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Mood-Congruent Retrieval and Circumplexity between Emotions in Early Childhood Memories

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Recommended Citation

MOOD-CONGRUENT RETRIEVAL AND CIRCUMPLEXITY BETWEEN

EMOTIONS IN EARLY CHILDHOOD MEMORIES

by

Robert C. Casas

A Dissertation Submitted to the Faculty of the Graduate School

of Loyola University of Chicago in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

December

1985

ACKNOWLEDGMENTS

It is a pleasure to acknowledge the assistance of the following individuals in completing this project. To each my heartfelt thanks are extended.

My dissertation committee: Alan S. DeWolfe (Director), Dan P. McAdams, and Fred Bryant each in distinct ways helped me develop this work from the initial idea to its final manuscript form. The final product is distinctly better because of the careful attention and thought they devoted to it.

Mark Mayzner began this work with me as a reader on my committee. While he was unable to complete the project with me, I nonetheless am grateful for his initial encouragement and help.

Frank Slaymaker assisted in the statistical analysis of the data. The argument presented in Appendix F results from one of our discussions.

James Steiger, at the University of British Columbia, gave me the listing for his FORTRAN IV program MULTICORR 2 and assisted in its implementation at Loyola University's computer center. Without his gracious assistance many of the statistical analyses reported here could not have been done.

Robert Plutchik of Albert Einstein College of Medicine of Yeshiva University, very kindly provided me with a copy of an un-published coding manual he had developed with R.D. Wynne. This

manual formed the basis for the coding manual used in this project
and given in Appendix D. My gratitude to him and my respect for his
"emotion work" as he has called it, will, I hope, be readily apparent
to the reader of the text.

Gordon H. Bower, of Stanford University, provided me with
several of his unpublished manuscripts pertaining to his research on
emotion and memory. His as yet unpublished review of the memory and
emotion literature was especially valuable to me in preparing my
own analysis of this literature. Finally, his lecture at Loyola
University last year crystalized my interest in this area; and
his correspondence was most encouraging at a time when I needed it.

Cheryl Sporlein typed the final manuscript and, in addition,
completed the technical apparatus of the manuscript (i.e., Table of
Contents, etc.).

Edward R. Casas was an incisive editor and listener during a
crucial phase of the literature review. Table 1 is the result of one
of his queries.

Finally, I thank my wife, Ann L. S. Casas and our children,
R. Maxim and Jeffrey Edward. Time on this project was time away
from them. Remembering always serves one's needs at the moment; but
one is also graced with moments to remember.

VITA

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Elementary education was obtained at Hardy Preparatory School
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logical Association, the Association for the Advancement of Behavior
Therapy, and the Illinois Psychological Association.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CONTENTS OF APPENDICES

". . .when one maintains a trace of childhood within

him. . .He seems to take part in the restitution of the

power of abolished dreams." Gaston Bachelard (1971).

The Poetics of Reverie. Boston, Massachusetts: Beacon

Press, pp. 133-134.

"To find an event in memory, it is necessary to construct

a plausible scenario for that event's occurrence, thus

using essentially the same mechanisms necessary to

understand the original event. Retrieval is therefore

a process of re-understanding the experience. . . ."

(Reisser, Black, & Kalamarides, 1985 in press, p. 2;

emphasis in original)

"There are no indifferent or nonsensical recollections.

. . .We remember those events whose recollection is

important for a specific underlying psychic tendency. . . .

Every memory is dominated by a goal-idea which directs

the personality-as-a-whole." (A. Adler, quoted by

Ansbacher, 1947/1979, p. 6)

CHAPTER 1

INTRODUCTION

The present study examines the influence of emotional "states"
upon the content and recollection of very old autobiographical memor-
ies, more specifically of early childhood memories (EMs). Two
questions are the major focus of the research. First, does the
current emotional state of the rememberer bias retrieval processes
toward memories with emotional content similar to or congruent with
the rememberer's emotional state? This mood biasing influence has
been referred to by Bower (1981) as mood-dependent retrieval (MDR)
because there is evidence that emotions can act as powerful retrieval
cues for mood-congruent memories. And, second, do emotions encoded
in EMs show any type of patterning or organization such as that
found in the naturalistic expression of emotional "states" (Diener
& Emmons, 1985; Plutchik, 1980). More precisely, will the circumplex
pattern between emotions identified by Plutchik (1980) in the natur-
alistic expression of emotions also be found in the patterning between
emotions encoded in memories of early childhood?

At a theoretical level the current study has two goals. The
first is to contribute data relevant to understanding the manner in
which the contents of a person's autobiographical memory can be
thematically related (McAdams, 1985) to the emotional aspects of

1

personality and motivational processes. The second is to demonstrate
that models of the relationship between cognition, emotion, and
memory (Bower & Cohen, 1982; Clarke & Fiske, 1982; Clark, Milberg, &
Ross, 1983; Izard, Kagan, & Zajonc, 1984) can be further refined by
considering qualities of the naturalistic expression of emotional
states (Diener & Emmons, 1985; Izard, 1972, 1977; Plutchik, 1980;
Polivy, 1981).

The literature pertinent to the present study is organized as
follows. Research and theory on the psychological significance of
EMs will be briefly reviewed. It will become apparent that further
insight into the memory processes mediating thematic continuity is
needed. One avenue toward such insight may be found through what is
known of emotional influences upon memory. Evidence that emotions
do influence memory processes will be discussed, and Bower and
Cohen's (1982) model of such influences will be considered. Research
inconsistent with it is analyzed and attributed to methodological
failures to control for the intensity, similarity, and polarity
parameters of emotional states. Plutchik's (1980) circumplex model
incorporating these dimensions of emotions will then be presented
and used to formulate several hypotheses about the emotional content
and recollection of EMs. A study testing these hypotheses is pre-
sented and discussed.

Current Perspectives on Early Childhood Memories

Many psychologists (Manaster & Corsini, 1982; Mayman, 1968;
Olson, 1979) consider EMs to be the simplest and most effective
method available for the "projective" assessment of personality and

motivational processes. The contrasting theoretical viewpoints of Freud (1901/1965) and Adler (1956, 1969) have guided the projective use of EMs. While Freud believed that the content of EMs was often "screened" or altered by later defensive processes, Adler argued that EM content was a transparent reflection of the goals, motivations, and life-style of the rememberer. What unites these theorists is their common belief that EM content could be analyzed to reveal significant information about the development, personality, and motivations of the individual.

There is, indeed, evidence to support the thematic relatedness of EM content to various descriptive features of the personality and motivational processes of the rememberer (Olson, 1979). Three studies are described below.

Kihlstrom and Harackiewicz (1982) evaluated Freud's (1901/1965) hypothesis that "screen memories" (the characteristics of which are described in the Methods section of the current report) reflect conflict and anxieties originating during the "Oedipal period" of psychosexual development. They found indirect support for this argument in that such memories were significantly correlated with current anxiety and defensiveness as assessed by psychometrically refined personality assessment devices.

Clear and direct support for Adler's perspective can be found in the studies of Lord (1971) and McAdams (1982). Lord (1971) found that positivity-negativity of affect, and activity-passivity as a mode of problem resolution in EM content was significantly correlated with similar themes in the thematic content of various other projective

and non-projective assessment methods (e.g., the Rorschach, Thematic Apperception Test, Draw-a-Person Technique, and interviews regarding vocational goals). McAdams (1982) demonstrated a similar type of thematic relatedness between power and intimacy motivation and more recent, rather than "early," autobiographical recollections. He found that themes of power and intimacy in Thematic Apperception Test protocols and in the content of recent particularly positive, or "peak experience" memories were significantly correlated. Lord (1971) provided data on the reliability of thematic coding and McAdams (1982) provided both reliability and validity information for his scoring system.

These demonstrations of the thematic relatedness of EM content to the rememberer's emotional state, motivational processes, and personality style lend credence to the use of autobiographical recollections such as EMs for assessment purposes (Olson, 1979). However, demonstrations of correlations between EM content and the characteristics of the rememberer require rather than provide further understanding of the underlying processes of memory mediating such relationships (Kihlstrom, 1981). On the basis of their own study Kihlstrom and Harackiewicz (1982) make the following appraisal:

> A major problem for studies of personality and memory is to explicate the relations between what is accessible in an individual's autobiographical memory, the way in which these memories are retrieved and reconstructed in the specific instance, and other features of personality. (p. 145)

There are, therefore, two issues faced by investigators attempting to pursue the relation between personality and memory as identified by these authors. The first involves identifying the relation between personality and memory; and the

second is explaining the relationship. There appear to be <u>at least</u> two ways in which personality may be related to and influence memory. Each has consequences for the second issue of providing a plausible account of the mechanisms involved. The first assumes that personality may ultimately be "translated into strategic cognitive activity" (Shower & Cantor, 1985, p. 276). This links personality and memory by assuming they are both a type of cognitive process. This approach at least partially addresses the second issue since "personality" (as strategic cognition) and memory can then be discussed in the same language, e.g., of information-processing. This notion has met wide acceptance (Cantor & Kihlstrom, 1981; Clarke & Fiske, 1982; Fiske & Taylor, 1981; Hamilton, 1983; Izard, Kagan, & Zajonc, 1984; Kihlstrom & Cantor, 1985; Mancuso & Ceely, 1980; Markus, 1980). Critics, however, wonder whether there might not be certain "unique features" (Greenwald, 1981) to personality that are overlooked in this theoretically reductive translation (Pervin, 1984, 1985; Tomkins, 1979).

A second way to conceptualize the relation between personality and memory gives to each equal status as independent but <u>temporally</u> interactive psychological systems (Lewis, Sullivan, & Michalson, 1984; Royce & Powell, 1984). A difficulty for this approach has been identifying the processes through which they interact.

A possible resolution to this quandry may have been anticipated by Schachtel (1947, 1959) in his theoretical analysis of the apparent "amnesia" most individuals have for memories of events much before the age of four or five years. Drawing upon Bartlett's (1932)

theory of memory, Schachtel argued that the cognitive "schemata" of the child and adult are too dissimilar for the adult's schemas to act as effective retrieval cues for childhood memories. An interesting feature of Schachtel's theory was the manner in which adult-child differences were conceptualized. The developmental change influencing memory was the relative extent to which emotions suffused and shaped experiences. The adult's cognitive processes are more strongly conventionalized and schematic because they are shaped by language and socialization. Whereas, Schachtel argues, the child's perception and thought are shaped more by emotional and sensory processes. The final step in the argument was the assumption that EM content was saturated by such emotional and sensory content. Since the adult's thought processes showed less of this content they could no longer function as effective retrieval cues for the memories.[1]

Schachtel's (1947) account of childhood "amnesia" depends upon a principle of memory functioning called the "encoding specificity principle" (Tulving, 1983). This principle of memory retrieval states that "what is stored is determined by what is perceived and how it is encoded, and what is stored determines what cues are effective in providing access to what is stored" (Tulving & Thomson, 1973, p. 353). There is extensive empirical support for the validity of this model of memory retrieval (Houston, 1984; Spear, 1978; Tulving, 1983,

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[1]The validity of Schachtel's psychoanalytic account of developmental changes is not the issue here. Recently, White and Pillemer (1979) have used Piagetian theory to make the same essential argument but attribute the key developmental changes to alterations in cognitive structures.

1984). The interesting suggestion made by Schachtel (1947, 1959) is that temporal and developmental fluctuation in the manifestation of emotional-motivational processes in thought content may influence the accessibility and retrievability of EMs.

Recent evidence that emotions may serve as powerful and influential encoding and retrieval contexts for memories (Bower, 1981, 1983; Gilligan & Bower, 1984) makes Schachtel's (1947) argument all the more intriguing in light of the two perspectives on the relation of personality and memory discussed earlier. Viewing emotions as one of the "other features of personality" alluded to by Kihlstrom and Harackiewicz (1982) makes one wonder whether there might not be certain "unique features" (Greenwald, 1981) of emotions which influence memory but cannot be reduced to or explained by cognitive processes.

Early childhood recollections have consistently been shown in survey studies to have strong and predominant emotional content (Dudycha & Dudycha, 1933, 1941; Kihlstrom & Harackiewicz, 1982; Walfogel, 1948; Wynne & Schaffzin, 1965). In addition, three recent theoretical discussions focusing on various aspects of childhood memories have asserted that strongly emotional EMs are the ones most likely to show thematic relatedness to the personality of the rememberer (Epstein, 1983; McAdams, 1985; Tompkins, 1979). Therefore, one might speculate that the accessibility and retrievability of EMs may be particularly vulnerable to interference as a result of fluctuations in emotional states. Evidence for emotional influences on memory will therefore be considered.

Emotional Influences Upon Memory

The structures and processes of memory have assumed an increa-
ingly important role in theories of human cognition over the last
decade (Rumelhart & Norman, 1983). Many researchers now accept the
following propositions about the structure of memories (Tulving &
Bower, 1974):

a) memory representations of individual events can be studied
   and described;

b) memories are usefully conceptualized as collections of more
   elementary components or features;

c) these features or components differ in some sense quali-
   tatively;

d) they are at least to some extent independently manipulable
   and variable; and

e) the extent to which a particular feature is represented
   in a memory trace can be quantitatively assessed.

Equally recognized is the fact that one's assumptions about memory
representations cannot be logically separated from assumptions about
memory processes, the two equally constrain one another (Anderson,
1978).

A powerful method for assessing the contents of memories involves
retrieval cueing (Tulving & Bower, 1974). Based on the encoding
specificity principle (Tulving, 1983), the method involves testing
memory for the same class of events using different retrieval cues.
If it is assumed that the effectiveness of cues is a function of their
"match" or inherent similarity with the features encoded in a memory,

then the relative effectiveness of different cues serves to identify the features of a memory. In this way both the structure (i.e., features or components) and the process (i.e., the encoding specificity principle) of memory can be examined.

A logical consequence of this framework for examining memory has been the recognition that various features of the "psychological state" of the individual, in addition to the putatively "to-be-remembered" material, are encoded into memory representations of events. One of the more intriguing aspects of this process is illustrated by occasions when it appears that the individual's "state" takes precedence over the "to-be-remembered" material as effective retrieval cues for memories. Such occasions are termed instances of "state-dependent" memory, and alcohol and drugs are known to produce such effects (Eich, 1980).

Recently, Bower (1981, 1983; Gilligan & Bower, 1984) has reviewed an extensive series of investigations he has conducted demonstrating that emotions can act as distinctive encoding and retrieval contexts for memories. He calls this "mood-dependent retrieval" (MDR) because it appears to be quite analogous to the phenomena of drug and alcohol "state-dependent" memory.

One of the first studies showing that an individual in a happy or sad mood better remembers material learned while in the congruent mood is described in Bower, Monteiro, and Gilligan (1978). Moods were manipulated in this study through the use of hypnotic induction. Each subject learned two different word lists and then was asked to recall both lists in a third and final session. Mood was manipulated at

three times: while learning list 1, list 2, and at recall. Six
different groups were formed by crossing the two moods of happiness
(H) and sadness (S) with the three stages of the study, i.e., H-H-H,
H-S-H, H-S-S, S-H-S, S-S-S, and S-H-H. Two types of matching of
moods across conditions therefore occurred. The mood "controls" who
learned and recalled the lists in the same mood (H-H-H and S-S-S),
and the groups who learned and recalled one of the lists in the same
mood (H-S-H, H-S-S, S-H-S, and S-H-H). Memory or retention was scored
as the percentage of items recalled from the original learning trials
that were retrieved on the last recall test. The results were clear
cut and highly symmetric. Figure 1 shows these results. Subjects
learning and recalling a list in the same mood (either happy or sad)
demonstrated the highest retention. Subjects in the same mood (either
happy or sad) across all three sessions (the "mood controls") demon-
strated an intermediate level of retention. Subjects who learned
and recalled a list in different moods (either happy then sad or sad
then happy) demonstrated the poorest retention. Thus, an emotional
state appears to have either facilitated or interferred with recall
depending upon whether learning and recall occurred under similar or
different moods.

The experiment just described involved a learning task in which
the emotional state of the subject was manipulated at both initial
encoding and later retrieval. As such it provides the necessary
degree of experimental control to warrant the conclusion that some-
thing about the emotional state of the subject influenced the accessi-
bility of the learned materials. The possibility that the hypnotic
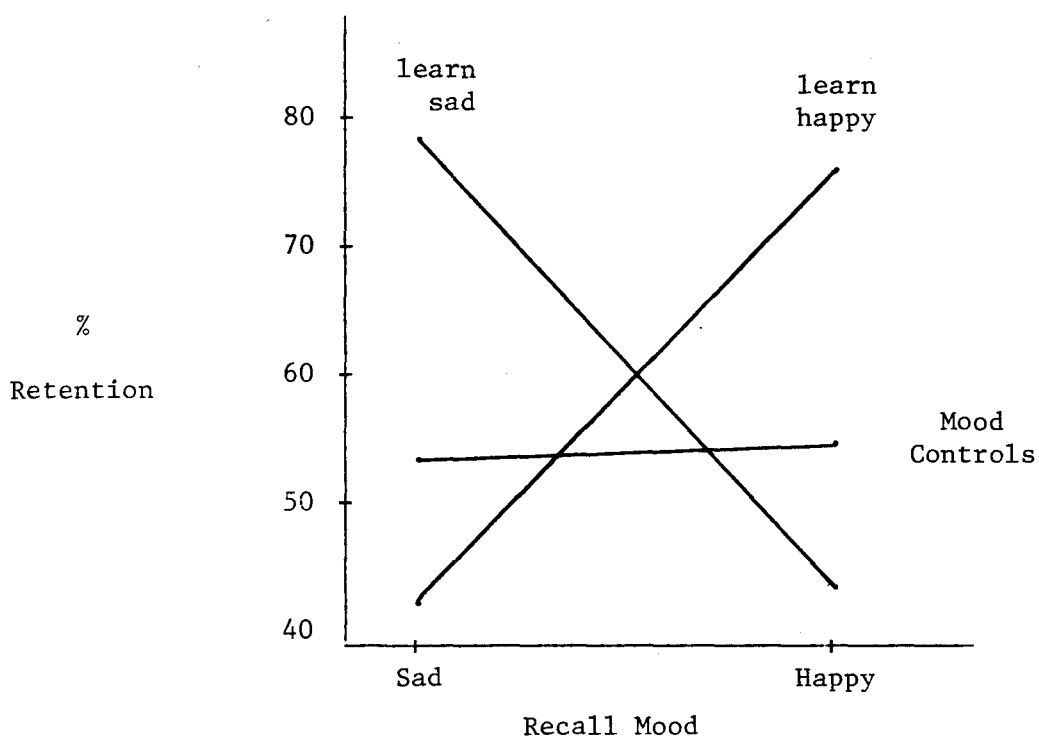
Percent retention depending on the match between learning and recall moods. The sloping lines refer to subjects who learned the two lists under different moods.

Figure 1.* The "Symmetric" Mood-Dependent-Recall Effect

*This figure is from Bower (1981, p. 132, Figure 2)

procedures somehow influenced the results does not appear likely since this two-list learning study has subsequently been replicated with similar (though not exactly the same) results by Bartlett and Santrock (1979) using children and a mood manipulation involving the reading of happy and sad stories. This experiment and the follow-up in Bartlett, Burleson, and Santrock (1982) will be discussed in greater detail subsequently when findings of asymmetric MDR effects will be considered.

In addition to word-lists, Bower (1981) reports the accessibility of recent autobiographical memories can be influenced by MDR. Subjects were given diaries in which to record their significant emotional experiences for one week. They were asked to describe the incident and rate its emotional intensity as soon as possible after the event occurred. At the end of the recording week the 14 subjects turned in their diaries and returned one week later for testing. At this time they were placed in either a happy or a sad mood and were asked to recall all of the incidents they had recorded. MDR was observed: Subjects who were happy at recall retrieved proportionately more of their happy incidents (94%) than did subjects who were sad (46%). The MDR effect, however, was "asymmetrical" in that the sad subjects did not recall a larger proportion of sad than happy memories. Happy subjects on average recalled 25.1 happy and 1.5 unhappy incidents while sad subjects recalled 8.6 happy incidents and 10 unhappy incidents. Thus, in addition to MDR, a difference in the effectiveness of memory functioning was observed across the mood conditions. Happy subjects recalled a larger total number of memories

than did the sad subjects (27 versus 18.6).

Having subjects rate the affective quality of a life-incident at the time of diary recording may have confounded the judgment of affective quality with the emotional tone of the experience itself as the factor producing the observed MDR effect. In other words, it may have been the affective judgment that "matched" the mood of the subject at recall. To rule out this possibility another study was conducted (Bower, 1981, Experiment 3). In this study subjects were asked to recall autobiographical incidents occurring before "entering high school" (subjects were college students). The assumption underlying this study was that subjects have a store of both happy and sad autobiographical memories. If MDR operates then one would predict that memories with affective qualities congruent with mood at recall would be better remembered than memories with dissimilar affective qualities.

The design of the study involved the use of post-hypnotic suggestions (Hilgard, 1965) to the effect that the subjects would enter either a happy or sad mood when "cued" by the investigator. Out of trance subjects were asked to recall incidents before high school and it was emphasized that as many unrelated incidents as possible were to be recalled. Subjects wrote brief "telegraphic" single-line phrases describing the incidents on a sheet of "green paper" that was the post-hypnotic cue for some subjects to feel sad and others happy. Ten minutes were allowed for recall. The post-hypnotic suggestion was then removed and subjects were asked to return the next day. At this time subjects, who were presumably in a more "neutral" mood

state, rated the affective quality of each incident as either happy, neutral or sad. These ratings were used to look for the MDR effect. An analysis of variance on the number of happy versus sad memories showed that happy subjects recalled far more happy memories and sad subjects recalled slightly more sad memories. The ratio of happy to happy plus sad memories was also analyzed. The proportion of happy memories would be 50% if no selective mood biasing was present. Happy subjects had a "happy proportion" of 96% while sad subjects had a "happy proportion" of 46% which is a statistically significant difference between the groups. The MDR effect was again asymmetric in that the sad subjects did not show a higher proportion of sad (i.e., sad to happy plus sad) memories than did the happy subjects.

A final study described in Bower (1981) provides what is probably the most impressive evidence of MDR currently available. It is also the most complex of the studies reported. The basic premise underlying MDR is that moods or affective states can act as distinctive encoding and retrieval contexts that either facilitate or interfere with memory when they are congruent or incongruent. To determine whether multiple emotions rather than just happy and sad emotions influence memory, the following study was conducted. The issue was whether four emotions could produce different degrees of MDR effect depending upon their degree of similarity to one another. Using Plutchik's (1980) analysis of basic emotions, Bower selected the emotions of joy, sadness, anger, and fear. According to Plutchik (1980) these emotions differ in their degree of polarity (or oppositeness) and similarity to one another. Joy is the polar opposite of

fear. These polar sets of emotions are orthogonal to one another in Plutchik's (1980) structural or "circumplex" model of emotions. Figure 2 displays Plutchik's (1980) circumplex model of eight basic emotions illustrating their similarity and polarity relationships.

The main prediction of Bower's (1981) study was that a recall mood similar to a learning mood would result in greater accessibility or recall. To test this subjects were asked to learn a different word list in each of the four emotions and then to recall each list while either in the same emotional state (in which it was learned), a different but not opposite emotional state, or the opposite emotional state. The results were that emotional similarity (as indexed by Plutchik's model) affected recall. When learning and recall emotions matched, retention averaged (i.e., across all four emotion matches) 85%; when the emotions were different but not opposite, 70% of the words on a list were recalled; but when learning and recall emotional states were opposite, retention averaged only 54%. The results are so orderly that they confirm not only Bower's MDR predictions but also lend support to Plutchik's (1980) similarity scaling solution for the emotions (Bower, 1981). This point will be discussed more fully later when Plutchik's model is considered in detail.

