples onto Kerri's wagon and pushed and pulled the wagon to the top of the nearby hill.
5. On their way down the other side of the hill, the children saw a big puddle of muddy water.
6. Grandma put on her coat and walked over to the children.

Appendix D  
POSITIVE INITIAL EVENT NARRATIVE

This is a story about Terri and Kerri and their adventure together one day. The two children were playing in Kerri's back yard at home. Terri, laughing and running towards the old apple tree, kicked Kerri's beach ball high into the air. Kerri was very upset because the beach ball disappeared into the branches of the apple tree. The two children saw a ladder against the neighbour's garage and decided to borrow it to get Kerri's ball down out of the tree. Kerri giggled as Terri climbed the ladder like a monkey at the zoo. Suddenly, Terri slipped off the ladder and fell onto Kerri, making both children cry. At the same time, the beach ball and a great many apples fell onto the ground. The children had a delicious treat of all the apples they could eat. When the neighbour came outside and saw that the ladder was missing, he scolded Kerri and Terri. After awhile, Kerri got the idea that they should take the rest of the apples to Grandma's Bakery. Terri liked the idea and gave Kerri a hug. The children loaded the apples onto Kerri's wagon and pushed and pulled the wagon to the top of the nearby hill. Terri and Kerri, jumping up and

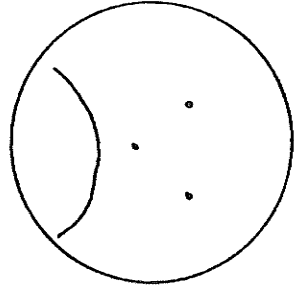
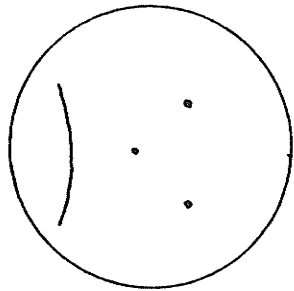
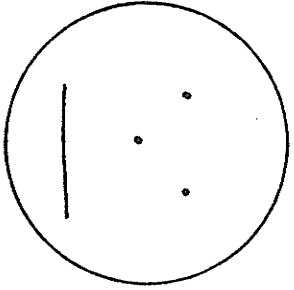
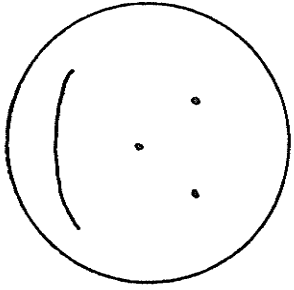
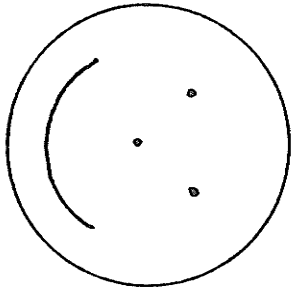
down, shouted and waved excitedly at the bakery. On their way down the other side of the hill, the children saw a big puddle of muddy water. The wagon started to roll down the hill so fast that all the apples dumped out into the mud, breaking into pieces. Other children passing by made fun of Terri's and Kerri's dirty clothes and faces. Grandma put on her coat and walked over to Kerri and Terri. At the bakery, Grandma took out the icecream and cookies and they all had a party. Then, it began to rain so hard that Terri and Kerri got all wet and the party was ruined. The children said goodbye and went home. Tomorrow would bring Kerri and Terri further adventures.

Appendix E  
NEGATIVE INITIAL EVENT NARRATIVE

This is a story about Terri and Kerri and their adventure together one day. The two children were playing in Kerri's back yard at home. Kerri was very upset because the beach ball had disappeared into the branches of the apple tree. Terri, laughing and running towards the old apple tree, kicked Kerri's beach ball high into the air. The two children saw a ladder against the neighbour's garage and decided to borrow it to get Kerri's ball down out of the tree. Kerri giggled as Terri climbed the ladder like a monkey at the zoo. Suddenly, Terri slipped off the ladder and fell onto Kerri, making both children cry. At the same time, the beach ball and a great many apples fell onto the ground. The children had a delicious treat of all the apples they could eat. When the neighbour came outside and saw that the ladder was missing, he scolded Kerri and Terri. After awhile, Kerri got the idea that they should take the rest of the apples to Grandma's Bakery. Terri liked the idea and gave Kerri a hug. The children loaded the apples onto Kerri's wagon and pushed and pulled the wagon to the top of the nearby hill. Terri and Kerri, jumping up and

down, shouted and waved excitedly at the bakery. On their way down the other side of the hill, the children saw a big puddle of muddy water. The wagon started to roll down the hill so fast that all the apples dumped out into the mud, breaking into pieces. Other children passing by made fun of Terri's and Kerri's dirty clothes and faces. Grandma put on her coat and walked over to Kerri and Terri. At the bakery, Grandma took out the icecream and cookies and they all had a party. Then, it began to rain so hard that Terri and Kerri got all wet and the party was ruined. The children said goodbye and went home. Tomorrow would bring Kerri and Terri further adventures.