The results of the four studies conducted by Bower indicate that emotions can selectively bias the recall of affectively toned memories. It should also be noted that these studies comprise only a small proportion of the research he has conducted to determine the influence of emotional states upon cognitive processes in general. These other influences are not the primary concern of the present study. For the
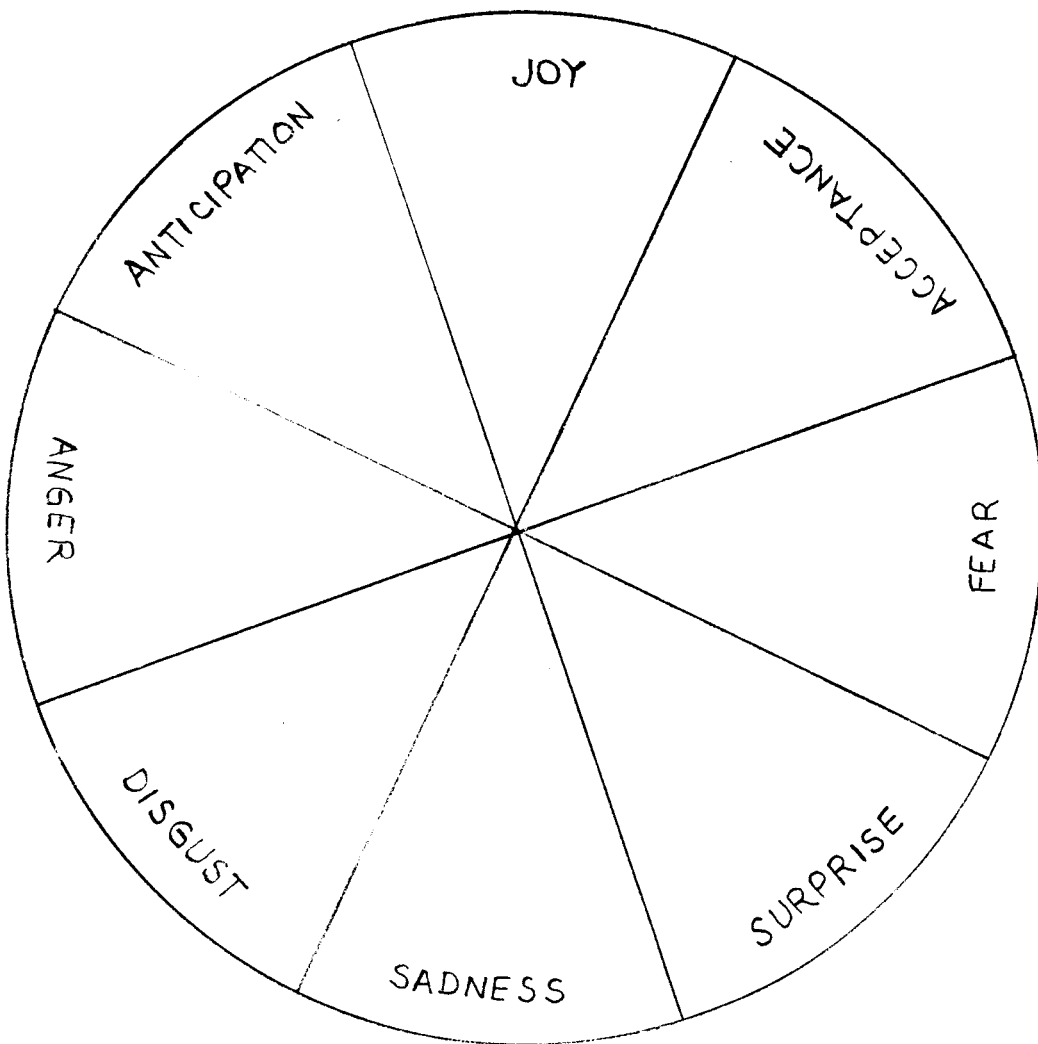
Figure 2.   Plutchik's Circumplex Model of Emotions*

*Adapted from Plutchik (1980, Figure 11.2, page 160).

sake of comprehensiveness, however, it can be noted that, in addition
to MDR, Bower has found evidence that 1) mood states enhance the
learning of mood congruent material, 2) the intensity of a mood
affects learning differently depending on the particular mood and
materials used, and 3) emotional states can bias cognitive processes
such as interpretations, fantasies, projections, free associations,
personal forecasts, and social judgments. Research supporting these
assertions is reviewed in Bower (1981, 1983; Bower & Cohen, 1982;
Gilligan & Bower, 1984).

Bower's Theory of Mood-Dependent Recall

Before turning to other studies finding MDR effects it will be
useful to consider Bower's (1981; Bower & Cohen, 1982) semantic net-
work theory of affect and memory processes. This theory models
memory for an event in terms of an associative network of descriptive
propositions and concepts. Network theories (e.g., Anderson & Bower,
1973; Collins & Loftus, 1975; Collins & Quillian, 1969; Rumelhart &
Norman, 1983) conceptualize memory as an associative network of nodes
representing among other things concepts, schemata, and events.
Bower (1981) proposed that emotions might be considered as nodes or
units in such a network with each emotion node having strong associa-
tive links to other units in the network (Figure 3). An event becomes
encoded in the network as a series of propositions with powerful
associative links to concepts and other units (such as "emotion
nodes") and schemata to which they are related. The propositions in
an associative network can refer to words, autobiographical experi-
ences, stories, or any other type of material encoded into memory.
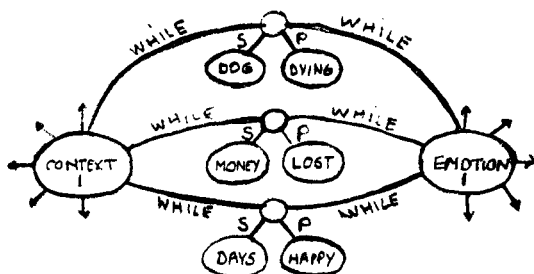
Figure 3.[a]   The Associative-Network Connections Which Can
               Be Used to Explain Mood-Dependent Retrieval

               The subject has studied many adjective-noun
               phrases (also called Subjects and Predicates,
               e.g., Dying Dog, Lost Money, etc.) in Context
               1 while feeling Emotion 1.

[a]This figure is from Gilligan & Bower (1984), p. 556, Figure 18.3.

These propositions are conceived as "the basic units of thought, and the activation of them or their related concepts is the basic process of thought" (Gilligan & Bower, 1984, p. 556). Activation is assumed to occur either directly or indirectly. Direct activation occurs by the presentation of a corresponding stimulus pattern; for example, stimulation of an emotion would activate the corresponding emotion node; or, to give another example, presentation of a word would activate a corresponding lexical item encoded in the associative network. Indirect activation occurs when "energy" spreads (Collins & Loftus, 1975) from associated nodes that are activated; for example, the lexical item node could be activated by "energy spreading" to it from an associated ("linked") emotion node.

The MDR results can be explained using the concepts of "spreading activation" and an associative network through the use of one additional assumption. Specifically, when material (of any kind) is encoded into the "network," emotions present at the time are also "tagged" into the same portion of the associative network. For example, in the list learning study presented earlier, one assumes the following. When a word is presented to the subject and encoded into memory, the emotional state at the time is also encoded along with the word. Facilitative MDR effects at recall are explained by assuming that congruent moods provide indirect activation for the node representing the word. Inhibitory MDR effects are explained on the assumption that the incongruent emotion node sends indirect activation to portions of the network representing material other than the "to-be-remembered" material. This causes "interference" for the

decision and control processes that many models of memory assume are involved in the act of recall (Anderson & Bower, 1973; Lindsay & Norman, 1977; Wickelgren, 1979).

An interesting aspect of this account of MDR is its ability to explain a previously puzzling feature of state-dependent memory (SDM) effects in general (Eich, 1980) such as those created by drugs and alcohol. Eich's (1980) review of this literature revealed that the many inconsistencies in finding SDM could be resolved when the specific memory tasks used to assess SDM were considered. He shows that the likelihood of finding positive evidence for SDM increases to the extent that memory is tested by recall rather than recognition methods. The associative network theory of MDR accounts for this difference using the concepts of direct and indirect activation. Consider for a moment the differences between a recall and recognition test. A recognition test is conducted by presenting the subject with the "to-be-remembered" item and inquiring whether it had or had not been presented in the learning trial. In this test, presentation of the "to-be-remembered" item provides direct activation for the portion of the associative network encoding the memory through the presentation of its corresponding stimulus pattern (i.e., a word, nonsense syllable, etc.). A SDM recognition test may therefore "override" any influence of the mismatch between learning and memory test "states" by providing the subject with a retrieval cue that acts as a direct source of activation for the memory.

By contrast an SDM recall test constitutes a much more severe test of memory. The recall task does not provide subjects with

specific cues (or "direct activation") with which to retrieve the memory. In such tests the subject is asked simply to remember what had been presented earlier. Under this set of circumstances the subject must "self-generate" (Anderson & Bower, 1973; Tulving & Thomson, 1973) cues with which to retrieve the memory. These self-generated cues are by definition sources of indirect activation for the associative network since they do not contain the exact stimulus pattern which is encoded in it. Thus, in a SDM (or an MDR) recall test when the subject's current "state" (either emotional or drug/alcohol induced) matches "features" encoded into the memory, it provides a source of direct activation for the memory and can facilitate retrieval. A "mismatch" between encoding and retrieval "states" degrades memory performance in a similar way by activating the wrong portions of the network which thus interferes with successful recall.

A final bit of evidence with which to evaluate this account is provided in Gilligan and Bower (1984). This study tested whether MDR would be differentially observed using recognition and recall tasks. Using hypnotic induction of happy and angry emotional states, the subject viewed pictures of faces first in one and then the other mood. Following an interval, subjects were given one recognition test in one of the moods and then another recognition test in the other mood. Each recognition test included "distractor" pictures not previously shown, some pictures learned in the happy mood, and some learned in the angry mood. This 2 x 2 design ensured that pictures seen in congruent and incongruent moods were viewed in each recognition test thus testing for MDR effects. The results were negative. No MDR

effects could be observed in either recognition test. Thus, Eich's
(1980) generalization that SDM effects occur in recall but not recog-
nition tests generalizes to emotional "states" and indicates that MDR
is a similar type of phenomenon.

A Review of Mood-Dependent Recall Studies

Table 1 lists the results of 24 experiments on MDR. This table
includes the 6 independent studies reported by Bower (Bower et al.,
1978; 1981). Table 1 classifies studies by the type of mood-induction
procedure used (with the exception of two studies which more precisely
"categorized" subject by diagnostic category), the specific moods or
emotions studied, and the degree of MDR observed (none, asymmetric,
symmetric).

Before hypnotic and non-hypnotic studies can be discussed as a
group it is necessary to determine whether these different methods of
manipulating moods affect the results of studies. Of the 18 studies
not conducted by Bower, 17 did not use hypnosis to alter moods.
Furthermore, of these 17 studies, 12 (70.6%) found some degree of MDR
(i.e., either symmetric or asymmetric). Of the 7 studies which did
utilize hypnosis, 5 or 71.4% found some degree of MDR. Therefore, one
can conclude that hypnosis is not necessary for MDR to occur and that
it does not appear to produce a larger proportion of MDR effects across
studies than does a non-hypnotic method of mood manipulation.

Subjects. The 24 studies used a variety of subject groups.
Bartlett and Santrock (1979) studied a group of young children with
a mean age of 10 years while Bartlett et al. (1982) studied two groups
of children with mean ages of 4 and 7 years. Both studies found

Table 1

Twenty-four Mood-Dependent-Recall (MDR) Studies Classified by Induction Method, Mood(s) Studied,

and Degree of MDR Found (None, Asymmetric, Symmetric)

INDUCTION METHOD	Mood(s)	Symmetric	Asymmetric	No MDR
Naturalistic[a]				
Bartlett & Santrock (1979)[b]	H-S		X	
Bartlett et al. (1982)[b,l]	H-S		X	
Clark et a. (1983)[c,m]	(R-E)[r]	X		
Isen et al. (1978)[d,n]	H-S			X
Macht et al. (1977)[c,o]				
Experiment 1	F-NF	X		
Experiment 2	F-NF			X
Experiment 3	F-NF			(X)[u]
Nasby & Yando (1982)[f]				
Experiment 1	H-S			X
Experiment 2	H-S			X

Table 1 (continued)

INDUCTION METHOD	Mood(s)	Symmetric	Asymmetric	No MDR
Velten Technique[g]				
Leight & Ellis (1981)				
Experiment 2[g]	S-N		X	
Synder & White (1982)[g]				
Experiment 1	H-S	X		
Experiment 2	H-S	X		
Teasdale & Russell (1983)[h]	H-S	X		
Teasdale & Taylor (1981)[g]	H-S	X		
Teasdale et al. (1978)[g]	H-S	X		
Hypnosis[i]				
Bower, Monteiro, & Gilligan (1978)[i]				
Experiment 1	H-S			X
Experiment 2	H-S			X
Experiment 3	H-S	X		
Bower (1981)[i,p]				
Experiment 2	H-S		X	
Experiment 3[q]	H-S		X	
Experiment 4	H-S,F-A	X		
Natale & Hantas (1982)[i,s]	H-S		X	

Table 1 (continued)

INDUCTION METHOD	Mood(s)	Symmetric	Asymmetric	No MDR
Pathological States				
Clark & Teasdale (1982)[j]	D-D	X		
Henry et al. (1973)[k]	M-D	X		

NOTES. [a]The specific methods for each study in this group are:

[b]reading happy and sad stories;
[c]physical exercise;
[d]success/failure at a computer game;
[e]mild electric shock;
[f]recalling recent happy and sad autobiographical experiences;
[g]described fully in Velten (1968), basically an autosuggestive procedure in which subject reads a series
 of statements printed on index cards that described emotionally-toned attitudes, feelings, behaviors, etc.;
[h]used a modified form of Velten's (1968) technique but deleted all references to what might be construed
 by subjects as personal experiences referring to autobiographical events;
[i]the hypnotic induction procedures were standardized insofar as the hypnotist made suggestions about the
 specific feelings the subject was to experience; however, the subject was encouraged to remember auto-
 biographical experiences similar to what was suggested and was encouraged to "re-experience" the effect
 that occurred in the past personal experience;
[j]the subjects were clinically diagnosed unipolar depressives showing diurnal variation in intensity of
 depression;
[k]the subjects were diagnosed bipolar affective disorders with episodes of depression and mania ("euphoria");
[l]the results of Experiment 1 were discarded by the authors due to a procedural error identified through
 Experiment 2 (which is included in this table);

Table 1 (continued)

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^{m}Experiment 1 only; 2 and 3 were on "arousal-selective" judgment not memory per se;
^{n}Experiment 2 is tablulated; Experiment 1 studied mood effects on social behavior;
^{o}authors report sex differences. Males displayed symmetric MDR across all three studies; females
  showed asymmetric MDR only in Experiments 1 and 2. The group results are tabulated;
^{p}Experiment 1 in Bower (1981) is summarized from Bower et al. (1978) Experiment 3 so it is included in
  the table from the original article where procedural details may be obtained;
^{q}the results showed a statistical trend toward symmetric MDR but did not reach alpha = .05;
^{r}this study compared a "relaxed" (R) to an "exercise" (E) "state" condition; the parentheses are used
  to indicate that presumably two levels of "autonomic arousal" rather than mood states per se were
  compared;
^{s}a combined Velten-type and a hypnotic procedure was used to induce mood states in this study;
^{t}the mood listed for this study is "F" for fear on the assumption that this was the predominant emotion
  elicited by the author's use of mild electric shock to alter the subject's "state";
^{u}MDR was observed for items early in the list though results for the entire list were insignificant (see
  text for a discussion of this finding);
^{v}H = happy; S = sad; R = "relaxed"; E = "exercise"; F = fear; NF = no fear; A = anger; D = depression;
  M = mania (euphoria).

26

asymmetric MDR. The studies by Clark and Teasdale (1982) and Henry, Weingartner, and Murphy (1973) studied adults with diagnoses of unipolar major affective disorder and bipolar major affective disorder (experiencing episodes both mania and depression) which had mean ages of 43 and 44 years, respectively. All other studies in Table 1 used young, adult, college students. All age groups showed some degree of MDR. Therefore, age does not appear to be a major determining factor of MDR.

The diagnostic groups studied both produced symmetrical MDR only. All other groups studied produced more variable results. However, there are only two studies using clinical groups, and future studies with such groups may produce more variable degrees of MDR. In any case it is not likely that the presence of psychopathology per se accounts for the consistency across these two studies. The nature of the psychopathology across the two groups is quite different on a whole spectrum of dimensions: i.e., symptomatology (both experience depression but only one by diagnostic criteria can ever have experienced episodes of mania), presumed psychological and biological etiologies, response to biological and psychological treatment (one group generally responds to "antidepressant medications" while the other generally responds to an entirely different medication type; that is, lithium), and the life-course prognosis of the disorder (one generally decreases in severity with age while the other generally does not). What probably is common across the two clinical groups is the "intensity" of the emotional or mood states they experience. Of all subjects studied in Table 1, the clinical groups probably experienced

the most intense levels of "sadness" (depression) and in the case of the bipolar group, "happiness" (more precisely, "euphoria"). The variable of emotion intensity will be considered again after other differences between the studies have been evaluated.

Materials. A variety of materials have been used to examine memory across the MDR studies: single or double word-lists, word-associations, simple phrases, stories, personality trait terms (positive, negative, and neutral in connotation), and autobiographical memories. MDR effects have been found with each type of variable though each has not always shown an MDR effect. Specifically, Bower et al. (1978) in Experiments 1 and 2 failed to find MDR with single word-lists but did find MDR when two word-lists were used. The authors argued that the single-word lists make for a "ceiling effect" that masked any MDR that might have been observed. However, Leight and Ellis (1981) used a single word-list and found asymmetric MDR.

Thus, it does not seem likely that either subject characteristics or material type can be considered independent causes of MDR variability in this set of studies.

Mood-manipulation methods. Four different methods of controlling for mood variation in MDR studies have been used: 1) hypnosis; 2) an "autosuggestive" procedure designed by Velten (1968) that requires the subject to read a series of mood-relevant statements that the subject is to "imagine" as being true for him or herself; 3) a variety of more "naturalistic" methods such as mild shock, reading happy and sad stories, remembering happy and sad recent autobiographical experiences, and success/failure at a computer game (see Table 1 notes for

the complete list and the studies which used them); and 4) classi-
fication of subjects by endogenously-produced mood states (i.e., the
two clinical groups, see Table 1). Each method of mood "manipulation"
has produced some degree of MDR.

Moods studied. A variety of moods or emotions have been com-
pared in MDR studies. The vast majority of studies (71%) have com-
pared "happy" and "sad" moods, though fear, anger, "relaxation," and
"exercise" conditions have also been studied. Clark, Milberg, and
Ross (1983) argued that variations in "autonomic arousal" per se are
sufficient to produce MDR. They found evidence for their assertion
when they compared a "relaxation" to an "exercise" condition. How-
ever, the authors did not actually measure the "emotional states" or
"arousal levels" of their subjects. Mandler (1984) has argued that
autonomic arousal is a non-specific component of emotional states
that is "interpreted" in terms of the thoughts and environmental
events covarying with it. He suggests arousal amplifies cognitive
"appraisals" into "emotional states." If this is the case we may
assume Clark et al.'s (1983) subjects did experience emotions. We
simply do not know what these emotions were.

Anger was studied in combination with fear, joy, and sadness
in Bower's (1981) Experiment 4 presented in detail earlier. The
reliable and very systematic effects observed indicated that distinct
emotions were produced and the polarity/similarity relations between
them affected memory.

Fear was studied in a much less precise way in the Macht, Spear,
and Levis (1977) study where mild shocks were used. The authors

recognized that some type of anxiety was produced through this method, but they did not systematically assess it in Experiment 1 or 3. When Experiment 1 produced symmetric MDR the authors wanted to be sure that it could be attributed to the anxiety produced by shock. They attempted to measure anxiety in Experiment 2 with galvanic skin response (GSR). Apparently, however, the introduction of GSR measurements (the sole change across studies 1-3) was sufficient to alter the conditions producing MDR because none was initially observed in Experiment 2. Experiment 3 (without GSR measurements) was conducted to verify the results of Experiment 1. Upon initial analysis Experiment 3 revealed no MDR. When the results of the three studies were re-analyzed by sex of subject, males were found to produce MDR across all three experiemnts, but females did so only in Experiments 1 and 3. A further analysis tested whether a "serial-position" effect could be observed such that items learned early in list learning trials were affected by MDR. This showed both males and females exhibited MDR in Experiments 1 and 3, but only males did so in Experiment 2.

The complex results of Macht et al. (1977) may be artifactual. However, Polivy (1981) reports data indicating threat of shock produces emotions, though the resulting emotional "state" is more properly considered a "blend" of fear, anger, and sadness rather than just fear alone. If we can generalize from a "threat of shock" to an actual mild shock condition then Polivy's (1981) results may help explain the Macht et al. (1977) findings. Polivy (1981) found that shock threat not only produces reliable increases in three emotions, but as well, the three emotions show rapid temporal fluctuations in

their respective intensities. Sadness rapidly decreases (over 5-10 minutes) while anger increases (same time period). Thus, the "serial position" effect of Macht et al. (1977) may reflect this waxing and waning of different emotions; and, of course, it is the presence of such emotions which is assumed to produce MDR. Finally, Polivy (1981) reports a reliable three-way interaction between sex of subject, sex of investigator, and time period (from the moment of shock threat) on the intensities of the three emotions elicited by this method of mood manipulation. Her results (Polivy, 1981) indicate that female investigators induce more fear; and over time the tendency to become more fearful with an investigator of the opposite sex (i.e., subsequently both sexes show a sex of investigator X sex of subject interaction) increases especially in "high threat" conditions. Thus, the "state" of the subject over the entire 5-10 minute learning periods used by Macht et al. (1977) may, indeed, have been very different when the specific emotions involved are considered. Polivy's study suggests that much greater attention must be paid to emotion-specificity and temporal fluctuations in emotions in MDR studies.

Polarity. A final consideration regarding the moods studied in the MDR experiments is their "polarity." Eighteen of the studies compared the polar effects of joy and sadness. Clark et al. (1983) compared a "relaxed" to an "exercise" condition, but this, too, would conceivably meet the criteria of "polar" states in the broadest sense. However, five other studies did not compare polar states in any sense of this term. Clark and Teasdale (1982) compared the effects of variations in the intensity of depression. Macht et al. (1977)

compared the effects of consistent shock (shock-shock condition) with
variable shock or no shock at all in three experiments. Finally,
Leight and Ellis (1981) compared induced sadness to a "neutral mood
state" condition. Of these five studies the latter four seem
problematic.

This is clearer if three common assumptions about affective
"states" (as opposed to other types of "states" produced through
exogenous substances such as alcohol or drugs) are considered. The
first assumption is that some type of emotion is always present in
subjects. The second is that emotions are continuously variable
quantities (i.e., have a real underlying dimension of "intensity").
And the third is that certain emotional states are opposites or
polarized in some sense (Izard, 1971; Plutchik, 1980; Tompkins, 1962,
1963; Wessman & Ricks, 1966). This suggests that comparing an induced
emotional state to an unmanipulated neutral one is more a conceptual
exercise than an empirical one. Subjects categorized as "neutral"
probably are experiencing some type and degree of affect. We simply
do not know what it might be. Of course, this criticism does not
apply when investigator measures the state of the subjects and sets a
criterion for the categorization of subjects as neutral. In the
latter case we have some empirical referent for the presumed neutral
emotional state.