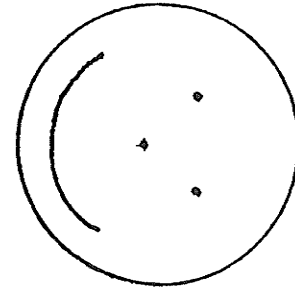
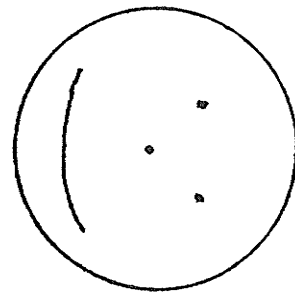
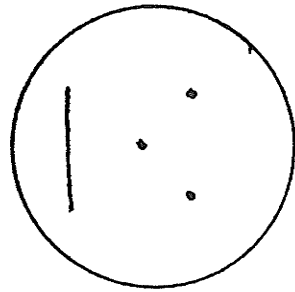
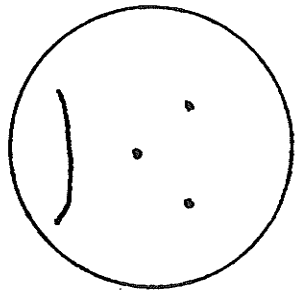
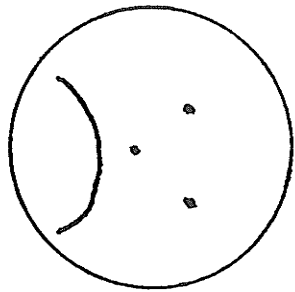
Appendix F  
SCHEMATIC DRAWINGS OF FACES, SMILING TO FROWNING



Appendix G

SCHEMATIC DRAWINGS OF FACES, FROWNING TO SMILING





## Appendix H

### CUED-RECALL ITEMS FOR POSITIVE INITIAL EVENT NARRATIVE

1. What did Terri do with Kerri's beach ball?
2. Why was Kerri upset?
3. The two children took something from the neighbour's.  
What was it?
4. How did Terri climb the ladder?
5. When Terri slipped off the ladder, what happened to  
Kerri?
6. Something fell onto the ground. What was it?
7. What did the children have for a treat?
8. Why was the neighbour mad at the children?
9. Kerri had an idea to take the apples somewhere.  
Where was it?
10. Terri liked Kerri's idea. What did Terri give Kerri  
for the idea?
11. What did the children put the apples into?
12. When the children got to the top of the hill,  
what did they do?
13. What did the children see on the other side of  
the hill?
14. Why did the apples break into pieces?
15. What did Grandma put on before she walked over to

Kerri and Terri?

16. Why did the other children passing by make fun of Kerri and Terri?
17. Grandma gave something to the children and they all had a party. What did Grandma give to the children?
18. Why was the party ruined?

## Appendix I

### CUED-RECALL ITEMS FOR NEGATIVE INITIAL EVENT NARRATIVE

1. Why was Kerri upset?
2. What did Terri do with Kerri's beach ball?
3. The two children took something from the neighbour's.  
What was it?
4. How did Terri climb the ladder?
5. When Terri slipped off the ladder, what happened  
to Kerri?
6. Something fell onto the ground. What was it?
7. What did the children have for a treat?
8. Why was the neighbour mad at the children?
9. Kerri had an idea to take the apples somewhere.  
Where was it?
10. Terri liked Kerri's idea. What did Terri give Kerri  
for the idea?
11. What did the children put the apples into?
12. When the children got to the top of the hill, what did  
they do?
13. What did the children see on the other side of  
the hill?
14. Why did the apples break into pieces?
15. What did Grandma put on before she walked over to

Kerri and Terri?

16. Why did the other children passing by make fun of Kerri and Terri?
17. Grandma gave something to the children and they all had a party. What did Grandma give to the children?
18. Why was the party ruined?

## Appendix J

### DISTRACTOR ITEMS FOR RECOGNITION TASK

#### Positive Distractors

1. Terri surprised Kerri with a balloon.
2. Terri and Kerri smiled at the cartoon.
3. Terri won a prize at the fair.
4. Terri and Kerri went on a holiday.
5. The children sat high up on the fire truck.
6. The children took presents to the birthday party.

#### Negative Distractors

1. Kerri had nobody to play with.
2. Kerri's daddy forgot to bring home candy.
3. Terri's friend hit the dog.
4. Kerri had a needle at the doctor's.
5. Terri broke his toy.
6. Mother spanked the children.

#### Neutral Distractors

1. Terri watched leaves blowing in the wind.
2. Grandma cleaned up the room.
3. Kerri and Terri crossed the road to school.
4. Kerri fed the cats.
5. The neighbours were fixing their stores.
6. Kerri got dressed for the day.