These considerations make it difficult to interpret the results
of the sad versus "neutral" comparison by Leight and Ellis (1981) and
the Macht et al. (1977) shock, variable shock, and no shock conditions.
Since two of the four experiments (see Table 1) showed some degree of

MDR this presents a real dilemma. The variable results across all 24
MDR experiments must be attributed to either real variability in the
phenomena or to improper experimental control over the key parameters
of the process by the investigator. In the case of the studies by
Leight and Ellis (1981) and Macht et al. (1977) the latter appears
more likely to have been the case. In subsequent analyses of the
entire 24 studies, then the results of these four experiments will not
be considered. The data from Polivy (1981) supports my rejection of
the Macht et al. (1977) series; and, the conceptual analysis given
to comparisons of an "emotional" to a "neutral" state is the basis for
rejecting the Leight and Ellis (1981) asymmetric MDR result. In
effect, this eliminates two positive and two negative MDR results
across two types of induction conditions (shock and Velten induction).

Emotional intensity. Several authors have speculated that the
intensity of emotional states may be a parameter influencing MDR
studies. For example, Clark et al. (1983) argue variations in "auto-
nomic arousal" may produce MDR. In a somewhat different vein Macht
et al. (1977) and Nashy and Yando (1982, footnote 2) argue asymmetric
MDR may be due to the failure to induce sufficiently intense emotional
states. Finally, Teasdale and Taylor (1981) present evidence that
differences in the accessibility of memories between mood conditions
(i.e., happy and sad) correlate with the extent to which the moods
actually differed between the conditions. The correlations between
happy and sad moods and the rated intensity (by subject) of happy
and sad memories were statistically significant.

Unfortunately, it is not possible to compare directly and

objectively MDR studies in terms of emotional intensity. Only four studies used standardized measures of mood states (specifically, the studies by Teasdale and his colleagues, see Table 1). Indeed, some investigators did not even measure mood changes at all but simply assumed that they changed as a result of mood manipulations (e.g., Bower et al., 1978, Experiments 1-3; Bower [1981], Experiment 4; Isen et al. [1978], Experiment 2; Macht et al. [1977], Experiments 1 and 3). In future studies this could easily be corrected since several standardized mood assessment devices are available (Lorr & McNair, 1982; Lubin, 1967; Underwood & Froming, 1980; Zuckerman & Lubin, 1965).

Lacking objective criteria for mood intensities across studies, a more intuitively based comparison can be made. One would expect the unipolar major depressives and the bipolar major depressives to be experiencing the most intense emotional states. A more moderate degree of emotional intensity may be attributed to those subjects who underwent hypnotic and Velten (1968) type mood inductions. These two procedures actually have three striking similarities. First, both procedures involve the use of "suggestions" (i.e., in hypnosis it is given by investigator; in Velten's procedure they are given one at a time on index cards). Second, both procedures involve the selective focusing of attention upon the specific suggestions (i.e., the hypnotist acts as the "focuser" in one procedure while the index cards produce the same or similar effect in the other). And three, both procedures request subjects to engage in an "imaginative involvement" with the suggestions. The primary difference between the procedures

is that one is basically interpersonal (hypnosis) while the other occurs in a more individualistic context. Previous hypnosis research suggests that many of the effects of hypnosis may be obtained either through "autosuggestive" or more interpersonal procedures (Fromm, Brown, Hurt, Oberlander, Boxer, & Pfiefer, 1981). Therefore, it is probably legitimate to assume that both hypnosis and the Velten-type inductions produced similar (moderate) intensities of emotional states in subjects.

The least intense emotional states can probably be attributed to the more "naturalistic" mood inductions. Success/failure at a computer game, reading happy and sad stories, physical exercise, and simply recalling happy and sad recent autobiographical events intuitively would seem to produce less intense emotions than would an "autosuggestive" (Velten technique) or hypnotic mood induction. Thus, we can rank the different induction methods from most to least "intensive" as: clinical groups, the hypnotic and Velten procedures, and the "naturalistic" ones. The only exception to this ranking may be the Macht et al. (1977) shock inductions. This method, despite being classified as "naturalistic" in Table 1, would probably belong in the group of studies inducing "moderately" intense emotions (i.e., the hypnotic and Velten methods). However, as previously discussed, this study and the one by Leight and Ellis (1981) have already been excluded from subsequent analyses. One can note, however, that inclusion of both of these reports would not substantially alter the results which emerge from the present analysis.

When Table 1 is examined with the current classification of

presumed emotional intensities in mind, a trend can be observed. The "less intense" induction methods produced more variable MDR results than did the more "moderate" and "high" intensity methods of manipulating subjects' moods. Table 2 presents the proportion of studies in the "high, moderate, and low intensity groups" finding each degree of MDR (none, asymmetric, and symmetric). The results are very orderly. Studies using subjects presumed to be experiencing more moderately or highly intense emotional states also produced the largest proportion of MDR results (either symmetric or asymmetric) and the smallest proportions of failures to observe MDR. Table 2 also shows that the proportions would not change substantially if the Leight and Ellis (1981) and Macht et al. (1977) experiments were included (see Table 2, note a),

It should be noted that the number of studies in the "high intensity" row is only two. The proportions may change as more MDR studies are conducted with diagnosed clinical groups. However, when only the "low" and "moderate" intensity groups are compared, the differences between them are still apparent. Therefore, it remains possible that differences in the intensity of the emotional states across studies accounts for the variability in degree of MDR observed.

The blending of emotions in mood states. A second possibility that may account for the variability across studies is the presence of multiple emotions in both naturalistically occurring (Izard, 1972, 1977; Plutchik, 1980; Tompkins, 1962, 1963) and induced (Polivy, 1981) affective states. Emotion theorists have long argued that emotions rarely occur in isolation; rather, they tend to occur in

Table 2

Proportion of Studies Finding Symmetric, Asymmetric, and No Mood-
Dependent Recall as a Function of Intensity of Emotional States
Presumed to Result from Different Induction Procedures[a]

| | Degree of Mood Dependent Recall | | |
Mood-Intensity	Symmetric	Asymmetric	None
Low (N = 5)	16.6%	33.3%	50%
Moderate (N = 12)	58.3%	25%	16.6%
High (N = 2)	100%	0%	0%

Note. [a]The mood-induction methods were ranked from low-moderate-
high. All studies in the "Naturalistic" section of Table 1
except Macht et al. (1977) are included in the "low inten-
sity group." All studies from the "Hypnotic" and "Velten
Technique" sections of Table 1 are included in the "moder-
ate intensity group" except Leight and Ellis (1981). The
two studies in the "Pathological States" section of Table 1
comprise the "high intensity group." If the two excluded
studies are incorporated into the "moderate intensity
group" the proportions for this row become: symmetric =
to%; asymmetric = 25%; and no effect = 25%.

"combinations" (Izard, 1972, 1977) or "blends" (Plutchik, 1980).
Plutchik (1980) argues, for example, that "contempt" consists of the
blending of the two more "basic" emotions of anger and disgust.

The blending of emotions in affective states may be particularly
important when moods are induced. Polivy (1981) has shown that a
variety of mood-induction methods produce multiple emotions even when
the inductions were intended to produce only one emotional state.
This appears to be especially true when negative or sad emotional
states are induced. She presents data showing that inductions in-
tended to increase only sadness also increased anger and hostility.
In one study (Experiment 3a) an induction to increase depression
actually increased the intercorrelation of anxiety, depression, and
hostility to an average r = .88.

The careful examination of multiple emotions reported in Teas-
dale's (Teasdale et al., 1980; Teasdale & Taylor, 1981) MDR research
verifies the relevance of Polivy's (1981) findings. Teasdale used
Velten's (1968) procedure to induce elation and depression. Subjects
rated their mood states after each induction on 0-100 point scales
for despondency, anxiety, and happiness. Each induction produced
statistically significant differences on each of the affect scales.
The exact scores were: elation condition (despondency = 8.5; anxiety
= 18.5; happiness = 71.7); depression condition (despondency = 44.8;
anxiety = 28.5; happiness = 37.0). The depression condition appears
to produce a more "mixed" affective state than the elation condition.
This was also observed in Teasdale and Taylor (1981) even though the
Velten-type induction was modified to eliminate any reference to the

subject's life experiences (to avoid "cueing" affective autobiograph-

ical memories which was the dependent measure in the research). Using

the same three affective scales the scores were: <u>elation condition</u>

(despondency = 13.1; anxiety = 18.4; happiness = 62.9); <u>depression</u>

<u>condition</u> (despondency = 48.4; anxiety = 21; happiness = 29.8). Thus,

not only are multiple affects induced by inductions targeted at only

one emotion, but the "depression" inductions also produce more "mixed"

affective states than do "elation" inductions.

This is relevant to the data in Table 2. There are 5 studies

(Bartlett & Santrock, 1979; Bartlett et al., 1982, Bower, 1981, Exper-

iment 2 and 3; Natale & Hantas, 1982) that compared the effects of

happy/sad moods on memory and <u>also</u> obtained asymmetric MDR results.

In each of these studies the sad emotional state failed to influence

memory to the degree the happy state did, i.e., was the cause of the

asymmetric pattern of MDR results. The studies by Bower (1981) and

Natale and Hantas (1982) used happy and sad autobiographical memories

as the dependent variable while the studies by Bartlett (Bartlett &

Santrock, 1979; Bartlett et al., 1982) used word lists. Since the

studies use different induction procedures and different types of

recollections, the asymmetric MDR observed may be due to the greater

mixture of emotions produced by depression inductions.

If emotion intensity and the blending of emotions is influencing

the results of MDR studies, then it would be useful to have a model of

affective states which addresses these two aspects of emotions. Plut-

chik (1980) argues that three parameters of emotions, i.e., <u>intensity</u>,

<u>polarity</u>, and <u>similarity</u>, are sufficient to differentiate between

discrete emotions in overall affective states. Figure 4 presents

Plutchik's (1980) model of the interaction between the three parame-

ters of emotions. The idea captured by this figure is that emotions

become less distinctive at lower intensities. As intensity decreases,

emotions become more similar (decreasing circumference) and less

polarized (decreasing diameter). The opposite occurs with increasing

emotional intensity. Thus, emotional intensity modulates the degree

of blending (or similarity and polarity) between emotions in affective

states.

Teasdale's (Teasdale et al., 1980; Teasdale & Taylor, 1981) data,

presented earlier, support this conceptualization. When the "despon-

dency" and "happiness" values changed across the studies so, too, did

the values for the other emotions measured.

Figure 4 presents the relations between emotions at a single

point in time. The argument just made, however, draws explicitly upon

the temporal dimension of emotional states, e.g., polar emotions at

high intensities are not likely to be experienced at the same time.

Thus, a fourth temporal dimension is required to more completely

understand the relations between emotions in mood states. Recent

empirical work highlights this clearly.

Diener and Emmons (1985; Diener, Larsen, Levine, & Emmons,

1985) have shown that intensity and polarity are, indeed, independent

parameters of emotional states that temporally interact in the over-

all affective experience of individuals. Diener and Emmons (1985,

Experiment 4) had subjects complete three-week, daily, and "moment"

(i.e., at the moment of the experience) reports of happy and sad
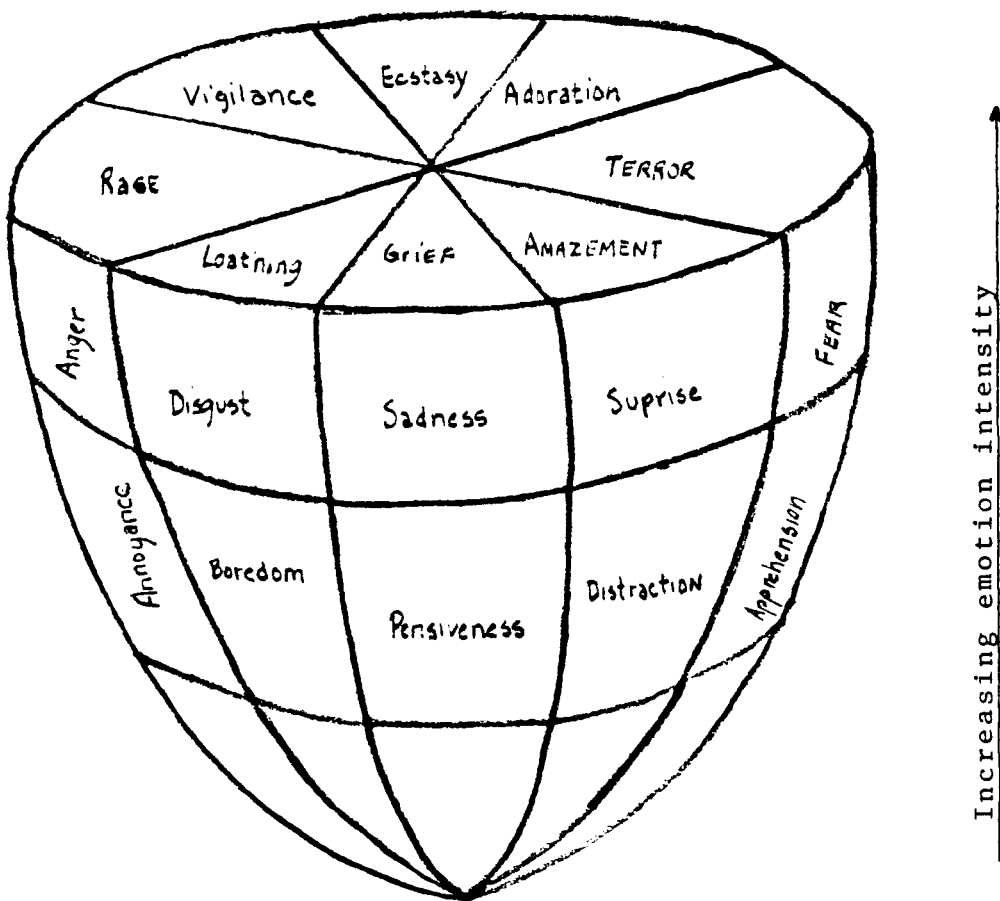
Figure 4.[a] Plutchik's Circumplex Model Incorporating

the Intensity Dimension of Emotions

[a]This figure is adapted from Plutchik (1980, p. 113, Figure 11.3).

emotions. The principal finding was that the relations between joy and sadness differed greatly depending on the time frame considered. The strongest negative correlation (i.e., polarity) between the two affects occurred during strongly emotional (i.e., high intensity) times as measured in the "moment" reports. The negative correlation, however, decreased in a linear fashion as the time span covered increased logarithmically. They also presented evidence that polarity and intensity are empirically separable dimensions of affect. When the intensity of emotions was evaluated they found systematic individual differences between subjects. Individuals were quite consistent across both emotions (happy versus sad) in terms of how intensely they reported experiencing the emotions. Some subjects report high intensities for both sadness and joy (experienced at different times), while others would very seldomly report experiencing high intensity levels of either emotion. Thus, when joy and sadness are measured systematically (i.e., daily) over time, the relationships between their temporal occurrence and their intensity and polarity can be generalized as follows. Duration and intensity are inversely correlated aspects of emotional experience, while intensity and polarity are positively correlated aspects of emotional experience. The first relation occurs because typically strong emotions do not last very long and hence will not be present across several measurement periods. The second relation occurs because, at any given time period, when happiness is experienced intensely, sadness will not be measured as present. Thus, these authors provide evidence for the way in which intensity and polarity are conceptualized in Figure 4.

In light of Bower's (1981, Experiment 4) demonstration that Plutchik's (1980) <u>similarity</u> relations between emotions can accurately predict differential MDR across emotions, it would be useful to see if the intensity and polarity relations could be useful as well. Specifically, will the circumplex model be useful in understanding symmetric versus asymmetric MDR? One would expect that <u>several</u> emotions would show more blending when they occur at lower intensities. This blending of emotions might, therefore, result in a poorer "match" across encoding and retrieval periods because many situational factors may slightly alter the "blend" present within the overall affective state of the subject. This would be especially likely to occur when subjects at low intensities of emotion are used in MDR experiments. The following might, therefore, be expected.

When two polar emotions such as joy and sadness are used in an MDR experiment only subjects at the more extreme ranges of emotional intensity (on each emotion) will show symmetric MDR. This follows from the assumption that low and moderate emotion intensity subjects will be experiencing more "blending" of different emotions in their overall affective state. In addition, since the situational and cognitive events determining which emotions will be "blending" are largely outside the control of the investigator, as a general prediction, asymmetric MDR or no MDR would be expected from subjects experiencing moderate and low levels of emotion intensity. The "encoding specificity principle" makes it possible, in principle at least, to make more exact predictions for each subject at all levels of emotion intensity. However, to empirically realize this possibility will require a degree

of experimental control over emotional states in subjects that has

at the present time not yet been demonstrated as feasible.

A second prediction can be made from Plutchik's (1980) model

that involves all eight emotions. If we assume that memories of events

encode all of the "features" of an experience (or psychological

"state"), then it follows that memories will encode the combination of

emotions present at the time of encoding. This suggests one could

examine the affective contents of autobiographical memories to deter-

mine whether the similarity-polarity features of the circumplex model

can be identified.

Wynne and Schiffman (1965) developed an emotion coding manual

for EMs that was subsequently refined by Plutchik and Wynne (1974).

This manual can be used to code the presence of all eight of the

emotions illustrated in Figure 4.

One might, therefore, expect that when the emotions of joy, sad-

ness, fear, anger, disgust, acceptance, surprise and expectancy are

coded in EMs, a circumplex pattern will be observed between the emo-

tions. This possibility warrants the following considerations. Plut-

chik (1980) has argued that the particular "pattern" to be observed

between the eight emotions depends critically on the intensity level

of emotions being studied. In addition, the particular measure of

similarity used has also to some extent altered the pattern he has

found in his own studies. Therefore, ". . .any one study of intensity

of the primary emotions will provide only an approximation to the

structure" (Plutchik, 1980, p. 159). Emotions at moderate to high

levels of intensity are required to observe the circumplex pattern in

Figure 2.

Memories encoding emotions at sufficiently high levels of intensity would, therefore, be required to produce a circumplex pattern. Since simply coding the presence and intensity of eight emotions in EMs presents a considerable challenge (primarily in terms of reliability and validity), one would not expect to find "perfect" circumplexity. However, if some degree of circumplexity can be observed between the emotions, then this can be taken as evidence in support of the validity and usefulness of Plutchik's (1980) model for understanding MDR variability.

The next section of this report will present these ideas in a more formal fashion as hypotheses. A method of circumplex analysis will then be discussed, since it will be used to test for the presence of circumplexity between emotions in EMs.

CHAPTER II

HYPOTHESES AND THE METHOD OF CIRCUMPLEX ANALYSIS

The present chapter presents the hypotheses to be tested and the
method and logic of circumplex analysis to be used in evaluating
several of the hypotheses.

Hypotheses

Three issues will be considered: (1) The effects of mood states
upon recall, (2) the relations among different emotions encoded in EMs,
and (3) the influence of current emotional states and emotions in EMs
upon the frequency of "screen memories."

Emotional influences upon memory. With regard to MDR, Hypoth-
esis 1 states subjects experiencing a happy mood at recall will
retrieve more happy EMs than will sad subjects. Hypothesis 2 states
subjects who are sad at recall will retrieve more sad EMs than will
happy subjects. Hypothesis 3 states subjects who are sad will recall
more sad EMs than happy EMs. And Hypothesis 4 states happy subjects
will retrieve more happy EMs than sad EMs. These hypotheses predict
symmetric MDR irrespective of the intensity level of a subject's
mood state. The alternative prediction, based on the assumption that
mood intensity is non-linearly related to the degree of MDR, can be
stated as Hypothesis 5: Only subjects experiencing more extreme
levels of happy and sad moods will show symmetric MDR, more moderate

46

mood subjects will show either asymmetric or no MDR.

The relations among different emotions encoded in memories.
Hypothesis 6 states that the 8 basic emotions of fear, anger, joy,
sadness, disgust, acceptance, expectancy, and surprise will be identi-
fiable in EMs and that they will show correlational relationships
conforming to the circumplex model (Plutchik, 1980). This hypothesis
will be tested 6 times, i.e., in five separate EMs and in a "summed"
EM (a composite score summed across the five EMs).

Emotions and the "survey characteristics" of EMs. Several
exploratory questions will be considered with regard to the structural
features of EMs. First, are there sex differences in the reported
quality of EMs? And second, do the qualities of EMs show any relation
to either current emotional states or to emotions rated in EM content?
Of particular interest will be whether "screen memories" show a rela-
tionship to current emotions or to emotions encoded in EMs. Finally,
since the features of EMs to be examined are closely related to those
studied by Kihlstrom and Harackiewicz (1982), a comparison across
the two independent samples will be made. This should reveal the
extent to which college age subjects show similarities in the basic
structural features of EMs.

The Logic and Method of Circumplex Analysis

The method of circumplex analysis as described by Guttman (1966),
Steiger (1979), and Wiggins, Steiger and Gaelic (1981) is actually
a very general structural modeling procedure. The method is structur-
al in that it results in a specification of the relationship between
each variable in an analysis; the method is general because different

types of relations can be hypothesized and tested with the method. The present discussion draws upon the method articulated by Wiggins et al. (1981).

The term "circumplex analysis" derives from Guttman's (1966) recognition that the varying magnitude of correlation between variables can be graphically portrayed in terms of a circle. Variables more highly correlated are placed closer to one another while variables with lower correlations are placed further apart around the circumference of a circle. The resulting display illustrates the <u>ordering</u> among a set of variables in terms of magnitude of correlation. Negative and zero-order correlations can occur. This is especially true for interpersonal and emotional variables (Plutchik, 1980; Wiggins et al., 1981). When negative correlations occur, this relationship between variables is called one of <u>polarity</u> or <u>bipolarity</u>. This is illustrated diagramatically by placing polar opposites at the two ends of a diameter through the circle.

While the results of a circumplex analysis are displayed in the form of a circle, the method of <u>detecting</u> circumplexity involves the identification of a specific pattern in correlation matrices (Steiger, 1979; Wiggins et al., 1981). The pattern sought in a matrix of variables assumed to have circumplexity can be illustrated with Table 3. This table refers to a matrix of eight variables only and this applies to the following discussion as well. The letter "p" is used to represent the greek letter <u>rho</u> since the table refers to the population parameters of variables exhibiting circumplexity. It can be seen that each minor diagonal in the table is associated with a

Table 3

Representation of the Circumplex Pattern in a Correlation Matrix[1]

VARIABLE	1	2	3	4	5	6	7	8
1	1				$P_1 >$	$P_2 >$	$P_3 >$	P_4
2	P_1	1						
3	P_2	P_1	1					
4	P_3	P_2	P_1	1				
5	P_4	P_3	P_2	P_1	1			
6	P_3	P_4	P_3	P_2	P_1	1		
7	P_2	P_3	P_4	P_3	P_2	P_1	1	
8	P_1	P_2	P_3	P_4	P_3	P_2	P_1	1

NOTE: The letter "p" is used to represent the greek symbol for
the letter rho, the population correlation coefficient.

[1]Adapted from Wiggins, Steiger, and Gaelic (1981, Table 1, p. 267).

different rho value. The table also states that the rho's (1-4)

conform to the inequality rho 1 > rho 2 > rho 3 > rho 4. Whenever

this inequality holds the matrix has "circular" properties. Rho 1

refers to variables adjacent to one another, rho 2 to variables

separated by one other variable, rho 3 to variables separated by two

other variables, and rho 4 to variables separated by three others.

In an 8 x 8 matrix of variables assumed to have bipolarity, the in-

equality pattern between rho's takes on one additional characteristic.

Rho 1 is a positive correlation. Rho 2 is a zero-order correlation.

Rho 3 is a negative correlation. And rho 4 is a negative correlation

of even larger magnitude. This follows from the geometric pattern

that 8 variables can have around a circle. Rho 4 variables are 180

degrees apart, rho 3 variables are 120 degrees apart, rho 2 variables

are 90 degrees apart, and rho 1 variables are 45 degrees apart. This

can be seen in Figure 2 of Plutchik's (1980) circumplex of 8 emotions.

Initial evaluation of circumplexity is done by obtaining an

estimate of the rho values and determining whether the inequality

pattern holds. In addition, however, the magnitude of the rho's

reflect the magnitude of the principal components, or "latent struc-

tures," presumed to underly the empirical correlations (Wiggins et al.,

1981). In a matrix of "perfectly" circumplex variables, only five

types of principal components can be extracted (Wiggins et al., 1981).

These are circumplex, polarity, orthogonality, specificity, and

general components. The specificity and general components are each

based upon a single latent vector associated with a single latent

root. The other three components each have two latent vectors and

roots. Of these five types all but the circumplexity component
reflect _deviations_ from perfect circumplexity. Thus, the magnitude
of the rho's indicate the amount of _empirical variation_ that can be
attributed to each type of principal component. Obviously, the more
variation "captured" by the circumplexity component, the more adequate
will be one's "circumplex model."

Variance attributable to each type of principal component can
be interpreted in a rather straightforward fashion except for the
general and specificity components. A portion of the variance of the
rho's can be attributed directly to circumplexity. Variance attribut-
able to the polarity and orthogonality principal components reflect
deviations from _perfect_ polarity and orthogonality. Thus, the latter
components measure the variance which cannot be attributed to cir-
cumplexity. The general and specificity components are much more
difficult to interpret especially when an analysis is conducted
upon the rho's. In general, they reflect variation due to the
specific methods and variables used in an analysis (Wiggins et al.,
1981). The variation of interest, of course, is that attributable
to circumplexity. Since the present study is not concerned with
refining the circumplex model tested (which is when the orthogonality,
polarity, general, and specificity components assume more importance),
only the variation due to circumplexity will be of major concern.

There are several methods for estimating the rho-values;
each differs in computational complexity and parametric distributional
characteristics (Wiggins et al., 1981). The latter affects the
validity of the statistical goodness-of-fit tests that can be

performed upon them. Generalized least square (GLS) estimates of the

rho's, however, appear to be the best compromise choice, and this

method will be used here.

Once the rho's have been computed and inspected for the in-

equality pattern, several further procedures can be used to assess

the adequacy of a circumplex in modeling the empirical data. Two

main issues guide this analysis. First, the degree of circumplexity

observed; and second, the proportion of empirical variance accounted

for by the principal components underlying the matrix.

Unfortunately, there is no simple and fully adequate method of

answering the first issue. Wiggins et al. (1981) suggest the

following five procedures. First, estimate the rho's to determine

whether a circular ordering can be used to represent the magnitude

of correlation between variables. Second, if the inequality of the

rho's is present, then perform a chi-square test to assess the

correspondence between the empirical and rho-matrix (i.e., construct

a matrix with the rho estimates inserted into the positions outlined

in Table 3). Third, perform a principal components analysis upon

either or both the empirical and rho-matrices. The latter should be

equivalent to the former in at least one sense (Wiggins et al.,

1981); the amount of variance attributable to each type of principal

component should be the same whether computations are performed upon

the rho-estimates or upon the empirical matrix. And fourth, one

can compute a mean square residual (MSR) between the empirical and

rho matrices to quantitatively assess the fit between the rho's and

the empirical correlations. Obviously, the smaller the MSR, the

greater the fit. Finally, one can compute a Wilson-Hilferty z-score for the chi-square statistic (Wilson & Hilferty, 1931). This transforms chi-squares with different degrees of freedom (df) into a standard normal deviate with 1 df allowing comparison of chi-squares across studies. The latter is useful in assessing the adequacy of a circumplex model across studies so as to provide a relative sense of goodness-to-fit of the model to data.

Each of the procedures advocated by Wiggins et al. (1982) is useful for assessing different aspects of the fit between data and the circumplex model. The key test of "fit," the chi-square, suffers from one major drawback, however. The statistic is sensitive to any departures at all between the rho and empirical matrices. Thus, the empirical data would have to possess perfect circumplexity, especially when the sample size is large, to avoid a significant chi-square value. For hypothesis testing purposes, however, a perfect fit is seldom achievable. And, it may not be the most important question. The degree of fit between data and a circumplex model is ultimately more of value than whether a perfect fit does or does not occur.

When degree of fit is the paramount question all of the procedures advocated by Wiggins et al. (1981) except the chi-square are of value since each provides a quantitative index of goodness-of-fit. Unfortunately, though, they are not statistical indexes so that alpha and beta cannot be determined.

Because the chi-square test appears to be the only statistical test currently available, the authors suggest a liberal interpretation should be made of it. Thus, instead of either rejecting or

failing to reject the null hypothesis of "no circumplexity" the authors recommend the use of the Wilson-Hiferty z-score. With the latter the adequacy of a circumplex model across studies can be made.

The procedures advocated by Wiggins et al. (1981) will be followed in the present study. James Steiger's FORTRAN IV program MULTICORR 2 will be used to compute the rho's. In addition, this program uses a Fisher's r-to-z transform, especially useful for small samples, and computes a chi-square based on this transformation. The calculation of the principal components underlying the matrix will be done upon the rho-estimates using the formulas provided by Wiggins et al. (1981).

In addition to these procedures, however, two further types of analyses will be conducted. First, a principal components analysis will be conducted upon the raw data, specifically, the summed emotion scores across all the EMs. This analysis will be useful in determining the validity of the rating system. The obtained components can be "rotated." If an eight-factor solution can be rotated to "simple structure," then this will support the assumption that eight different emotions are being rated by the coding process.

Second, since the principal components analysis will be done on the rho-estimates, for purposes of assessing circumplexity, some means of assessing the amount of total empirical variation used in the analysis will be useful. A method of estimating this percentage of empirical variation used in the circumplex analysis of the rho's is as follows (see Appendix F). The total empirical variation can be

partitioned into two components. The variance of the rho's measures

one component and the MSR measures the other. The ratio: variance

of the rho's / the sum of the rho-variance plus the MSR, provides a

quantitative measure of the proportion of empirical variance utilized

in the circumplex analysis.

The ratio obtained in this fashion is useful because the circum-

plex analysis is not done on the total empirical variation in the raw

matrix. Rather, it is done on the variation captured in the rho-

estimates. When principal components are extracted from the rho-

estimates, all of the empirical variation will not be used. The

variation not used is measured by the MSR. Correspondingly, the

variance attributable to each type of principal component, including

circumplexity, will be inflated. The ultimate question is the amount

of empirical variance due to circumplexity, not just the amount of

variance in the rho's which can be attributed to circumplexity.

A more accurate estimate of the empirical variation attributable

to circumplexity can be obtained with the following ratio: variance

in the rho's attributable to circumplexity principal component

divided by the proportion of total empirical variation captured by

the rho's. This ratio uses as its denominator the ratio given earlier.

This will provide a quantitative index of the amount of empirical

variation which can be attributed to circumplexity.

Estimates of the principal components underlying a matrix can

be obtained by direct computation from the rho-estimates (Wiggins

et al., 1981). Alternatively, the components can be extracted from

the empirical correlation matrix. The magnitude of variation

attributable to each type of principal component should be the same
using either the estimation of the direct procedure (Wiggins et al.,
1981). Logically, however, there is a distinction between the
procedures. Direct extraction from the empirical correlation matrix
utilizes all of the variation between the variables. Computing the
principal components from the rho-estimates uses only variance "cap-
tured" by the rho's. The latter will always be less than the total
variation in an empirical matrix unless it has perfect circumplexity.

CHAPTER III

METHOD

Subjects

Subjects were 53 college students recruited through the Loyola

University, Department of Psychology Experimental Subject Pool.

Subjects were offered course credit for their participation in the

study. Five subjects were eliminated from the final sample either

because they had not completed all of the data collections forms or

because it was apparent that they had responded randomly on one or

more of them. The final sample consisted of 48 subjects. There were

14 males with a mean of 19 years ($\underline{SD}$ = 1.44) and 34 females with a

mean age of 18.4 years ($\underline{SD}$ = .95).

Procedure

All subjects were tested in large groups of approximately 15.

Each subject completed the following forms: The Emotions Profile

Index (EPI; Plutchik & Kellerman, 1974), the Profile of Mood States-

Bipolar Form (POMS-B: Lorr & McNair, 1982), Five Early Memory Record-

ing Forms (EMRF; see Appendix A) and an Early Memories Ranking Sheet

(see Appendix B). The materials were presented to each subject in a

packet to which was affixed a disclosure and consent form (see

Appendix C). Subjects read the disclosure form, and if they decided

to participate on an informed basis, they were requested to sign the

consent form and to proceed through the assessment package.

The order of the assessment forms in the complete package was randomized across subjects. Only the EMRFs were filled out in sequence from one to five, in order to preserve the order of recall of ERs for later analysis. It took approximately 1.5 hours to complete the entire assessment package.

Scoring. The EPI and the POMS-B were scored following the criteria set out in their respective manuals. Only the Elation scale of the POMS-B was scored since the other scales were not relevant to the current study. The EMRF required each subject to recall an EM and then to complete a series of questions about the recalled event. The following information was requested: age at the time of the event, frequency of previous recall (just now, occasionally before, frequently before), affective quality (pleasant, neutral, unpleasant), prose description of predominant emotions in the EM, and rating for the presence/absence of various sensory qualities (auditory, gustatory, kinesthetic, visual, and tactile). If visual imagery was reported, subjects were asked to describe whether others only, or the self could be observed in the memory. Presence of color qualities (black and white, or chromatic) was also requested. Finally, subjects were asked to describe any feelings or thought they had about the EM. After all EMs had been recalled, subjects were asked to rank order the EMs in terms of their current importance or meaning to the subjects.

Rating the EMs for 8 basic emotions. Raters were two graduate students in clinical psychology. The current author served as the primary rater. The second rater was used to evaluate the interrater

reliability of the eight basic emotion rating scales. The primary rater coded all ERs while the second rater coded 150 of the EMs, or approximately 62% of the sample (48 subjects X 5 EMs = 240 EMs).

The emotions coding manual is a considerably revised version of the manual developed by Wynne and Plutchik (1974). The revised manual is included here as Appendix D. The primary revisions were as follows: The original preface describing Plutchik's circumplex model of emotions was excluded; subjective emotion terms describing combinations of the eight basic emotions of the Plutchik model, obtained from Plutchik (1980), were included; and finally, the scoring criteria were reorganized and amplified by information drawn from Plutchik (1980).

To present the occurrence of rater bias which would result in a spurious confirmation of the circumplex model being evaluated, the following procedures were adopted. The coders rated EMs for only one emotion at a time. The ratings were then placed on summary sheets (see Appendix E). The order in which the eight basic emotions were coded was randomized to prevent an order of rating effect (Guilford, 1954) such that ratings adjacent in time would show greater inter-correlations. Guilford argues this order of rating effect is sufficiently strong to warrant consideration. By randomizing the order of rating and by rating only one emotion at a time, spurious inter-correlations between emotions should be either minimized or created in such a way that they would detract from the pattern sought in the data.

The eight emotions were rated using a 7-point scale. Zero indicated the emotion was not present. A score from 1 to 6 was used for intensity of the emotion if it was judged present. The verbal descriptions

for intensity at each numerical weight were as follows: 1 = very slightly, 2 = slightly, 3 = fairly, 4 = strongly, 5 = very strongly, and 6 = extremely.

Reliability of the Scoring

In examining the inter-rater reliability for each emotion scale several indices of agreement between the raters were computed. The first two indices indicated the raters' agreement on: 1) the presence versus absence of the emotion, and 2) disagreement on the rated intensity of the emotion larger than 3 scale points. The final index, a Pearson r, was computed on the final score made after re-rating of initial scores disagreeing more than 3 scale points. The steps in this procedure were 1) familiarization with the emotion coding manual and 2) rating of each EM for presence/absence and intensity. Initial ratings were then compared for rater agreement on each type of judgment (presence/absence and intensity). When rater disagreements were larger than 3 scale points, raters were so advised and asked to re-read and re-score the EM. Re-ratings were then combined with the appropriate initial ratings (i.e., unchanged ratings) and a Pearson correlation was computed to assess reliability between raters.

Table 4 presents the data on EM ratings for each emotion. It can be observed that final ratings were reasonably similar to one another as assessed by the correlation coefficients. Table 4 also suggests that several of the emotions were more difficult to score. The emotion of "expectancy" showed initial disagreements on the present/absent judgment 19% of the time. A similar score occurred for disgust. However, anger, fear, sadness, and acceptance achieved

Table 4

Reliability Scores for the Emotion Rating

Emotion	Pearson r*	Disagreements on Presence vs. Absence **	Disagreements Larger Than 3 Scale Points**
Anger	.92	2.6%	0%
Fear	.91	8.6%	2%
Happy	.85	14.6%	3%
Sad	.92	8.6%	2.6%
Expect	.80	19.0%	30.5%
Surprise	.83	16.0%	14.6%
Accept	.86	4.0%	10.0%
Disgust	.97	19.0%	30.0%
Average	.88	11.5%	11.6%

*These scores were computed after consultation.

**These scores were computed prior to consultation, and were
  calculated by the following formula: index scores/150, e.g., for
  anger, there were 4 disagreements on the present or absent
  judgment and therefore 4/150 = 2.6%.

fairly high levels of initial agreement for both the presence/absence and intensity judgments. The final inter-rater correlations for the more difficult to code emotions are also lower than for the easier emotions indicating that re-rating did not entirely alleviate the difficulty of the scoring process. However, all final ratings achieved a minimum inter-rater reliability coefficient of .80 and, therefore, the rating process was considered sufficiently reliable to warrant the use of the ratings for subsequent analysis.

Validity of the Scoring System

Two aspects of the validity of the scoring system are addressed: (1) the degree of circumplexity (and the specific similarity/polarity relations) between each of the emotions, and (2) the validity of the assumption that eight distinct emotions are being scored by the system.

At this point in the analysis of the data the distinctness of the eight emotions is the paramount issue. To provide an empirical assessment of this a principal components analysis of the ratings was done through SPSS-X. An average emotion score was used for this analysis since there are relatively few subjects in the present sample though it should be noted that there are six for each emotion. Thus, each subject provided one emotion score (the average across all five EMs) for each of the eight emotions. These scores for all subjects were intercorrelated. The resulting matrix was submitted to a principal components analysis with the number of factors to be extracted set at eight. The factors extracted were then rotated to a "simple structure" solution using a varimax rotation and a Kaiser

normalization. This type of rotation attempts to load only one var-
iable highly on a factor while reducing the loadings of all other
variables to the minimum possible. If this is achieved, a "simple
structure" is obtained which indicates the degree to which each var-
iable may be considered a distinct "factor" underlying the variation
in the data.

Table 5 presents the rotated factor matrix for the averaged
emotion scores. It can be seen that each emotion variable does,
indeed, load highly on only one factor. The second highest loading
of a variable on a factor (for all factors) never exceeds .20, indi-
cating simple structure was achieved. Thus, the rating system appears
to be measuring the presence of eight distinct emotions in ERs.

A careful inspection of the factors in terms of the most positive
and most negative loadings (i.e., polarity) also indicates where
deviations from Plutchik's (1980) circumplex model are occurring.
However, an analysis of the circumplexity of the emotions will be
reserved for the discussion in the Results section. There the extent
of circumplexity as assessed by the Wiggins et al. (1981) method using
the estimated rho's will be complemented by the current principal
components analysis done on the raw data.

Identifying "Screen Memories"

Freud (1901/1965: Kihlstrom & Harackiewicz, 1982) used four
criteria to identify "screen memories": 1) they were affectively
"neutral" or lacked emotional tone; 2) they were repetitively
recalled spontaneously; 3) they were predominantly visual in sensory
imagery; and 4) the rememberer was able to observe him- or herself

Table 5

The Rotated Factor Matrix of the Principal Components in Emotion Scores[1]

Variable[2]	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8
Surprise	.97261	.09782	.05422	.03429	-.01346	-.01832	.16425	-.11334
Sadness	.09972	.96546	.07706	.02426	-.01321	.10303	.07289	-.18791
Anger	.05482	.07658	.96972	.99395	-.19827	.07427	.02345	-.07338
Acceptance	.03489	.02424	.00376	.96250	.15134	-.15835	-.11111	.10701
Joy	-.01375	-.01382	-.20839	.15510	.95462	-.94643	.00120	.13671
Disgust	-.01986	.10809	.07891	-.16401	-.04775	.95035	.19925	.06427
Fear	.17573	.97423	.02380	-.11420	.00146	.19838	.95211	.06427
Anticipate	-.12292	-.20169	-.07941	.11382	.14207	-.09917	.06541	.94375

[1] N=48. The data were averaged emotion scores (across five early memories) for each subject. The emotion scores were intercorrelated and the resulting matrix was submitted to a principal components analysis. The extracted components were then rotated using a varimax procedure with a Kaiser normalization. The procedure was done with SPSS-X.

[2] The sequence of emotions in this column is not Plutchik's (see Figure 2), but rather is that given in the computer output for the sake of convenience.

in the memory image. The EMFRs inquire about these features of EMs.

Using all four criteria, 50% of the total sample of subjects failed

to recall a "screen memory." However, 18 subjects recalled 1, 5 sub-

jects recalled 2, and 1 subject recalled 3 "screen memories." Thus,

while "screen memories" did not comprise a large percentage of the EMs

recalled (12.9% of all EMs), there were enough for subsequent analysis,

i.e., their relation to the emotion variables in the current study.

Identifying "Traumatic Memories"

The criteria for identifying traumatic memories was quite

simple. EMs containing any reference to the following themes were

scored as traumatic: bodily injury, severe grief, loss of loved

ones, violations of normative expectations (regarding love, intimacy,

and friendship), death, and violence. An example of a violation of a

normative expectation regarding love is: A subject reported an EM of

when his mother had been away from home vacationing for a period of

time. When she returned home he was sitting on the front steps of

his house with his sister. He saw her get out of his father's car.

He jumped over his sister and ran to her. She refused to hug or kiss

him and rebuked him for not helping his younger sister approach the

car with him. He recalled feeling shamed and saddened.

Two raters coded all EMs and made a judgment as to whether the

memory was traumatic. Both raters agreed that 150 memories were not

traumatic, that 64 were traumatic, and disagreed on the presence of

trauma in 26 EMs. Thus, overall raters agreed 89% of the time (i.e.,

214/240 = 89%) on the presence of trauma in the EMs.

Statistical Analysis

Statistical analysis of the data in terms of its circumplexity was achieved using the Fortran IV program developed by James Steiger (Wiggins et al., 1981) entitled MULTICORR Version 2. This program is generalized for the detection of "pattern" in correlation matrices with magnitudes up to 21. The parameters of the program were set at values conforming to the logic of circumplex structure in an 8 x 8 matrix. The principal components, eigenvalues and eigenvectors, and Mean-Squared Residual were computed by calculator from the programs output (i.e., the rho-estimate) using the formulas supplied in Wiggins et al. (1981).

CHAPTER IV

RESULTS

Discussion of the results is organized around five aspects of
the data: 1) the "survey" characteristics of EMs; 2) the relation
between the "state" (POMS-B) and "trait" (EPI) measures of emotion
or mood; 3) the relation between emotions experienced by subjects
("state" and "trait") and emotions rated in EMs; and 5) evidence for
circumplexity between emotions rated in EMs.

The "Survey" Characteristics of EMs

Table 6 presents the data collected on the content features of
EMs. The figures in the table refer to the percentage of EMs sub-
jects rated as having the content feature. Figures are given for
males, females, and the combined sample. Also included in column 4
are the comparable figures obtained by Kihlstrom and Harackiewicz
(1982) with the college-age portion of their sample.

A striking feature of Table 6 is the similarity between the
figures obtained with the two independent samples of subjects in the
two studies. It would appear that the general content features of
EMs are very similar for this subject age group.

There was only one statistically significant sex difference.
Females stated they could observe themselves in their memory imagery
for 73.3% of their EMs. Males only rated 48.5% of their EMs as

67

Table 6

Content Features of Early Memories and Characteristics

of the Subject Sample

Feature	Subject Characteristics			Kihlstrom and Harackiewicz[a]
	Men	Women	Combined	
# of Subject	14	34	48	164
Mean Age	19	18.4	18.7	-
SD	1.4	.95	1.12	-
Total Number of Early Memories	70	170	240	164
Percentage of Early Memories with Content Feature				
Clarity of Memory[c]				
cloudy	23	22	22.5	24.7
clear	46	55	52.3	44.3
vivid	31	22	24.6	31.0
Frequency of Prior Recall of Memory[c]				
just now	24	25	24.5	-
occasionally before	57	60	59.5	69.6
frequently before	18.5	15	15.8	24.1
Affective Rating of Memory[c]				
Pleasant	35.7	36.4	36.25	43.0
Neutral	22.8	25.3	24.6	29.7
Unpleasant	41.4	38.2	39.2	27.2
Visual Presence of Self in Memory[c]	48.5	73.3	66.3	58.1
Memory in Color[c]	71.4	74	73.5	71.0
Memory Achromatic[c]	24.3	26	25.6	29.0

Table 6 (continued)

| Feature | Percentage of Early Memories with Content Feature | | | |
	Men	Women	Combined	Kihlstrom and Harackiewicz[a]
Sensory Qualities Judged Present in Memory Imagery[c]				
visual	98.5	94.4	99.1	98.1
auditory	31.4	47.7	42.5	32.9
olfactory	15.7	7.6	10.0	10.8
tactile	38.6	35.8	36.6	42.2
kinesthetic	41.7	47.6	45.8	54.4
gustatory	5.7	7.0	6.7	2.5
Memories Meeting Criteria for Freudian Screen Memories[d]	7.1	15.2	12.9	(4.0)[b]
Judged to Possess Trauma Content[d]	26.5	28.6	27.0	26.7
Judgment of Age At Which Event Occurred[c]				
Mean (Years)	6.0	5.2	5.6	3.91
SD (Years)	1.4	1.4	1.4	1.26
Range (Weeks and Years)	3-11 yrs.	7 wks-18 yrs.		

[a] Data in this column obtained from Kihlstrom & Harackiewicz (1982, Table 1). Missing entries indicate lack of comparable data.

[b] Kihlstrom & Harackiewicz (1982) scored any early memories with 3 of Freud's 4 criteria as a "screen memory." Therefore, their data on this content features are not identical to those of the present study. However, an intercorrelation (with the current subjects) of all four features in early memories showed that they were highly correlated with one another at statistically significant levels. Therefore, the data from the two studies may be generally if not strictly comparable.

[c] Subjects judged this content feature.

[d] The experimenter judged this feature. For "screen memories" it was based entirely on ratings or judgments provided by the subject. The "trauma" feature was judged by the investigator alone.

having this feature. The difference ($\underline{t}_{(46)}$ = 2.80, $\underline{p}$ <.01) is significant. More will be said about this difference when "screen memories" are discussed later since the "self-seen" variable is related to the former as well.

As a combined group the subjects rated 76.9% of the EMs as either "clear" or "vivid." Only 22.5% of them were rated as "cloudy." Over 73% of them were rated as having color imagery. And visual, auditory, and kinesthetic sensory imagery predominated in the entire sample. Finally, 75.3% of the EMs were rated as having been either "occasionally" or "frequently" recalled before the experiment. Thus, it appears that subjects find their EMs to be quite clear and memorable.