Appendix K

ITEMS IN RECOGNITION TASK

1. Terri climbed the ladder like a monkey.
2. Kerri had nobody to play with.
3. The children loaded the apples onto a wagon.
4. The children saw a muddy water puddle.
5. Terri watched leaves blowing in the wind.
6. Kerri's daddy forgot to bring home candy.
7. Terri surprised Kerri with a balloon.
8. Terri and Kerri smiled at the cartoon.
9. The ball and apples fell onto the ground.
10. Grandma cleaned up the room.
11. Kerri and Terri crossed the road to school.
12. Terri won a prize at the fair.
13. Grandma took out the icecream and cookies.
14. Kerri had an idea to take the apples to  
Grandma's Bakery.
15. The children, jumping up and down, shouted and waved  
at the Bakery.
16. Terri's friend hit the dog.
17. The apples broke into pieces.
18. Kerri had a needle at the doctor's.
19. Terri and Kerri went on a holiday.
20. The children sat up high in the fire truck.

21. It began to rain and Terri and Kerri got all wet.
22. Grandma put on her coat.
23. Terri broke his toy.
24. Terri gave Kerri a hug.
25. Kerri fed the cats.
26. The neighbours were fixing their store.
27. Kerri got dressed for the day.
28. Terri kicked the beach ball.
29. Other children made fun of Kerri and Terri.
30. Mother spanked the children.
31. Kerri was upset when the beach ball disappeared.
32. Terri slipped off the ladder onto Kerri.
33. The children took presents to the birthday party.
34. The neighbour scolded the children.
35. Kerri and Terri had a delicious treat of all the apples they could eat.
36. The children took the ladder from the neighbour's garage.



Appendix L  
THOUGHTS GENERATED BY THE 3-YEAR-OLD CHILDREN

Happy-mood Condition

You play games to make you happy.

When we have a pyjama party at Lea's.

Making magic makes me happy.

When my mom is happy.

Toys.

When I go to the circus with my daddy.

After the story I am going to be very happy; and I am going to McDonald's after daycare.

Watch TV.

Reading books like Christmas story.

When your mom and dad make you feel happy inside.

When my mom hugs me and kisses me.

Birds.

My brother.

My dolls.

Playing with toys--cars and trucks.

Ghostbusters--I got the garbage man, and you pin the garbage on his head, and you take his slimy wings out.

## Sad-mood Condition

When my mom turns off the lights.

Tears.

My mom and cars.

Coughing.

If you hit somebody.

When I was sick before.

When you cry.

When my mom or dad smacks me.

When daddy's mad at mommy.

When sick.

My mom makes me sad.

When you hurt yourself.

When you fall down and hurt yourself.

Cats make me feel sad.

If somebody hits somebody they'd be sad and they'd tell  
their mom.

When someone hurts me.

Appendix M

THOUGHTS GENERATED BY THE 6-YEAR-OLD CHILDREN

Happy-mood Condition

When my mom takes me to Tinkertown because my favorite ride is there.

Playing soccer.

When my sister never breaks my toys.

When my mom and dad kiss me and hug me and all that.

Jesus.

When it is your birthday and you play with your friends.

When I'm playing with my friends.

My dog makes me happy: playing with my dog.

I have a lot of things that make me happy: I go to school.

When I play with my friends.

My mother.

When my mom had a baby.

When you get something that is really nice.

When my mom tells me we're going to go shopping and I'll get a toy--a colour racer.

When my mom's going to take us out for a movie for my brother's birthday.

All the snacks I want.

## Sad-mood Condition

If my cat died.

If my grandma died I'd be really sad because she's getting really old.

When my mom goes away.

When my friend said he'll come over and he didn't.

One day my dad went to my grandma's and he was looking and my grandma wasn't there.

When I don't get to play outside.

When my mom goes away and she goes for a long time.

When my brother hurts me.

When I don't get a chocolate bar.

Peoples calls me names.

Like when your uncle die working on the train tracks, and lying down dead and they took him to the hospital.

When bears come toward me I get a little afraid too.

If someone kidnapped me.

If someone punches me or something.

When my friends doesn't want to play with me

When I climb the fence and ripped the pants.

Appendix N

THREE-YEAR-OLD CHILDREN'S FREE-RECALL RESPONSES

Example 1

He was mad; the neighbour was mad.

The kids made fun of her.

The apples fell into the mud.

They had a party.

Example 2

I love ghostbusters.

Maybe they throwed the beachball around.

They put them in the wagon.

They eated apples.

## Appendix O

### SIX-YEAR-OLD CHILDREN'S FREE-RECALL RESPONSES

#### Example 1

One of the girls kicked the ball in the tree.  
They went to get it and fell down on the other girl.  
Apples fell down, too.  
Went to Grandma's, so could cook.  
Went in the wagon and saw mud.  
Went over it and the apples fell in the mud.  
And then, Grandma came.  
And they told her what had happened.

#### Example 2

Kerri, she run to the apple tree and she kicked a Terri's beachball up in the air and it landed in a tree.  
They saw a ladder at the next door neighbours and borrowed it to get the beachball out.  
And when they got the beachball out Terri slipped off the ladder.  
The beachball and tons of apples fell.  
And they ate it for a good treat.  
And the neighbours saw the ladder disappeared and he saw and gave a funny frown to them.  
They took the apples to Grandma's Bakery.

They had a party.

It started to rain really hard and they went home and got soaked and everything else.