The ratio of "pleasant" to "unpleasant" EMs was approximately 1. This ratio is different from that reported by previous investigators (Dudycha & Dudycha, 1933, 1941; Kihlstrom & Harackiewicz, 1982; Walfogel, 1948) who report a ratio closer to 2:1.

Twenty-seven (27%) percent of the EMs were rated by the investigators as having "traumatic content." This figure accords well with the data obtained by Kihlstrom and Harackiewicz (1982) who obtained a percentage of 26.6. This figure is also close to the percentage rated as "unpleasant" by the subjects.

The average age of the EMs as rated by subjects was 5.6 years. The women reported a much larger range of dates for their EMs than did the men. Walfogel (1948) reports the same phenomena. On the average, then, the EMs studied here are 13 years old.

The Emotional Characteristics of EMs

Subjects were asked to rate the affective qualities of their EMs in a global way as either "pleasant," "neutral," or "unpleasant" in overall affective tone. However, since the investigators rated each EM for the presence and intensity of the eight basic EPI emotions it is possible to more finely assess the emotional qualities of the memories.

Table 7 presents the data collected on all of the emotion variables studied: EPI emotions, EM-rated emotions, and the POMS-B Elation-Depression scores assessing the current mood-state of the subjects. Four summary emotion scores are also introduced in this table for both the eight emotions in the EPI and in the EMs: Sum Positive Emotions (the simple sum of the acceptance, joy, and expectancy scores); Sum Negative Emotions (the simple sum of the fear, anger, surprise, disgust, and sadness scores); Total Emotion (the simple sum of all eight emotions scores); and Sum Positive/Total Emotion (the ratio of the three positive emotion scores to the five negative emotion scores). A fifth summary score was developed based on the subjects' affective ratings of EMs. "Pleasant," "neutral," and "unpleasant" subjects' ratings were assigned scores of 3, 2, and 1, respectively, and the average ratings across the 5 EMs per subject were called the Mean EM Affect score.

The mean POMS-B Elation-Depression score for the entire sample was 46.40 ($\underline{SD}$ = 9.99). This is a normative standardized $\underline{t}$-score (i.e., mean = 50, $\underline{SD}$ = 10) so the present sample is neither very elated nor depressed as a group. Males had a mean of 44.38 ($\underline{SD}$ = 9.76) and

Table 7

Means and Standard Deviations for Emotion Variables: Emotions

Profile Index (EPI), Profile of Mood States Bipolar Form Elation-

Depression Scale (POMS-B), Emotion Rated[a] in Early Memories

(EM Emotion), and the Emotion Summary Scores

$\underline{N}$ = 48	Mean	Standard Deviation
POMS-B[i]	46.40	9.99
EPI Emotion[b]		
Acceptance	20.94	4.74
Joy	16.40	4.10
Anticipation	19.06	4.78
Anger	7.23	4.84
Disgust	8.02	4.53
Sadness	5.40	3.98
Surprise	10.98	3.97
Fear	15.81	4.72
Sum Positive[c]	56.23	7.31
Sum Negative[d]	36.30	7.60
Total Emotion[e]	92.31	4.33
Sum Pos./Total[f]	.61	.08
EM Emotion[g]		
Acceptance	1.58	.81
Joy	1.35	.90
Anger	.88	.92
Disgust	.53	.66
Sadness	.88	.81
Surprise	2.20	.95
Fear	1.53	.90
Sum Positive[c]	3.98	1.81
Sum Negative[d]	6.00	2.48
Total Emotion[e]	9.96	2.53
Sum Pos./Total[f]	.41	.16
Mean EM Affect[h]	2.01	.40

Table 7 (continued)

NOTES: [a] The investigators rated emotions in EMs.
[b] The EPI raw score (Raw Score Range: 0-29) means and $\underline{SD}$ are reported.
[c] The sum of acceptance, joy, and anticipation scores.
[d] The sum of anger, disgust, sadness, surprise, and fear scores.
[e] The sum of all 8 emotion scores.
[f] The ratio of the Sum Positive and Total Emotion scores.
[g] Emotions rated on a 7-point scale: 0 = absent, 1-2 = low intensity, 3-4 = moderate intensity, 5-6 = high intensity.
[h] The subject global affective ratings of "pleasant," "neutral," and "unpleasant" were assigned scores of 3, 2, 1, respectively and the mean score across the 5 EMs each subject recalled and rated = Mean EM Affect score.
[i] The POMS-B mean is reported as a $\underline{t}$-score.

females of 45.85 (SD = 13.59). The difference between the means is not significant.

The most intense emotions in EMs were acceptance, joy, surprise, and fear. This accords with the findings of Dudycha and Dudycha (1933, 1941) and Walfogel (1948) who both found fear to be the most common negative emotion in EMs; and joy to the most prevalent positive emotion. Table 8 lists the average number of EMs per subject in which an emotion was identified. The most intense EPI emotions were acceptance, joy, fear, and anticipation. This suggests some degree of correspondence between the two types of emotion measures, so to better assess this EM-emotions and EPI-emotions were intercorrelated. Table 9 presents the intercorrelation matrix. Also included in the table are the POMS-B and Mean EM Affect scores. Of the 81 correlations between EM-emotion and EPI-emotion scores only three are significant: EM-acceptance and EPI-fear (r = .37, p <.01) and EPI-anger (r = -.30, p <.05); and EM-disgust and EPI-acceptance (r = .31, p <.05). It appears that even though the mean scores for the EPI and EM emotions are proportionately similar, there is almost no linear relation between the two types of measures.

There are, however, two patterns of correlations in Table 9 which merit interest. The POMS-B and EPI-emotion scales show several sensible and significant correlations. The POMS-B and EPI-joy scale are positively correlated (r = .36, p <.05), while the POMS-B correlates negatively with EPI-anger (r = -.30, p <.05) and EPI-sadness (r = -.40, p <.01). The positive correlation between EPI-surprise and the POMS-B (r = .32, p <.05) is unexpected, though, since it is

Table 8

Average Number of Early Memories Per Subject in Which

an Emotion Was Identified

	Mean	SD
Anger	1.48	1.21
Fear	2.59	1.10
Surprise	3.30	1.08
Expectation	2.65	1.20
Disgust	.80	.93
Acceptance	2.70	1.15
Joy	2.17	1.09
Sadness	1.53	1.06

NOTE: N = 48. Five early memories per subject.

Table 9

Intercorrelation Matrix of Emotions Profile Index Scales, Emotions Rated[a] in Early Memories, the

Profile of Mood States Bipolar Form Elation-Depression Scale, and the Mean EM Affect Score[b]

		EMOTIONS RATED IN EARLY MEMORIES									
		Accept (1)	Fear (2)	Surprise (3)	Sad (4)	Disgust (5)	Anger (6)	Anticip. (7)	Joy (8)	POMS[c]	Mean EM Aff.[d]
Accept	(1)	.14	.24	.07	.26	.31*	-.05	.05	.16	.28	.06
Fear	(2)	.37**	-.01	-.04	-.06	.09	-.04	.01	-.002	-.13	-.06
Surprise	(3)	-.28	.002	-.09	.01	.13	.05	.04	-.14	.32*	.02
Sad	(4)	-.11	-.11	.03	.07	-.14	.07	-.15	.01	-.40**	.07
Disgust	(5)	-.14	-.07	.07	-.15	-.26	-.02	-.005	-.01	-.06	-.16
Anger	(6)	-.30*	-.10	.11	.22	-.01	.27	-.14	-.12	-.30*	-.12
Anticipation	(7)	.11	-.08	-.07	-.22	-.11	-.11	-.07	-.13	.10	-.11
Joy	(8)	.14	.05	.02	.13	.23	-.04	.02	.10	.36*	.21
POMS-B E-D[c]	(9)	.06	.00	.06	.00	.10	-.08	.10	-.16	--	.07
Mean EM Aff[d]	(10)	.24	-.36*	-.37**	-.27	-.15	-.32*	.26	.61***	--	--

Table 9 (continued)

[a]The investigators rated the emotions in early memories.

[b]The mean EM Affect score is derived from subjects' global ratings of their EMs as "pleasant," "neutral," and "unpleasant." Each rating was assigned a score of 3, 2, 1, respectively, and the average across the 5 EMs = Mean Affect Score.

[c]The Profile of Mood States Bipolar Form Elation-Depression Scale.

[d]The Mean EM Affect Score; see Note b.

*p <.05

**p <.01

***p <.0001

considered a negative emotion by Plutchik (1980).

The relations between the Mean EM Affect score and EM-emotions are interesting insofar as they probably indicate the more specific bases for the subjects' global EM affective ratings. Thus, the Mean EM Affect score correlates positively with EM-rated joy (r = .61, p < .0001), and negatively with EM-rated joy (r = -.36, p <.05), surprise (r = -.37, p <.01), and anger (r = -.32, p <.05). This supports the impression gained from the means in Table 6 that the emotions of fear, joy, and surprise are predominant as emotional features of the EMs. In addition, surprise does appear to be a negative emotion in the context of EMs since it is significantly and negatively correlated with subjects' global affective ratings of the pleasantness of the memories.

The Relation Between EM-Rated Emotions and Subjects' Three Global Affective Ratings of the Memories

The investigators rated the eight emotions in EMs. The subject's 3 global affective judgments of "pleasant," "neutral," and "unpleasant" were correlated with the investigator's ratings of the presence and intensity of the 8 emotions. Table 10 presents the correlation matrix. The figures refer to the number of EMs each subject rated for each global affect category and the investigator's emotion intensity ratings for the EMs (summed across the 5 EMs) for each subject.

The pattern of results indicates the investigator's more specific emotion ratings show systematic and sensible relations with the subject's more global affect judgments. If we assume that each specific emotion formed the basis for the global subject's judgments,

Table 10

The Relation Between the Investigator's Ratings of Eight Emotions in Early Memories and Subjects' More Global Affective Judgments of Them as "Pleasant," "Neutral," and "Unpleasant"[a]

Experimenter Rated Emotions in Early Memories	Subject's Global Affect Ratings of the Early Memories		
	"Pleasant"	"Neutral"	"Unpleasant"
Anger	−.30*	.13	.28*
Fear	−.21	−.25	.49***
Surprise	−.29*	−.05	.42**
Disgust	−.17	.15	.09
Sadness	−.31*	.23	.16
Joy	.66****	−.41**	−.46**
Expectancy	.33*	−.32*	−.13
Acceptance	.34*	−.42**	.07
Sum Positive[a]	.64****	−.53****	−.34*
Sum Negative[b]	−.44**	.05	.51****
Total Emotion[c]	.02	−.34*	.26
Sum Pos/Total[d]	.70****	−.41**	−.52****

[a]The correlations are between the number of early memories (of 5) subjects rated in each affect category and the investigator's intensity ratings for each emotion averaged across the 5 memories for each subject.

*$p < .05$

**$p < .01$

***$p < .001$

****$p < .0001$

then the following conclusions can be made. Subject's judgments of an EM as "pleasant" are based on the presence of higher levels of the three positive emotions of joy (r = .66, p <.0001), acceptance (r = .34, p <.02), and expectancy (r = .33, p <.02). They are also based on lower intensities of the three negative emotions of anger (r = -.30, p <.03), surprise (r = -.29, p <.05), and sadness (r = -.31, p <.03).

Subjects' global affective ratings of an EM as "neutral" appear to be based on the presence of lower intensities of the emotions of joy (r = -.41, p <.004), acceptance (r = -.42, p <.003), and expectancy (r = -.32, p .025). Finally, lower intensities of fear (r = -.25, p <.08) are probably related to this judgment since its presence at a higher intensity might alter the subject's judgments from "neutral" to "unpleasant" in overall affective-tone.

The subject's judgment of EMs as "unpleasant" appears related to the presence of high intensities of the negative emotions of anger (r = .28, p <.056), fear (r = .49, p <.001), and surprise (r = .42, p < .003). Similarly, it is based on the presence of very low intensities of emotion of joy (r = -.46, p <.001).

It seems sensible to conclude that the investigator's ratings of the specific emotions in EMs show strong relationships with the subject's more global affective judgments of EMs. Additionally, Plutchik's (1980) assessment of surprise as a negative emotion is again borne out by the EM data. Finally, global affective judgments, while valid, must also be seen as obscuring more specific relations between discrete emotions and the affective quality of an experience. The two independent measures appear to provide complementary, but not

identical information regarding the affective qualities of an individual's remembered experience.

"Screen Memories" and the "Self-Seen" Variable

When EMs are identified as "screen memories" using all four of Freud's criteria, 12.9% were observed. When only the presence of self in EM imgaery (the "self-seen" variable) is considered, 66.3% are identified. Females rated a larger proportion of their EMs as having this variable (73.3%) than did the males (48.5%).

The frequency of screen memories reported by subjects was correlated with all EPI emotion scales including four summary variables: Sum Positive Emotions (acceptance, joy, and expectancy), Sum Negative Emotions (anger, fear, surprise, disgust, and sadness), Total Emotion (sum of all 8 emotions), and Sum Positive/Total Emotion. These summary emotion variables are conceptually distinct. Sum Positive and Sum Negative index the characteristic intensity with which subjects experience the positive and negative emotions, respectively. These variables increase as subjects' characteristic intensity level for each emotion increases. The Sum Positive/Total Emotion indexes the relative balance of intensities of positive emotions to all emotions. And the Total Emotion variable indexes the subjects' characteristic emotion intensity irrespective of what quality or valence the emotion may have (Plutchik, 1980). As such, it indexes the individual difference variable of how intensely the subject experiences emotion per se.

Several of the EPI emotion variables correlated significantly with the frequency of "screen memories." Specifically: Acceptance

($\underline{r}$ = -.27, $\underline{p}$ <.06), Sadness ($\underline{r}$ = .31, $\underline{p}$ <.05), Anger ($\underline{r}$ = -.27, $\underline{p}$ <
.03), Sum Negative Emotion ($\underline{r}$ = .32, $\underline{p}$ <.05), and Sum Positive/Total
Emotion ($\underline{r}$ = -.30, $\underline{p}$ <.05).

Since one of the criteria for a screen memory is that the subject
rate it as being neutral in overall affective tone, it was decided
to correlate such memories with emotion rated in EMs by the investi-
gator. When this was done, the following significant correlations
resulted. Specifically, EM-Emotions [Acceptance ($\underline{r}$ = -.32, $\underline{p}$ <.05),
and Sum Positive Emotion (same as in EPI)($\underline{r}$ = -.36, $\underline{p}$ <.01)] were
related to the frequency with which subjects recalled screen memories.

Since the EPI measures "trait" levels of characteristically
experienced emotions and the EM-emotion measures the emotional char-
acteristics within the sample of EMs, the following summarization of
the observed relations is warranted. Individuals who report higher
levels of negative affect and lower levels of the emotion of acceptance
both in their current lives and in their autobiographical memories
also show a higher incidence of screen memories.

Kihlstrom and Harackiewicz (1982) found the personality "trait
of harm-avoidance" (measured by the Jackson Personality Inventory)
predicted the occurrence of screen memories in their sample. Harm-
avoidance is considered a characteristic tendency to avoid anxiety-
provoking situations. "Anxiety" is a somewhat vague and general term
for what can more precisely be measured as combinations of fear and
(two or more of the following) anger, shame, guilt, and interest/
excitement (Izard, 1972, 1977). The findings of Kihlstrom and
Harackiewicz (1982) can be related to the present results if the

following assumption is made. High levels of negative emotions (EPI
fear, anger, sadness, surprise, and disgust) and low levels of
acceptance are in a general way equivalent to anxiety. In other words,
the two studies are measuring anxiety but in different ways.

There is no conceptual difficulty in equating a high EPI Sum
Negative Emotions score with anxiety since Izard (1972) has shown
that the latter can be more finely differentiated into the emotions
of fear, anger, and sadness. A low EPI acceptance score also is
related to anxiety when the specific qualities of this emotion are
considered. Plutchik (1980) defines and measures the emotion of
acceptance at several levels of analysis. At the level of _subjective_
feelings it is equated with the affective "states" of "calmness,"
"agreeableness," "contentment" and "warmth." At the _behavioral_ level
it is equated with tendencies toward "approach" and "affiliation."
It should be clear that anxiety is in some sense the opposite of the
subjective and behavioral referents of "acceptance" as it is con-
ceptualized and measured in the EPI. Thus, it is very likely that the
current results complement those of Kihlstrom and Harackiewicz (1982).

In addition to complementing the results of the previous study,
however, the present results also _extend_ them in a very important way;
i.e., they provide a more _direct_ type of evidence for Freud's concep-
tualization of the psychological meaning of screen memories than is
provided by the previous study. Freud (1901/1965) believed that such
memories implied an ongoing _conflictual_ process in the rememberer both
at the level of past and current experience. The memory was believed
to be of the past conflictual event (i.e., a "traumatic Oedipal

experience"). The current conflict was believed to be represented by the "screening" of the original memory content by more innocuous and less anxiety-provoking detail devoid of emotional-tone. Another measure of the conflictual process was that such memories were repetitively recalled despite their apparently banal content. The final indicator was the imaginative elaboration of the memory content such that the subjects could "observe the self" in the memory imagery. This last was direct evidence that the original memory content had been altered in some way.

The present study provides more direct evidence for Freud's hypothesis because the emotional qualities of the memories themselves were measured. Thus, high levels of negative emotions (Sum Negative Emotions) and low levels of acceptance in both the trait instrument (the EPI) and in the memories themselves correlated with the frequency of reporting screen memories. Of course, the present results do not address Freud's hypothesis about the nature of "Oedipal traumas" as the ultimate basis for screen memories.

Trauma Memories

Twenty-six (26%) percent of all EMs were rated as having traumatic content. Two questions were considered. First, are trauma memories rated by subjects as being more frequently recalled than nontraumatic memories; and second, did such memories show a relationship to either trait (EPI) or "state" (POMS-B) emotion? A major diagnostic sign of stress and trauma-related pathology is the occurrence of intrusive, repetitive imagery (i.e., memories) of the traumatic event accompanied by intense dysphoric and anxious affect. Of course, such

severe symptoms were not expected for EMs, but rather the question was whether there might be any similarity at all.

Subjects' judgments of the extent of previous recall of each EM was compared for the trauma and the non-trauma meories. The proportion of each type of EM in each recall category ("just now," "occasionally before," and "frequently before") was tabulated. The proportion of traumatic EMs in each category of recall frequency is: Now = .25, Occasionally Before = .564, and Frequently Before = .187. For non-traumatic EMs it is: Now = .268, Occasionally Before = .566, and Frequently Before = .166. The differences between proportions for each type of memory was examined using a z-test (Guilford & Fruchter, 1978). All three tests were non-significant. Similarly, the correlation between incidence of traumatic EMs and state (POMS-B, Elation-Depression) and trait (EPI Sum Positive/Total Affect scales) emotions across subjects produced no significant correlations.

Mood-Dependent Recall of Early Memories

Several analyses were conducted of the relation between the mood state of subjects and the rated (by subject) affective quality of EMs. These analyses correspond to Hypotheses 1-5 presented earlier.

The first issue examined was whether there was an overall interaction between mood states and EM affective quality as is predicted by Bower (1981). In other words, can MDR be observed regardless of the intensity level of the mood state of subjects.

The categorization of subjects as "happy," "neutral," and "sad" was made on the basis of the sample mean on the POMS-B Elation-Depression scale (mean = 46.9, $\underline{SD}$ = 9.9). Subjects with scores one

standard deviation (SD) above the sample mean were considered "happy." "Neutral" subjects scored within one sd either side of the mean, and "sad" subjects scored below one sd from the sample mean. Neither the happy or sad subjects are normatively (i.e., POMS-B standardization data) either very happy or very depressed.

Table 11 presents a breakdown of subjects' rated affective quality of EMs (positive, neutral, negative) by current mood state of subject (happy, neutral, sad). The mean percentage of the 5 EMs recalled by each subject mood group in each EM affect category is tabulated. It can be seen that the happy subject recalled the largest percentage of happy EMs and the lowest percentage of sad EMs. However, sad and neutral subjects recalled approximately the same percentages of happy, neutral, and sad EMs. Thus, upon initial inspection of the data there appears to be an asymmetric MDR effect when the entire subject sample is considered. When a one-way ANOVA was conducted on the percentage of EMs rated as happy by each mood group, a non-significant F [$F_{(2,45)}$ = 1.68, ns.] was obtained. Thus, the asymmetric MDR pattern is non-reliable in terms of the group data.

A second statistical analysis was conducted that examined the linear relations between subjects' mood states and the affective qualities of EMs. The mean affect scores and the number of EMs rated positive, neutral, and negative by subjects were correlated with subject's POMS-B Elation-Depression score. Table 12 presents these statistics for males and females separately and as a group. None of the correlations reached statistical significance. A trend was observed, however, for the more "elated" males to rate fewer numbers of

Table 11

Subject Mood State[a] and Subject Ratings of the Affective Quality[b]

of Their Early Memories: Mean Percentage[c] of Early Memories

for Each Mood State Group[d]

Mood Groups	Subject's Affect Ratings of Memories		
	Positive	Neutral	Negative
Happy ($\underline{N}$ = 9)	51.0%	20.0%	28.8%
"Neutral" ($\underline{N}$ = 21)	31.0%	26.6%	41.9%
Sad ($\underline{N}$ = 18)	37.7%	24.4%	37.7%

[a]Subject mood assessed by the Profile of Mood State Bipolar Form
Elation-Depression scale (POMS-B, E-D).

[b]Subjects rated their early memories as being either positive, neutral
or negative in overall affective tone.

[c]There were a total of 240 early memories. Each subject recalled 5
early memories.

[d]The POMS-B, E-D mean score for the entire sample was 46.9 ($\underline{SD}$ = 9.9).
The happy mood group scored above 57 on the POMS-B, E-D scale. The
"neutral" mood group scored between 43-56, and the sad group scored
below at or below 42 on this scale.

Table 12

Correlations Between Subject's Mood State[a] and Their Ratings of

Early Memories as Happy, Neutral, or Sad: Comparisons for

Males, Females, and Total Sample

	Men (N = 14)	Women (N = 34)	Combined (N = 48)
POMS-B, E-D and Mean EM Affect[b]	.18	.05	.08
POMS-B, E-D and # EMs Happy[c]	.28	.06	.11
POMS-B, E-D and # EMs Neutral[c]	−.35[d]	−.003	−.11
POMS-B, E-D and # EMs Sad[c]	−.006	−.02	−.02

[a]Mood state as assessed by the Profile of Mood States Bipolar Form Elation-Depression scale (POMS-B, E-D).

[b]The mean affect score is derived from subject ratings. A positive (happy) ratings was assigned a score of 3; a neutral rating was assigned a score of 2; and a negative (sad) rating was assigned a score of 1. The mean of these scores across 5 early memories constitutes the mean affect score for the subject.

[c]Subjects rated the early memory for this quality.

[d]p <.10. All other correlations non-significant.

EMs as neutral in affective tone (POMS-B, Elation-Depression score correlated with number of EMs rated as neutral by males, r = -.35, p < .10).

A final analysis was conducted to test Hypothesis 5 that subject's mood intensity moderates the degree of MDR observed. Careful inspection of the "neutral mood group" in Table 11 suggests a subtle trend for this group to show more EMs rated as sad and fewer EMs rated as happy than the group which is identified as sadder. In effect they are doing the opposite of what one would expect. Figure 5 graphs the data in Table 11 so this reversal for the moderates group can be more readily seen.

Hypothesis 5 predicted that the moderate mood-intensity group might show a different type of recall pattern than the more extreme mood-intensity groups. The groups were defined as "happy," "neutral" (moderate), and "sad" in Table 11 on the basis of the sample mean of the POMS-B Elation-Depression scale. An alternative method of categorizing the mood groups is possible, however, because this instrument has normative data which can be used for this purpose. The population mean for this instrument is 50 with a sd = 10 scale points. The "happy" mood group in Table 11 has only 9 subjects so it was decided not to further subdivide this group. However, the "sad" group has 18 subjects. It is possible to extract 11 subjects from this group who have at or below a score of 36 which is 1.4 sd below the population mean for the POMS-B scale. When "happy" and "sad" mood groups are defined in this way the data in Table 13 is obtained.

Table 13 shows the mean proportion of EMs (out of a total of 5

% of
Early Memories

(51)
Happy Mood

(41)

(38)

Sad Mood
(38)

(27)

"Neutral"
Mood

(28)

(31)

(24)

(20)

50

40

30

20

10

0

Sad   Neutral   Happy

Self-Rated Affective Quality of Memory
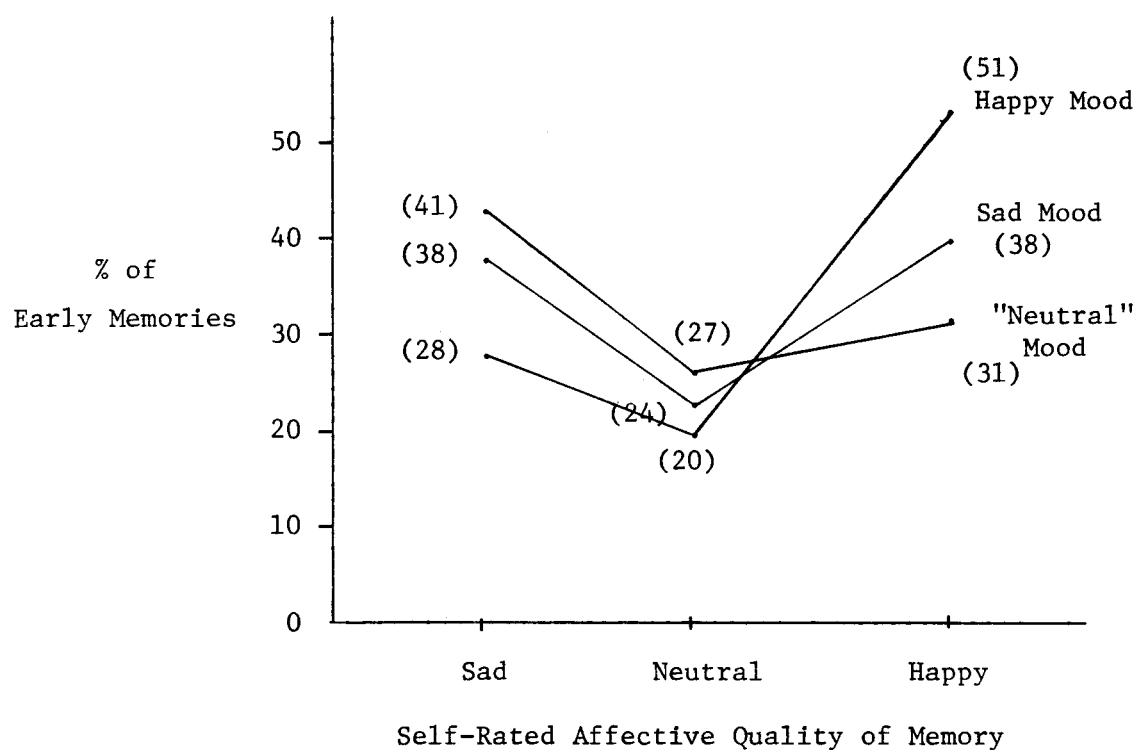
[a]The variables presented here correspond with each variable
presented in Table 11.

Figure 5. Graphic Presentation of Data in Table 11[a]

Table 13

Mean Differences in the Proportion of Early Memories Rated as

Positive and Negative by "Happy" and "Sad" Mood Groups[a]:

"Moderate"[d] Mood Subjects Removed

	Subject-Rated Affective Quality						
Mood Group	Positive	SD	Negative	SD	t	df	p[c]
Happy (N=9)	.511	.03	.288	.04	1.57	8	.10
Sad (N=11)	.400	.05	.327	.05	-.73	10	ns
t[b]	5.24		-1.83				
df	18		18				
p[c]	.001		.05				

[a] Mood groups defined by subject's score on the Profile of Mood States Bipolar Form Elation-Depression Scale. Happy subjects scored at or above a t-score of 57; the Sad subjects scored at or below a t-score of 36. The normative population mean for the scale is a t-score of 50 (sd = 10).

[b] t-test for matched samples.

[c] All probability values are one-tailed for directional hypotheses.

[d] The moderate group obtained t-scores between 37-55 on the mood scale (see note a).

EMs) each subject rated as positive and negative in overall affective

tone with subjects divided into "happy" and "sad" mood groups. It

can be seen that happy subjects recalled more positive EMs than did

the sad subject group $[\underline{t}_{(18)} = 5.14$, $\underline{p} < .001$, one-tailed]. The sad

subjects also recalled more negative EMs than did the happy subjects

$[\underline{t}_{(18)} = -.1.83$, $\underline{p} < .05$, one-tailed]. There was also a statistical

trend for the happy subjects to recall a larger number of positive

than negative EMs $[\underline{t}_{(8)} = 1.57$, $\underline{p} < .10$, one-tailed; $\underline{t}$-test for matched

samples]. However, there was a reversal for the sad mood group. They

actually recalled more positive EMs than negative EMs though this

difference is probably not reliable since a statistical trend could

not be found when a matched-sample $\underline{t}$-test was conducted $[\underline{t}_{(10)} =$

$-.73$, ns.].

Thus, when subject's mood state was categorized as happy or sad

based on normative criteria rather than sample means, an asymmetric

pattern of MDR was observed. When the small sample sizes (and the

statistical trend for the happy group) are considered, it is not

inconceivable to expect that a symmetric MDR pattern might be observed

with a slightly larger sample. In any case, the present analysis

supports Hypothesis 5 without any qualification in at least one sense.

When the more extreme mood subjects are considered a more powerful

MDR effect can be observed. This can be seen when the point-biserial

correlation coefficients corresponding to various $\underline{t}$-test values are

considered. For a $\underline{t}$-test score of 5.24, $\underline{r}_{pb} = .776$; and for -1.83,

$\underline{r}_{pb} = .396$. Both correlations exceed the magnitude of the correla-

tions observed when less extreme mood groups were compared in earlier

statistical analyses.

Circumplexity Structure of Emotions in EMs

Tables 14-18 present the correlation matrices for the eight EPI emotions rated in EMs by the investigator. Table 19 is the correlation matrix for the summed emotion scores (i.e., the average intensity rating for each emotion across all 5 EMs) for each subject. Table 20 presents the GLS rho-estimates generated by J. Steiger's MULTICORR 2 for each matrix. Also included in the last table are data on the following: chi-square goodness-of-fit test between the empirical matrix and the rho-matrix; the mean square residual (MSR) between the rho and empirical matrices; the variance of the rho's; percentage of variance from the empirical matrices utilized in the circumplex analysis (see Appendix F); and the Wilson-Hilferty z-score (Wilson & Hilferty, 1931) which transforms χ^2s with variable degrees of freedom into a z-score with 1 df to allow comparison across analyses. Table 21 presents the principal components extracted from the rho matrices (Wiggins, et al., 1981) in terms of the variance in the matrices which can be attributed to each type of principal component. Table 20 and 21 can be used to assist visual inspection of circumplexity in Tables 14-18.

Inspection of Tables 14-18 reveals that the clearest degree of circumplexity occurs in Table 18 for EM 5 the last memory recalled by each subject. Recall that we are seeking a pattern of correlations in each successive minor diagonal that is initially positive, then zero-order, then negative, then more highly negative (see Table 3). There are departures from this pattern in Table 18 especially for the

Table 14

Intercorrelation of the Eight Emotions in Early Memory Number 1[a,b,c]

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Joy	(1)								
Accept	(2)	4144							
Fear	(3)	-2587	-3138						
Surprise	(4)	-1461	-0890	1618					
Sad	(5)	-0184	-2367	3336	3826				
Disgust	(6)	-2255	-1742	1825	0021	3234			
Anger	(7)	-1516	-0373	0122	0507	2203	0849		
Anticipate	(8)	1238	2185	-2501	-1466	-1786	-2104	1078	

[a]Decimals are ommitted from the table.

[b]The eight emotions were rated by the investigator using an 0-6 scale of intensity. 0 = absent, 1-2 = low intensity, 3-4 = moderate intensity, 5-6 = high intensity.

[c]N = 48.

Table 15

Intercorrelation of the Eight Emotions in Early Memory Number 2[a,b,c]

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Joy	(1)								
Accept	(2)	4940							
Fear	(3)	-4315	-1666						
Surprise	(4)	-0538	0473	1605					
Sad	(5)	-1524	-1628	0284	1203				
Disgust	(6)	-0404	-2350	1367	-0351	0903			
Anger	(7)	-0116	0901	1553	2358	2888	2058		
Anticipate	(8)	0641	1172	-1998	-0484	-3794	-2371	-2138	

[a]Decimals are ommitted from the table.

[b]The eight emotions were rated by the investigator using a 0-6 scale of intensity. 0 = absent, 1-2 = low intensity, 3-4 = moderate intensity, 5-6 = high intensity.

[c]N = 48.

Table 16

Intercorrelation of the Eight Emotions in Early Memory Number 3[a,b,c]

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Joy	(1)								
Accept	(2)	3844							
Fear	(3)	-3000	-2172						
Surprise	(4)	-3771	-1002	4990					
Sad	(5)	-3248	-0723	2435	0993				
Disgust	(6)	-1214	-1335	3980	1568	1099			
Anger	(7)	-4381	-2336	1031	0258	3794	2593		
Anticipate	(8)	5226	1464	-0776	-2942	-2218	0423	-2670	

[a]Decimals are ommitted from the table.

[b]The eight emotions were rated by the investigator using a 0-6 intensity scale. 0 = absent, 1-2 = low intensity, 3-4 = moderate intensity, 5-6 = high intensity.

[c]$\underline{N}$ = 48.

Table 17

Intercorrelation of the Eight Emotions in Early Memory Number 4[a,b,c]

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Joy	(1)								
Accept	(2)	5409							
Fear	(3)	-1401	-2686						
Surprise	(4)	-1543	-0313	3295					
Sad	(5)	-1911	-3106	-0295	2219				
Disgust	(6)	-2815	-1313	0763	1097	2341			
Anger	(7)	-4263	-3347	-0757	0120	2423	1041		
Anticipate	(8)	1400	-0188	0754	1277	-2056	-0538	-1793	

[a]The decimals have been ommitted from the table.

[b]The eight emotions were rated by the investigator using a 0-6 intensity scale. 0 = absent, 1-2 = low intensity, 3-4 = moderate intensity, 5-6 = high intensity.

[c]N = 48.

Table 18

Intercorrelation of the Eight Emotions in Early Memory Number 5[a,b,c]

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Joy	(1)								
Accept	(2)	5057							
Fear	(3)	-5291	3005						
Surprise	(4)	-1408	-0690	2087					
Sad	(5)	-3238	-1737	1505	0278				
Disgust	(6)	-1939	-3085	1355	0591	4597			
Anger	(7)	-1362	-1493	-0268	1732	0260	2965		
Anticipate	(8)	3785	2766	-1530	-3482	-3334	-3428	-2213	

[a]Decimals are ommitted from the table.

[b]The eight emotions were rated by the investigator using an 0-6
scale of intensity. 0 = absent, 1-2 = low intensity, 3-4 =
moderate intensity, 5 - 6 = high intensity.

[c]$\underline{N}$ = 48.

Table 19

Intercorrelation of the Eight Emotions in the Summed Emotion Scores[a] For the Early Memories[b,c,d]

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Joy	(1)								
Accept	(2)	3144							
Fear	(3)	-0246	-2325						
Surprise	(4)	-0481	0408	3214					
Sad	(5)	-0703	0048	1622	2283				
Disgust	(6)	-1462	-3463	3979	0170	2362			
Anger	(7)	-4062	-0415	0702	1270	1803	1750		
Anticipate	(8)	3080	2314	0528	-2369	-3951	-2253	-2030	

[a]The summed emotions scores were the average intensity ratings for an emotion across all 5 early memories per subject.

[b]The deimals are ommitted from the table.

[c]The emotions were rated by the investigator using an 0-6 intensity scale. 0 = absent, 1-2 = low intensity, 3-4 = moderate intensity, 5-6 = high intensity.

[d]$\underline{N}$ = 48.

Table 20

Generalized Least Square Estimates of the Rho Values[a] in the Inter-

correlation Matrices For All Five Early Memories Separately And As

A Summed Variable: Statistical Analysis of the Population Estimates

	Early Memories					
Parameter	1	2	3	4	5	Summed
Rho 1	1606	0941	1739	1402	2451	1400
Rho 2	0304	−0297	0165	−0436	0705	−0030
Rho 3	−1051	−0467	−0850	−1406	−1044	−0060
Rho 4	−0812	−0700	−1625	−1315	−3144	−1500
χ^2 df=24	39.4	49.2	71.36	40.6	60.95	49.2
Mean Squared Residual[d]	f	.025	.038	f	.024	.030
N	48	48	48	48	48	48[c]
Variance[a] of Rho's	f	.0040	.0158	f	.0430	.0105
Percent of Variance[b]	f	13.7%	29.4%	f	64%	25.9%
$Z_{W \cdot H}$[e]	f	−3.18	.003	f	−1. 49	−3.18

[a] Decimal points are ommitted from the table of rho-estimates.

[b] Percentage of variance from the empirical matrix of correlations used in the circumplex analysis. (See Appendix F for the rationale and method of calculating this percentage.)

[c] While the same 48 subjects are used in all analyses, the "Summed" variable consists of the average emotion intensity score across all memories for each subject.

[d] The mean squared residual is the mean of the squared deviations of each empirical correlation from its corresponding rho-estimate.

Table 20 (continued)

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[e]The Wilson-Hilferty z-score with 1 df.

[f]Circumplexity not present. Therefore, statistics not calculated.

Table 21

Proportion of Variance in the Principal Components Obtained Through Circumplex Analysis of Emotion Scores Rated[a] in Early Memories Two, Three, Five, and Summed Across All Five Early Memories[b,c]

SAMPLE	Circumplex	General	Polarity	Orthogonality	Specificity
Early Memory 2	31.72	12.07	21.77	24.74	9.70
Early Memory 3	38.21	13.10	19.91	20.11	8.65
Early Memory 5	45.21	13.85	20.51	13.61	6.81
Summed Early Memories	33.93	14.06	23.34	21.42	7.18625

[a]The investigator rated the presence and intensity of emotions in memories.

[b]Early memories one and four were not included since examination of the ordinary least sqaures estimates of the rho values obtained through MULTICORR indicated a lack of circumplexity. See Table 20.

[c]N = 48 for all analyses.

following correlations: minor diagonal one (sadness and surprise = .0278); minor diagonals two and six (see Table 3; these two diagonals represent emotions separated by one other emotion on the circumplex) show deviations for fear and joy (-.5291), anticipation and anger (-.3428), and anticipation and acceptance (.2766); minor diagonals three and five show deviations for disgust and fear (.1355), and anger and surprise (.1732); finally, minor diagonal four which should show only large negative correlations (if polarity is present and strong) shows a deviation for anger and fear (-.0268). Thus, 7 of the 28 correlations show a deviation from an exact circumplex pattern. However, the remaining correlations do show the pattern indicative of circumplexity and this can be demonstrated by the rho-estimates for this matrix which are given in Table 17: rho 1 = .2451, rho 2 = .0705, rho 3 = -.1044, and rho 4 = -.3144.

The MSR between the rho's and the empirical correlations in Table 18 is .024 which indicates the rho's are on the average fairly good estimates for each empirical correlation. Table 20 also shows that 64% of the variation in the empirical matrix was utilized in the circumplex analysis (variance of the rho's/variance of the rho's plus MSR = 64%, see Appendix F). Table 20 shows that 45.21% of the variation in the rho matrix for EM 5 can be attributed to circumplexity. Thus, 28.9% of the empirical variation can be accounted for by circumplexity (64% x .4521 = 28.9).

The chi-square test recommended by Wiggins et al. (1982) is, as they argued, an overly severe method for assessing the adequacy of a circumplex model's fit to the empirical data. This test assessed the

degree of fit between the rho and empirical matrices. Any deviations between them increases the statistic. For EM 5 the chi-square = 60.95 the largest observed with the present data. Since EM 5 also produced a clear circumplex structure (as indexed by the rho's, the principal components analysis, the MRS, and the percentage of empirical variation attributable to circumplexity), some type of resolution of this discrepancy must be considered. EM 5 probably produced the largest chi-square value because it is also the one with the largest absolute value of the rho's and empirical correlations. Therefore, the large deviations observed for 7 of the empirical correlations from perfect circumplexity (e.g., anger and fear = .0268 and is estimated by rho 4 = -.3144) are overly influencing the statistical test. Since we are less concerned with perfect circumplexity than with the degree of observable circumplexity in the data, the statistic should probably be given a relative weight in the interpretation of the results.

Table 20 and 21 show that while circumplexity was observable in EM 2, 3, and the summed emotion scores, it is less evident than in EM 5. The most important figures to compare are the percent of variance from the empirical matrix used in the circumplex analysis (Table 20) with the degree of circumplexity (Table 21) in the rho-estimates. These two values indicate that the following proportions of empirical variation can be attributed to circumplexity in the respective analyses: EM 2 = 4.34%, EM 3 = 11.2%, and Summed Emotion score = 8.78%. These are not large amounts of predictable variance. However, they are not insignificant either.

Rosenthal (1984) has developed one method of dramatizing the

significance of predictable variance that makes this last conclusion clearer. Rosenthal has constructed the "binomial effect size display" (BESD) table to index the change in "success rate," "cure rate," etc. achievable with the use of any new procedure. Using the predictable variance estimates given earlier (28.8%, 11.2%, 8.78%, and 4.34%), the change in "success rate" achievable with the use of the circumplex model is, respectively, from .23 to .77, .33 t0 .67, .35 to .65, and .40 to .60. From this perspective the circumplex model does add a meaningful increase to the degree of variation in the empirical data which can now be conceptualized and further investigated.

The inequality pattern of the rho-estimates simply indicate whether a circular model in general will fit the data. However, they do not in and of themselves indicate the adequacy of the specific model being tested (Wiggins et al., 1982). The data in Table 21 more specificially assesses the adequacy of Plutchik's (1980) circumplex model. Here, the rho-estiamtes have been used to evaluate the percentage of variance attributable to the 5 kinds of principal components which can be derived from a circumplex matri. The figures in the table suggest that a "general" and "specificity" component accounted for relatively uniform amounts of variation in the four analyses, i.e., approximately 13% and 8%, respectively. Within the limits of the present study it is not possible to further interpret these figures.

Deviations from perfect polarity also accounted for relatively similar amounts of variation in the empirical matrices, approximately 21.3%. This variance indexes the adequacy of Plutchik's (1980) model

of the polarity relations between the four sets of emotions in the present study. This is clear when each of the polar opposite emotions (fear-anger, joy-sad, acceptance-disgust, surprise-expectancy) are examined in each of the empirical matrices. A sense for where departures in polarity occurred can be obtained by counting the number of instances when polar emotions showed negative, zero-order, or positive correlations in the six matrices. Joy and sadness were correlated negatively 4 times, and at a zero-order magnitude 2 times. Acceptance and disgust were negatively correlated in all 6 matrices. Surprise and expectancy were negatively correlated 4 times, positively 1 time, and at a zero-order value 1 time. Fear and anger showed the largest number of deviations from polarity being positively correlated 2 times and at a zero-order magnitude 4 times. Thus, deviations from polarity between the emotions of fear and anger probably contributed most to the variance captured by the principal components measuring this deviation.

Table 21 shows the variance attributable to deviations from perfect orthogonality across the four analyses. This variance indexes the adequacy of Plutchik's (1980) similarity scaling of emotions in the present data. A sense for where the deivations are occurring can be obtained by inspecting the correlations proceeding downward through the columns of each table. Perfect orthogonality would be represented by a change in the magnitude and sign of the correlations corresponding to the rho-inequality for circumplexity (rho 1 > rho 2 > rho 3 > rho 4, where rho 1 is positive, rho 2, zero-order, rho 3, negative, and rho 4, highly negative). Table 3 shows exactly how the pattern

should appear. Note, each column has a reversal point (e.g., column 1: rho 1, rho 2, rho 3, rho 4, rho 3, rho 2, rho 1). Inspection of Table 18, which exhibits the best circumplexity, is revealing. There appears to be a subtle trend for deviations to occur where positively valenced emotions shift to negatively valenced ones. For example, joy and fear are separated by acceptance and therefore should show a zero-order correlation (i.e., as represented by rho 2). However, in 5 of the 6 tables, they are negatively correlated with magnitudes ranging from -.5291 to -.0246.

A visual sense for the deviations from polarity/similarity of the emotions in the EM data can be obtained from Figure 5. This figure graphs the loadings of the eight emotions on the first two principal components extracted from the empirical correlations in Table 19 (of the summed emotion scores). Table 22 presents the 8 principal components which were extracted (by decision, using the SPSSX decision procedure for number of factors to be extracted), their eigenvalues, percent of variance accounted for by each, and the cumulative variance accounted for with each successive principal component. The factor matrix for the first three principal components, which have eigen-values larger than 1, are also given in the table. Table 5, given earlier, presents the rotated factor matrix for these components using Varimax rotation and a Kaiser normalization.

Figure 6 illustrates the roughly circular ordering of the emotions using principal components 1 and 2 as axes for the variable's placement. There is a clear separation of the positively and negatively valenced emotions. However, fear and anger fail to show the degree of

Table 22

Principal Components Analysis of the Summed Emotion Scores[a] Using
the Raw Data Instead of the Rho[b] Estimates

Principal Components[c]	Eigenvalue	Percent of Variance	Cumulative % Variance
Factor 1	2.89	28.6	28.6
Factor 2	1.31	16.4	45.0
Factor 3	1.28	16.0	61.0
Factor 4	.96	12.0	73.0
Factor 5	.83	10.4	83.4
Factor 6	.53	6.6	90.0
Factor 7	.45	5.7	95.6
Factor 8	.34	4.4	100.0

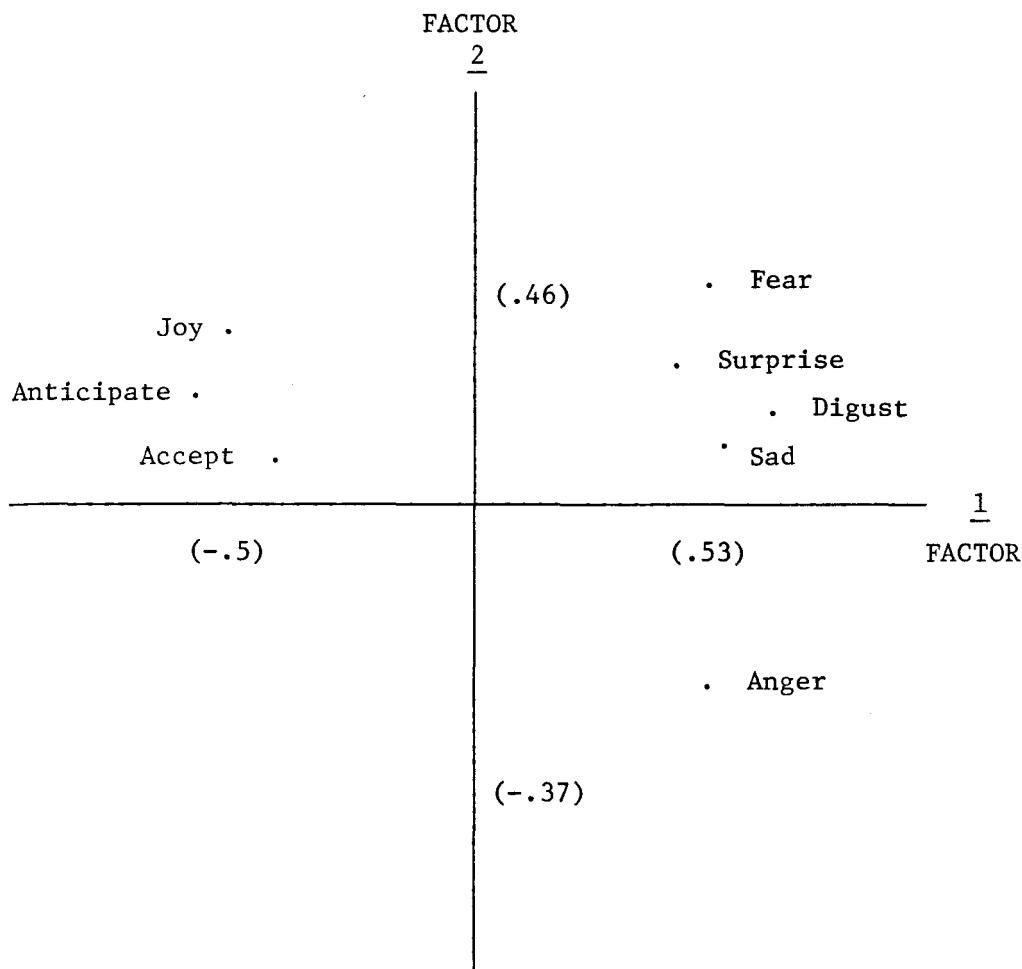| Factor Matrix[d]	Principal Components		
Variable	Factor 1	Factor 2	Factor 3
Disgust	.62670	.25977	.39729
Sad	.53904	.16783	.48524
Anger	.51628	-.37627	.18278
Fear	.46394	.69796	-.23752
Surprise	.39139	.41158	.51908
Accept	-.50467	.08519	.64059
Joy	-.56065	.57632	.13066
Anticipate	-.63320	.28079	-.31052

Table 22 (continued)

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[a]The summed scores are the average intensity score for an emotion across all 5 early memories per subject.

[b]Ordinary least square estimates of the population correlation.

[c]Calculated with unities in the matrix diagonals.

[d]Only Factors 1-3 included. Others have eigenvalues less than 1. Table 4 is the rotated factor matrix for all 8 factors (emotions).

```
                          FACTOR
                            2
                            |
                            |
                            |
                            |
                            |
                            |
                    (.46)   |        . Fear
         Joy .              |
                            |     . Surprise
  Anticipate .              |          . Digust
                            |       · Sad
      Accept  .             |
  _____|_____  1
                            |                          __
            (-.5)           |      (.53)          FACTOR
                            |
                            |
                            |     . Anger
                            |
                    (-.37)  |
                            |
                            |
                            |
                            |
```

^aThe factor loadings for the eight emotions on the first and
second principal components extracted from the emotion summary
scores (i.e, the average intensity score for each emotion per
subject). $\underline{N}$ = 48.

^bFour points on the four axes are given for reference.

^cEPI = The Emotions Profile Index.

        Figure 6. Plot of the Factor Loadings for the 8 EPI^a

                   Emotions on Principal Components 1 and 2:

                   The Summary Emotion Scores^{b,c}

polarity exhibited by the other emotions. And, in addition, the positions of the polar emotions of surprise-anticipation and acceptance-disgust precede sad-joy which differs from the ordering found in Plutchik's (1980) similarity scaling solution.

One can conclude from these analyses that circumplexity can be found in varying degrees, from fairly good to absent, in the emotions rated in EMs. Thus, a circular ordering appears to be of some usefulness in representing the magnitude of correlation between emotion variables in EMs. However, there are deviations from perfect polarity and orthogonality [when Plutchik's (1980) model is used as the reference model] that must either be accounted for, or, failing this, one must conclude that an alternative circumplex model may be constructed to provide a better fit to the empirical relations between emotions in EMs. Pursuit of this would require additional research with larger samples and direct analyses of empirical relations between emotions.

CHAPTER V

DISCUSSION AND CONCLUSIONS

The Survey Characteristics of Early Memories

Comparison of the general content characteristics of EMs ob-

tained in the current study with those in the Kihlstrom and Harac-

kiewicz' (1982) research suggests that EMs for a college age group

do share structural similarities. Since only general features of EMs

were studied, little can be said about them. Five EM features, how-

ever, appear to warrant further discussion. These will now be

considered.

Mean EM age. An older mean EM age was observed in the present

study. The older age in the present study can probably be attributed

to the larger number of EMs requested of the current subjects, five

instead of the "earliest" in the previous research. It has long been

recognized that individuals can recollect very few memories from

childhood (Schachtel, 1947). This may reflect either developmental

processes (Schachtel, 1947; White & Pillemer, 1979), or it may simply

reflect a "decay" process for memories. Rubin (1982) has shown that

the number of memories recalled from one's past is a log-linear func-

tion of the age period from which the memories are requested. In

other words, the number of memories available from each period of life

decreases systematically as a function of time. Requesting subjects

to recall more than the "earliest" EM would logically seem to require that older EMs be expected in the sample.

Percentage of previous recall data. Reqesting more than 1 EM would seem to be a logical explanation for the differences observed with this variable as well. However, an additional psychological factor (i.e., separate from a memory "decay" account) may be implicated. Kihlstrom and Harackiewicz (1982) observed that approximately 93% of their EMs were previously recalled whereas only 76% were so rated in the present experiment. A decrease of 17% when 5 times as many EMs were requested does not seem an overly large difference. Yet, the difference between the percentages is highly significant statistically, z = 3.40 (p <.01). Perhaps the most reasonable interpretation to draw is that there is something especially memorable about the "earliest" EM as previous researchers have speculated (Adler, 1956; Olson, 1979). Only further research can determine what this might be. Again, however, the difference between the two studies (one of the "earliest" EM and one of five EMs) can probably be attributed to methodological differences.

The "self-seen" variable. The percentage of EMs rated as having this feature differed across the two studies (66.3% versus 58.1%; z = 1.75, p <.05). In addition, a sex difference was observed in the present study with women rating more of their EMs (73.3%) as having this quality than did the men (48.5%). It does not seem likely that methodological differences between studies can account for either of these differences. And, providing an account of the differences using data obtained in the experiment or in theories of

recollection is difficult.

The occurrence of the "self-seen" variable in autobiographical memories does, however, appear noteworthy. While upon first inspection the percentage of memories rated as having imagery of the physical self seemed overly large, this may not be the case.

Freud (1901/1965) noted that the "self-seen" variable appears to be unequivocal evidence that some type of imaginative elaboration of the memories had taken place. Nigro and Neisser (1983), drawing upon Bartlett's (1932) theory of recollection as "reconstruction" arrive at a similar conclusion. Such imagery cannot occur through perception. It must have been "added" to the memories after initial encoding into memory. These authors also provide empirical evidence that <u>older</u> and more <u>emotional</u> autobiographical memories are the ones most likely to have imagery of the physical self. These three <u>facts</u> (i.e., evidence for <u>imaginative elaboration,</u> <u>older</u> and more <u>emotional</u> memories more likely to have the feature) combined with a more general perspective on the nature of the recollective process can be used to understand this feature of EMs.

The perspective on recollective processes alluded to is known as the "generation-recognition" model of recall (Anderson & Bower, 1973; Norman & Bobrow, 1979; Reisser, in press; Reisser, Black, & Abelson, 1985, Reisser, Black, & Kalamarides, in press). According to this model, remembering autobiographical experiences takes place in at least two stages. The first stage involves the <u>generation</u> of a plausible "scenario" (Reisser, in press) or "description" (Norman & Bobrow, 1979) of the memory that is used to cue retrieval of

corresponding memories. The second stage involves recognition processes that evaluate the extent to which retrieved memories are the one(s) sought or not.

Reisser's studies (see references above) of the "strategies" that subjects use to generate initial retrieval scenarios for autobiographical events reveal that certain common types of "general" and "personal" knowledge and comprehension processes are involved. Basically, scenarios utilize the same knowledge and understanding processes involved in comprehending everyday events. Thus, when subjects attempt to retrieve a personal memory, they initially generate scenarios including the following types of information and knowledge: knowledge of actions, persons, events, places, and times. For example, when asked, "Where were you eight weeks ago on Saturday?", subjects may utilize their general knowledge of the months in the year to determine that 8 weeks ago was in July. Furthermore, they know from personal knowledge that in July they were on vacation visiting relatives. The specific relatives were "Uncle Jim" and "Aunt Sarah." This process of using general and specific knowledge continues in an iterative process that eventually provides a specific enough scenario with which to attempt recall of a specific event that Saturday.

It seems quite plausible that visual imagery of the self interacting with others in a specific place, in a specific way, and at a specific time, i.e., highly concrete detail, would emerge at some point in this iterative process of recollection. Furthermore, visual imagery may be quite functional for furthering recollection in at

least two ways. Bartlett (1932) noted that an image often guided

the recollective process and that subsequently retrieved detail was

used to "flesh out" the image. The image may further recollection

by being used as a specific cue for further memories (a "guiding" of

recall); and, as well, such an image may be useful in retaining

memory detail already retrieved as the process of recollection con-

tinues (Bartlett's "fleshing out" of the memory).

When autobiographical memory is viewed in this way, it seems

less unusual that visual imagery including the physical presence of

the self might occur. Furthermore, it does not really seem surprising

that subjects would incorporate this "self" imagery into their subse-

quent representations of the event. Having remembered something in

great detail it would only seem reasonable to retain as much of the

detail as one could.

One could go on to discuss the pitfalls of such imaginative

elaborations of memory--indeed, some researchers have begun to do so

(Loftus, 1979)--but I think this would miss the essential point.

Autobiographical memories are not about "objective events"; rather,

they are highly personal and often creative constructions that serve

as "anchors" for self-identity (McAdams, 1985) and self-appraisal.

A less common use of autobiographical memory entails the recollection

of the "facts." Given the more common use of autobiographical memory

we can marvel at how accurate it can be.

Finally, Nigro and Neisser's (1983) data make a great deal of

sense within the context of the explanation just given. Older

memories are often more difficult to recollect. Therefore, one would

expect subjects to utilize more elaborate retrieval processes to remember them. Emotional memories, in turn, may be the ones subjects expend the most effort and time to recollect. Thus, age and emotionality may be interacting with more generic features of autobiographical recollection (i.e., the use of scenarios, gradual reconstruction, iterative retrieval, etc.) to produce a higher incidence of the "self-seen" feature in EMs. Thus, the "self-seen" variable may not be so unusual after all. We may conclude with Nigro and Neisser (1983) that autobiographical recollection, rather than more restricted forms of memory, may be the best place to study the types of imaginative reconstructions so inherent in memory processes (noted long ago by Adler, 1956, 1969; Bartlett, 1932, Freud, 1901/1965) but seldom adequately addressed by current research.

"Screen memories." The data obtained suggest that Freud (1901/ 1965) made a perspicuous observation about EMs with the four qualities defining "screen memories." Such memories are not as banal as they might at first seem. When the content of such memories is coded for the presence of the eight EPI emotions they are not as neutral in affective content as subjects rate them to be. Subjects' "neutral" ratings are systematically related to the presence and intensity of emotions in EMs as can be seen from Table 10. Subjects who recall more "screen memories" report experiencing more negative affect and less positive affect in their current lives and in their memories. Since this type of EM has well-defined characteristics, further research certainly appears warranted on the psychological factors involved in their occurrence. One avenue to pursue in light of

Freud's (1901/1965) ideas might be to assess subjects' perceived levels of family conflict as indexed by Schwarz's (Schwarz & Zuroff, 1979; Schwarz & Getter, 1980) measuring instrument. Would subjects with higher levels of perceived family conflict also remember more "screen memories"?

The Emotional Content of Early Memories

The data gathered in Tables 7 and 8 represent the investigator's coding of the eight EPI emotions in EM content. As noted earlier, fear, surprise, joy, acceptance, and expectation are the most common emotions rated in EMs. What is also apparent in these tables is that multiple emotions are present in EMs. This has several implications for MDR studies and perhaps for an understanding of the significance of EMs for subjects at various times in their lives.

All but a few of the studies conducted on MDR, except for Bower's (1981) experiment 4, have examined the effects of two polar emotions upon memory. It was pointed out earlier that this conceptual convenience runs counter to the occurrence of multiple emotions in naturalistic affective states (Izard, 1971, 1972, 1977; Plutchik, 1980; Tompkins, 1962, 1963; Wessman & Ricks, 1966). It may also entail a loss of power to observe MDR effects especially when moderate to low intensity mood states are studied. Prior to the data collected in Table 7 and 8, however, the basis for these assertions lay in an extrapolation from naturalistic studies of affective states to emotional influences on memory. The present data provide direct empirical evidence that multiple emotions are encoded into the content of EMs. Therefore, subsequent studies ignoring the presence of

multiple emotions in memories will do so with a known risk (i.e., Type 1 errors in statistical judgments) that need not have been accepted.

The presence of multiple emotions in EMs may also be relevant to understanding the often changing significance of childhood memories for subjects (Olson, 1979). Previous studies have observed that subjects reconstruct their EMs somewhat differently when under varying emotional or motivational report conditions. For example, Burnell and Solomon (1964) observed that military recruits before and during basic training, a high "stress" condition, altered their EM content somewhat. Specifically, the content of the memories reported during basic training were rated as having more themes reflecting emotional dependency and aggressive impulses. Similarly, Tobin and Etigson (1968) found that aged individuals prior to and during institutionalization altered their EM content. With a similar aged non-institutionalized group as controls the hospitalized group were observed to recall their EMs with more thematic material reflecting "death" and "loss" during the time they were committed.

The presence of multiple emotions in EMs may help explain this phenomena as follows. Bower (1983; Gilligan & Bower, 1984) has shown that subjects in particular emotional states often make cognitive evaluations and judgments that are congruent with their emotional state. For example, happy and sad subjects made judgments of the same set of facial photographs in terms of the affective characteristics of the persons portrayed. Sad subjects "saw" many more sad features to the facial pictures while happy subjects "saw" many more

happy features. The same phenomena may be true of subjects recalling their EMs. However, rather than interpreting this as an emotionally-induced "distortion" of the reality of the events encoded, it may reflect instead an <u>alternative</u> evaluation based on emotional features ignored while in a polar emotional state. Surely the most significant events in a person's life are often amenable to different interpretation and evaluation at different times.

Some researchers prefer to interpret the revisions of personal history that can be obtained from subjects at different times as a reflection of a less benign process. Greenwald (1980), for example, attributes such revisions to the operation of a "totalitarian ego." Such an "ego" exercises "hegemonistic" control over the cognitive apparatus so as to distort the "reality" of the past. Perhaps such revisions need not <u>always</u> reflect so tendentious a process. Instead, they may reflect the influence of emotional states upon perception, cognition, and memory. It is less sensible to conclude that one emotional state is the "correct" or "real" perspective with which to view events than to perceive it as one of many valid and "real" alternatives (based on the multiple emotions which individuals are capable of experiencing). Indeed, such revisions of personal history may be indicative of adaptability rather than "maladaption." The capacity to perceive <u>new</u> features of one's past, to imaginatively "re-vision" (Hillman, 1975) one's present and future, may be the <u>most</u> adaptive capacity individuals possess. The effects of emotions on perception, thought, and memory may be central to this capacity.

Mood-Dependent Recall of Early Memories

The predictions of the current study, based upon the literature review in Chapter II, were largely supported by the results. Table 13 shows that MDR can be observed for EMs. Furthermore, the intensity of the mood state appears to moderate the degree of MDR observed (compare Table 11 and 13). Thus, it appears that MDR is non-linearly related to the intensity of mood states. Subjects at moderate moods show a different recall pattern than do subjects at more extreme mood intensities (see Figure 5).

The present study observed asymmetric MDR regardless of the method of classifying subjects. Therefore, the details of Hypothesis 5 were not supported. However, this may be due to the limited range of mood-intensities studied in the present experiment. Further research with a larger range of mood-intensities therefore appears warranted.

Studying a larger range of mood-intensities may also help clarify the "moderates" effect observed in Figure 5. It is not at all clear why subjects at more moderate moods would recall more sad EMs than "sad" subjects and fewer happy EMs than "sad" subjects. Possible reasons for the "moderate" effect may be the presence of more discrete negative emotions in moderate mood states as would be predicted by Plutchik's model (1980; see Figure 3). A second reason may be that there is an interaction between the distribution of emotions in memories and the distribution of emotions in naturally varying mood states. This would be the prediction of the encoding specificity principle account of MDR (Bower, 1981). Clearly, both

more data and more precise conceptualization are required to explain the pattern of recall observed in moderate mood states.

Circumplexity Between Emotions in Early Memories

Circumplexity was observed in 4 of the 6 analyses conducted on the emotions rated in EMs. The circumplexity observed in EM 5 was the most clear-cut evidence observed. Several assumptions were made in conducting these analyses and it is instructive to review them now in light of the data obtained on the survey characteristics of EMs.

The most basic assumption was that circumplexity exists between emotions in naturalistic mood states (Diener & Emmons, 1985; Plutchik, 1980). Second, it was assumed that memories of experiences would encode "features" pertaining to each discrete emotion. Third, it was assumed that such "features" could be identified and rated for "intensity" from the recall reports produced by the subjects. And fourth, it was assumed that subjects could reliably produce reports that would reflect the relation between each emotion as it naturally occurred at the time of the experience. Of these assumptions the fourth appears to be the most problematic in light of the data obtained in the present study.

The discussion of the "self-seen" variable presented earlier makes this clear. There can be little question that a large percentage of EMs have undergone some degree of imaginative elaboration. This elaboration theoretically would be expected to influence both the MDR and the circumplexity analyses. However, of the two types of analysis the latter would probably be most adversely affected.

It really matters little for MDR when emotions are encoded into memories. It is simply the congruency between current mood and affective quality of the memories which is predicted. However, the second and fourth assumptions stated above are critical for the circumplexity analyses. If the EM content contains some blending of emotions present during the initial experience and the blend present during later encodings, the resultant pattern might not reflect the relations between emotions in naturalistic affective states. In retrospect, EMs may not have been the best place to search for circumplexity between emotions.

The circumplex hypothesis constrains every relation observable in a matrix of correlations. Therefore, it is noteworthy that varying degrees of circumplexity were observed between emotions in EMs. Bower's (1981) research strategy for varying four emotions across encoding and retrieval conditions may be the only truly direct way to examine the implications of circumplexity between emotions upon MDR. In light of the present results such strenuous research effort appears definitely worthwhile.

Bower's (1981, 1983; Gilligan & Bower, 1984) research has demonstrated pervasive and extensive influences of emotions upon memory, thought, and perception. Further research should be conducted in a more orderly way taking into account the naturalistic relations between emotions in affective states. In addition, each discrete emotion may have different functional impact upon memory, cognition, and perception. Izard (1977), Plutchik (1980), and Tompkins (1962, 1963, 1979) have made many suggestions in this

regard. For example, a sad emotion may produce little mood-congruent learning because it often leads to the withdrawal of attention from the environment. However, joy, fear, and anger may have the opposite effect since each emotion is obviously related to what is going on in the environment around the subjects. The present study represents additional evidence consistent with these theories in that emotions are organized not only in naturalistic states but in memories as well.

General Conclusions

The current study adds to the growing body of research demonstrating the influence of emotions upon memory processes. Chapter I reviewed previous MDR research and concluded that variability across studies in the degree of MDR obtained might be attributable to failure to adequately conceptualize and experimentally control the natural parameters of emotions, i.e., their similarity, polarity, and intensity. The present study provided mixed evidence in support of this conclusion.

Specifically, MDR was observed with EMs but fully symmetric MDR could not be demonstrated. Furthermore, intensity was shown to moderate the degree of MDR. Given the range of mood intensities studied, the present research in retrospect can be seen as failing to achieve sufficient "power" with which to observe the hypothesized relationships. Finally, circumplexity was observed in varying degrees between emotions in EMs. Thus, a circumplex model of emotions was shown to be useful in understanding some of the variation between emotions in memories.

How might future research on emotional influences upon memory

and other cognitive processes proceed? Most generally, I think that future research must begin to consider the naturalistic expressions, characteristics, and relations among discrete emotions. Two principle areas for future research are as follows. Further data is required on the relations between emotions in naturalistic affective states. Plutchik's (1980) model is primarily based on similarity judgments between affective terms. Work conducted by Diener and Emmons (1985) indicates the more preferred strategy for studying emotional states. Unfortunately, however, this last research did not investigate the entire circumplex model. Therefore, a research study to accomplish this is currently underway.

The usefulness of a circumplex model for understanding MDR can only be fully tested by more directly studying the influence of several discrete emotions on memory. Since Bower (1981, experiment 4) has already studied the effects of joy, sadness, fear, and anger, an initial study in this direction might investigate the effects of disgust, acceptance, expectancy and surprise.

Aspects of the circumplex model can be tested in other ways as well. One of the predictions made from Figure 4 was that the blending between emotions in affective states will vary depending upon the intensity of each emotion present. This prediction is independent of MDR but also has implications for it. A preliminary test of this feature of the model can be made by assessing the varying relation between emotions as a function of emotional intensity. This could be studied both in the context of MDR and in natural mood states alone. Both of these studies are essential. The "moderates" effect

shown in Figure 5 may ultimately be unravelled by this type of
study.

The importance of determining the validity of Plutchik's (1980)
model for understanding the interaction between emotion intensity and
MDR (as well as other influences or emotions on behavior) was recently
highlighted in a series of "commentary" articles on a recent failure
to obtain mood-congruent learning (MCL). Hasher, Rose, Zacks, Shaft,
and Doren (1985) reported a failure to obtain MCL when a large sample
of "sub-clinically depressed" college subjects were studied. These
authors state that their subjects were chosen, despite their very
low levels of "depression" (probably more accurately identified as
moderately sad), because they assumed that 1) mood has an underlying
linear dimension of intensity, and 2) that mood-intensity is linearly
related to degree of MDR (Hasher et al., 1985).

Failing to find MCL with their subjects they retract both
assumptions in their reply article (Hasher, Zacks, Rose, & Doren,
1985). There is no basis for doubting a linear dimension of mood-
intensity in their data; only the latter of the two assumptions
is logically invalidated by their results. It must be stressed that
these investigators used unusual care in measuring the moods of their
subjects and they also made repeated mood measurements to ensure
that their subjects maintained their mildly sad mood levels through-
out the study. In other words, this was a carefully executed and
thorough study within the limits of what is currently known about
emotions.

The commentary articles on this study are similarly instructive.

Ellis (1985), Isen (1985), and Mayer and Bower (1985) offered a rich variety of speculations on why MCL was not observed. However, most of this was directed toward non-emotion factors that could increase the methodological precision of emotion-influence studies. In addition, Isen (1985) concluded that asymmetric MCL and MDR had been routinely observed, therefore it must be a systematic phenomena. Ellis (1985) speculated that emotional intensity moderated the degree of MDR but he could give no reasonable account of why this might be the case. Mayer and Bower (1985) offered a similar hypothesis about mood-intensity and they also noted that different induction procedures might produce differing combinations of emotions. However, no one suggested that emotion polarity, similarity, and intensity might be interactive dimensions of emotions moderating MDR and MCL. Instead, subject factors, variations in materials used, and interactions between materials and moods were offered as the primary accounts for MDR and MCL variability.

It seems to be more parsimonious to consider characteristics directly related to emotions as moderators of MDR and MCL, as was done in Chapter II, than to speculate about non-emotion factors. If emotion intensity modulates the similarity and polarity relations between discrete emotions in affective states, then a unified account of MDR and MCL variability may be possible. This would certainly be more valuable than the proliferation of non-emotion factors currently being suggested as accounts for variability across separate studies.

Several caveats and conclusions can be drawn from the present

study and the literature which has been reviewed. First, emotions

need to be more adequately conceptualized using the data available

from studies of the naturalistic expression of emotions (e.g., Diener

& Emmons, 1985; Ekman, 1982; Izard, 1971, 1972, 1977; Plutchik, 1980;

Tompkins, 1962, 1963, 1979). Emotions are not just the "evaluative

component" of cognitions. They are much more fundamental than this.

One of the more profitable ways to study the relation between

emotions and cognitive processes may be to recognize that they inter-

act temporally (Lewis, Sullivan, & Michalson, 1983). Such temporal

interactions may be understood quite directly through the use of

Tulving's (1983) "encoding specificity principle." This principle

provides a very broad generalization about the interaction between

encoding and retrieval processes. It may be worthwhile to see how

far this principle can go in explaining mood-cognition effects before

the introduction of alternative and less cohesive accounts.

Focusing upon the temporal integration of cognition and emotion

would be quite consistent with a current trend in personality and

motivational theory. Theorists are increasingly recognizing the need

to conceptualize their variables in dynamic-temporal rather than

static-atemporal terms (Atkinson, 1983; Atkinson & Birch, 1978;

Klinger, 1977; Martindale, 1982; McClelland, 1985). Pervin (1985)

has suggested that much of the recent trend toward "cognitive"

approaches to personality and motivation stems from a dissatisfaction

with "trait" approaches. Such approaches appear to do injustice to

the rich variability that can be observed in the actions of individ-

uals over time and across situations. However, at a theoretical

level cognitive-developmental approaches (Damon, 1985) are as static as "trait" models of behavior. Such models assume an inherent stability to cognitive processes within "stages." Transition between "stages" is said to occur; but, once achieved, subsequent variability in cognitive processes is neither expected or predicted. It is treated, perhaps inappropriately, as "measurement error."

The opposite would be true of a theory of personality and motivational processes conceptualized in dynamic-temporal terms. A suggestion toward this end was made earlier in the interpretation of the "self-seen" variable. If personality-motivation is conceptualized as an independent system of processes interacting over time with cognitive and memory processes, then there may be a true possibility for understanding the intricate and subtle changes in the behavior of individuals in different situations and at different times. A valuable source of data toward this end may be the "unique" (Greenwald, 1981) effects of emotions upon thought, perception, and memory.

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APPENDIX A

E.R. No. _____

Name: _____   Age:_____ Sex:_____ Date:___/___/___

Early Memories Recording Form *

In the space provided below please write out a description of your
earliest memory (or if you have already reported the earliest one,
then another early memory). Please think back to your childhood, going
as far back as you can possibly go, and then write a description of
this recollection in detail below. Please do not report something that
someone else has told you about. Only report a memory you are sure
you can remember yourself.

Please be reasonably complete in your recollection and write as legibly
as you are able. After you have finished, please go on to the next
task as directed by the person administering this study.

How old were you at the time of the event you remembered? Please estimate your age to the nearest birthday:

_____ years

How clear was the memory? Check one:

_____ Cloudy   _____ Clear   _____ Vivid

Is the memory you have described one that you just thought of on being asked, or is it one that you have thought of before? Check one:

_____ Remembered just now

_____ Thought of occasionally before

_____ Thought of often before

What was the feeling involved in the memory? Check one:

_____ Pleasant   _____ Neutral   _____ Unpleasant

More specifically, briefly describe the emotion(s) that were associated with the memory (for example, happiness, anger, or surprise):

_____

What specific sensory images did you experience while you were recalling the memory? Check each one that applies:

_____ Vision (seeing)   _____ Gustatory (taste)

_____ Audition (hearing)   _____ Olfactory (smell)

_____ Tactile (touch)   _____ Kinesthetic (movement)

If vision was involved, was the memory image in black-and-white or in color? Check one:

_____ Black-and-white   _____ Color

If vision was involved, did you see yourself in the memory, or did you see only what others were doing about you? Check one:

_____ Saw myself   _____ Saw others only

If you saw yourself, briefly describe what you saw yourself doing:

_____

_____

Please add any other comments that might be of interest regarding your earliest memory: _____

_____

_____

Thank you for your cooperation.

APPENDIX B

Early Memories Rating Form

Please answer the following questions about the early memories you
wrote down earlier in this study. The questions will require that
you look over your previous answers. Please take the time to do so.

1.) Most people can usually judge whether some things are more
meaningful and important to them than others. This is usually
true even in situations where all of the things being judged are
important in some way or another. Please make this judgment
about the five early memories you reported earlier. When you are
making your judgment, however, I would like you to be considering
how personally meaningful to you the recollected memories are
in terms of your current life interests, hopes, wishes and
feelings. When you make your judgment please keep in mind that
what is being judged is the overall feeling of meaningfulness
for you of the memories.

1. _____   2. _____   3. _____   4. _____   5. _____

(Most meaningful . . . . Less meaningful)

Please write the number of the early memory which belongs in each
numbered slot. The "number of the early memory" is at the top
of the sheet where the memory is written.

APPENDIX C

Introduction to the Early Memories Study: Consent Form

This study is about the earliest memories that people have of events, or experiences, in their lives. If you decide to participate in the study you will be asked to recall five (5) of the earliest memories you can recollect in your life. Your very first memory should be one of the memories you report. You will be asked to write a narrative description of each memory and to answer several questions about each recollection. All of these questions will be given in the form of a questionnaire, so you will be able to take as much time as you like in answering. Since this study is based on the assumption that each person's memory reflects the integrity of the person, several non-memory questionnaires will also be given to you to complete before and after the recollection portion of the study.

All of your written answers will be kept strictly confidential. Please feel free to answer these questions without inhibition. Your true feelings, thoughts, and memories can be expressed if you wish.

If you are willing to participate in this study, please sign your name and the date in the space provided below to indicate this willingness.

Name: _____   Date: _____

APPENDIX D

Coding Emotions in Early Childhood Memories:

A Coding Manual[1]

[1]This coding manual is based upon an earlier version developed by
Wynne and Plutchik (1974, unpublished manuscript).

Introduction

This manual provides guidelines for coding the presence and
intensity of eight basic emotions in Early Childhood Memories (ERs).
The emotions coded by this manual are drawn from the work of Robert
Plutchik (Emotions, New York: Harper & Row, 1980); and the present
manual is a revised version of the manual developed by Plutchik and
Wynne (1974, unpublished manuscript). The current manual adopts the
basic form and content of the previous manual and introduces changes
primarily designed to amplify and clarify material already present in
the first version.

Emotions can be described in several ways. The emotion of fear,
for example, can be described in subjective "feeling" terms like
fright, terror, etc. However, the emotion of fear can also be
described and amplified by terms referring to behavior (e.g., avoid-
ance, withdrawal, etc.), to functions (e.g., protection), and to
character traits (e.g., timid, shy, etc.). Plutchik (1980) has
argued a similar structural relationship underlies the relatedness
of these different "languages" of emotion.

The redundancy between these different languages of emotion can
facilitate the rating of emotions in ERs. Thus, while each of the
eight emotion coding scales provided below are identified by a sub-
jective "feeling" term, notice that each coding scale also includes
material related to each of the four different "languages" of emotions
just described. This means that it is not necessary for an ER to
contain an explicit reference to a subjective "feeling" term for an
emotion in order for that emotion to be identified and coded as
present. Evidence for the presence and intensity of an emotion should
be sought by using these four languages of emotion, not just be refer-
ence to subjective feeling terms. Priority, however, especially in
cases of doubt, should be given to subjective references.

The basic process of coding the ERs is as follows. First, deter-
mine whether an emotion is at all present. Second, if an emotion is
judged to be present, make a judgment concerning the intensity of the
emotion using a three-category scale: low, medium, and high. Third,
judge the intensity of the emotion as either high or low within the
category (low, medium, high) just previously mentioned, i.e., having
decided fear at a low intensity is present, make a further two-part
distinction, and decide whether it is a low level, low intensity
expression, or a high level, low intensity expression of fear. In
effect, you will have a seven-point scale for rating each emotion:
zero (0) = emotion is absent; one (1) = low, low intensity; two (2)
= high, low intensity; three (3) = low, medium intensity; four (4)
= high, medium intensity; five (5) = low, high intensity; and six (6)
= high, high intensity.

Only rate emotions experienced by the "hero" (i.e., the remem-
berer) of the ER. Intensity judgments are to be made using the

underlying intensity scale implied in the language of the memory (e.g., irritated, angry, and enraged imply an increasing level of intensity), and by the underlying scale implied in the language describing the actions and events depicted (e.g., "I pushed him," "I hit him in the face," and "I beat him senseless" imply an increasing level of intensity to the emotion of anger).

Qualifications of actions, feelings, and events within the ER can be used to judge intensity as well (e.g., "I swore at him. It must have really scared him because he looked frightened."); however, qualifications of the <u>entire</u> ER should not be used in rating intensity of the emotional (e.g., "this is a very vague memory," when given as a qualification, for example, to the immediately preceding example, should not be used to decrease an intensity rating). Notice that reference to feelings, behaviors, functions, and traits are all used in determining the presence and intensity of emotion.

To simplify the rating task you will be asked to rate sets of ERs for one emotion (and only one) at a time. Do not try to recall your previous ratings when judging the presence and intensity of suceeding emotions. Emotions can occur singly or in combinations. Therefore, rating one emotion at a time should facilitate more accurate coding of any and all emotions present in the ER. You may notice that some statements imply multiple emotions, e.g., "I was laying on my bed when suddenly the door burst open, my brother walked in wearing a frightening halloween costume, and I was so happy to see him because he had been away so long, that I didn't yell at him for scaring me." This ER could appropriately be scored for surprise-startle, fear, and joy (and, if further information is given, perhaps even sadness-deprivation). Please note, however, that your task when coding this ER is to consider only the single emotion you are presently coding for. Do not be concerned with whether other emotions are present; you will have a chance to exercise this sensitivity to the presence of multiple emotions when each emotion is coded in turn.

THE ANTICIPATION SCALE

0	1	2	3	4	5	6
absent	very slightly	slightly	fairly	strongly	very strongly	extremely

Scoring Criteria

1.) Anticipation is indicated by feelings of expectancy, anticipation, curiosity, alertness, inquisitiveness, and vigilance (this is a curious alertness, not a fearful alertness): behaviorally this emotion is indicated by exploring, looking, listening, touching (i.e., sensory activity aimed at evaluating, locating and identifying things) etc.; functionally, this emotion is generally indicated by exploratory behavior; in the language of traits, anticipation is suggested by controlled behavior.

2.) Be sure to distinguish anticipatory reactions to events which primarily indicate fearfulness (e.g., anticipating a fearful event) from the basic emotion of anticipation which is more directly concerned with anticipatory inquisitiveness and exploration. Score the former for fear, and the latter for anticipation. Exploration to alleviate a fear is scored.

3.) Score incidents indicating an active desire or behavior directed toward getting to know one's current environment (or past or future, as well).

4.) Score incidents evidencing feelings of curiosity and desire to explore and manipulate things.

5.) Often anticipation is indicated in statements emphasizing the sensory aspects of events (e.g., loudness, bright, shining colors, as in "There was a loud noise, I couldn't figure it out," or "The bright shining colors were fascinating.").

6.) New play experiences imply exploration or inquisitiveness.

7.) Amazement is a combination of surprise and exploration. The surprise component is stronger, therefore, when assigning an intensity score be sure to assign a lower score for the anticipation component (e.g., an amazement response might be assigned a four (4) on the surprise dimension and a two (2) on the anticipation dimension to rate this differential contribution to these two basic emotions to the experience of "amazement.").

IF ANTICIPATION IS ABSENT, ASSIGN A SCORE OF ZERO (0).

LOW INTENSITY ANTICIPATION (score 1 or 2).

Seeking new experiences: "It was a very hot, sunny day, and I was
    searching for something to do."

Achievement: "In the first grade, I remember learning how to print
    and draw, I became a very good painter and won a contest at a
    state fair for printing and drawing." (Comment: this involved
    a new learning experience which implies the willingness to
    explore a new activity, the score is for this exploration.)

Sensory Activity: "My favorite glass had orange juice in it, and it
    had a bunch of folds at the bottom too"(a picture of the glass
    was drawn to accompany the description). (Comment: this
    description indicates a strong sensory attraction to the object
    described, and this visual attraction results in a detailed
    visual knowledge of the object which implies visual sensory
    exploration of the object.)

Work Memories: "Helping my father fix the car before a long journey."
    (Comment: fixing an object requires prior diagnostic assessment
    of the problem which is a type of exploratory behavior.)

MEDIUM INTENSITY ANTICIPATION (score 3 or 4)

Exploring Things: "The earliest memory I can recall is rummaging
    through my grandmother's attic. I recall finding many inter-
    esting things such as an old army uniform, ice-skates, and
    other objects." (Comment: finding implies prior search, and
    indeed the person reports "rummaging.")

Sensory Activity: "I remember a great deal of sunshine in the room.
    Either my sister's clothes or the bedspread was pink. I also
    remember yellow pastels--perhaps the sunlight. I don't remember
    any specific emotion except sunlight and a definite aura of
    pastel colors." (Comment: scored for visual exploration of
    details)

Work Memory: "I also remember being able to cook and help with the
    dishes around this time, something I did frequently." (Comment:
    both activities imply ordered, and hence anticipated sequences
    of acts; furthermore, the qualify "frequently" suggests this
    was a routine involvement in these activities.)

Manipulation: "Making paper airplanes. We folded them, about a
    hundred of them, and I can still see them spread out on the
    couch." (Comment: This activity requires attention to detail,
    i.e., exploration of the materials and the goal; while the
    number produced gives a sense of the extended nature of this
    attention.)

Expectancy: "I remember hoping the baby would be a girl. My father
    called the doctor who arrived after what seemed an interminable
    delay."

MEDIUM INTENSITY ANTICIPATION (continued)

Curiosity: "I remember asking my parents about animals, and cars, and all sorts of things, all of the time." (Comment: The activity of questioning and its frequency are the basis for scoring this memory.)

Fascination: "There was a bridge over the stream which seemed quite deep. This fascinated me, for there seemed to be caves along the sides of the stream." (Comment: Fascination, like amazement, involves both expectancy and surprise. The detailed description of a new environment implies visual exploration.)

HIGH INTENSITY ANTICIPATION (score 5 or 6)

Fascination: "I also remember teacher giving me my first science book (astronomy) which caught my interest and kept me reading one astronomy book after another that year and for many a year thereafter."

Excitement: "He pushed me in the cart way across town and we went to some drug store. I was so excited at the time." (Comment: this activity is scored as exploratory, the intensity judgment is based on the qualifying statement made about excitement.)

Sensory Activity: "I named the colors of the store fronts, automobiles and merchandise as we passed. This became a standard activity during walks. My parents pointing to items and my labeling it with its colors. There were numerous people and much excitement during this time." (Comment: This is being scored for the exploration of the environment described, the new learning involved, and the qualifier about the intensity of the experience.)

Note: Cognitive-processing such as worry about the future, or a specific events, planning, etc. imply anticipation. Be sure to distinguish fearful cognitive-processing from the type of exploratory activity which is being scored as anticipation. Only score for this emotion when the cognitive-processing which is being described involves a clear reference to exploratory action of some kind, e.g., trying to resolve an issue, deal with a problem, etc. Otherwise, examine the extent to which emotions such as fear and sadness might not be more appropriate emotional influences to consider.

THE DISGUST SCALE

0	1	2	3	4	5	6
absent	very slightly	slightly	fairly	strongly	very strongly	extremely

Scoring Criteria

1.) Disgust is indicated by feelings of revulsion, loathing, sarcasm, dislike, aversion, intolerance, and often prejudice; behaviorally by avoiding contact with, moving away from, lying (by rejecting the truth); functionally by tendencies to reject people, places, events, or things; and by character traits of dogmatism, disbelief, and distrust.

2.) Avoidance due to fear is not scored for disgust.

3.) Often indicated by avoiding new experiences. And, by tendencies to prejudice individuals or events in negative ways.

4.) Bitterness is partly disgust and partly anger.

5.) Shame is a combination of disgust and fear.

6.) Scorn, indignation, resentment, and contempt are combinations of disgust and fear.

7.) Feeling betrayed is a combination of anger, disgust, and fear.

8.) Humiliation is a combination of sadness, anger, and disgust.

IF DISGUST IS ABSENT, THE SCORE IS ZERO (0)

LOW INTENSITY DISGUST (score 1 or 2)

Rejecting People: "The girl next door called to me to play with her on her swings. I pretended I didn't hear her and ran onto the porch."

Avoiding New Experiences: "Thinking that I never wanted to grow up because things were going so well."

Boredom: "When I was four years old I was asked to be a mascot at a high school graduation. I wore a white evening gown and fell half-asleep part way through the program."

MEDIUM INTENSITY DISGUST (score 3 or 4)

Rejecting Situations: "I decided not to cry from pain and consequently refused to say I was sorry. My friends told me not to walk on thin ice but I did anyway."

Aversion: "I remember feeling an uneasiness as she washed the vaginal

area. I used to try to avoid letting her touch me there."

Prejudging Events Negatively: "It was my longest stay away from home in a strange environment which I just knew I wasn't going to like."

Intolerance: "When I was four years old, my older sister was in a hospital. She came home with all her hair shaved off. I laughed at her."

Dislike: "I didn't like my teacher."

HIGH INTENSITY DISGUST (score 5 or 6)

Disgust: "My uncle forcing me to eat lima beans (which I disliked intensely) in order that we go to a parade. Since we were in a restaurant at that time, I ate them, and promptly vomited. The time I ate cheese and grapes and vomited. I was a very ugly child."

Loathing: "He had a beard and I loathed his kissing me on the forehead."

THE SADNESS SCALE

0	1	2	3	4	5	6
absent	very slightly	slightly	fairly	strongly	very strongly	extremely

Scoring Criteria

1.) Sadness is indicated by the individuals' reports of feelings of sadness, grief, loss, depression, mourning, melancholy, sorrow, nostalgia, distress, pessimism, sentimentality, detachment, dejection, and loneliness; behaviorally when the individual cries, acts distressed, attempts to withdraw into self, gives, up, etc.; functionally sadness is expressed in efforts to reintegrate, i.e., to reestablish contact with the lost, or unattained (unattainable) object; in the language of traits, sadness is indicated by depression, moodiness (sad), and pessimism.

2.) Common events referred to are getting lost with an emphasis on sorrow rather than fear; if no affect is mentioned the Early recollection should be scored low. Indicates by states of deprivation: tiredness, hunger, disability. Reference to unfair treatment, injustice, etc.

3.) Jealousy should be scored partially sadness (deprivation), partially anger (destruction).

4.) Embarassment is sadness and surprise.

IF SADNESS (DEPRIVATION) IS ABSENT, THE SCORE IS ZERO (0)

LOW INTENSITY SADNESS (score 1 or 2)

Getting Lost: "I got lost from my mother. I couldn't find her and finally a lady brought me to the police station."

Being Sent to Bed: "I was sent out of the room and up to bed."

MEDIUM INTENSITY SADNESS (score 3 or 4)

Loss of Desired Object: "He tied the balloon on my finger, but somehow it got away. I was miserable the rest of the day."

Deprived of Desired Object: "My uncle gave everyone a piece of chewing gum for eating their spinach, but he wouldn't give me any until I ate mine."

Melancholy: "I became very sad listening to the violin music."

Disappointment: "We dug until we were tired, but found no treasure. I was tired and disappointed."

Sadness: "I somehow remember feeling depressed about being alone and inside on a fine summer day. Because I was small I was always getting beaten up."

HIGH INTENSITY SADNESS (score 5 or 6)

Loneliness: "Later I heard he had been killed in an auto accident. I felt very horrible but I always cherished his ring."

Grief: "Some boy scratched the doll's eyes out. I don't think I have ever again been so heartbroken."

Getting Lost: "I got lost from my family and I was so unhappy. I thought I'd never find them again."

Loss: "My mother took me and left me at school. I thought she would never come back for me."

THE JOY SCALE

0	1	2	3	4	5	6
absent	very slightly	slightly	fairly	strongly	very strongly	extremely

Scoring Criteria

1.) Joy is indicated by the individuals' reports of feelings of happiness, joy, pleasure, sexual gratification, passion, delight, sensuality, love, ecstasy (more mildly by contentment, calmness, relief) and often by serenity; behaviorally, joy is often indicated by laughter, amusement, giving, kindness, sympathy, pride, sexual attraction (and behavior); functionally, joy is indicated at the most abstract level by the idea of reproduction, which implies courting, mating, etc., and the overall "thrust" of the emotion is for sensual contact and the reproduction of self. (The logic here is illustrated in altruistic behavior where the individual is much more likely to engage in altruistic acts when feeling joyful, fulfilled, etc., in effect reproducing itself in the person helped.) In the language of traits, joy is indicated by gregariousness, altruism, confidence, pride, and optimism.

2.) If feelings of joy, happiness, satisfaction, etc. occur in the context of food, receiving gifts, then the memory should be scored on the acceptance-incorporation scale. Activities which indirectly refer to acceptance-incorporation, e.g., "We had a great time when we went shopping at the grocery store" do receive a score on the joy scale.

IF JOY IS ABSENT, THE SCORE IS ZERO (0)

LOW INTENSITY JOY (score 1 or 2)

Warm Ties: "I loved being allowed to go to the hospital when he was brought home and being able to hold him."

Contentment: "My grandmother made all new clothes for it and I was quite content."

MEDIUM INTENSITY JOY (score 3 or 4)

Warm Ties: "I loved being allowed to go to the hospital when he was brought home and being able to hold him."

Pleasure: "He just walked in and kissed my mother and then he came over to my twin's and my crib and picked us up. Then we had dinner. I felt very happy and we were all in a good mood."

Satisfaction: "It gave me satisfaction to know I could win the battles."

Happiness: "A girl taking me to my first halloween party and the wonderful time we had."

Sensuality: "I had a means of achieving sexual enjoyment by placing my hand under my penis and moving my behind up and down."

HIGH INTENSITY JOY (score 5 or 6)

Joy: "I loved the snow and enjoyed playing in it immensely."

Ecstasy: "It was an absolutely thrilling experience."

THE SURPRISE-STARTLE SCALE

0	1	2	3	4	5	6
absent	very slightly	slightly	fairly	strongly	very strongly	extremely

Scoring Criteria

1.) Surprise is indicated by reference to feelings of wonder, amazement, astonishment, puzzlement, distraction, strangeness, shock, etc.; behaviorally, it is indicated by orienting attention towards the object eliciting the emotion and often ceasing other activity (note: orienting away from, moving away from, escaping the thing which elicited the surprise can occur and these responses are more properly conceptualized as subsequent to the initial surprise, see Criteria 2 below); functionally, this emotion is the orienting response, a transitory behavior resulting from some unexpected object, or experience. In the language of traits, this emotion is dyscontrolled behavior (e.g., hysteria).

2.) In general the emotion of surprise is followed by some other form of emotional behavior such as joy, fear, anger, etc., which simply reflect a specific evaluation of the object.

3.) Awe is a combination of fear and surprise.

4.) Embarrassment is surprise and sadness.

5.) Disappointment is surprise and sadness.

6.) "Shock" often refers to surprise and disgust, fear, or anger.

7.) Revulsion often refers to surprise and disgust.

8.) Outrage often refers to surprise and anger.

9.) Surprise is often indicated by the following emotion terms: alert, fascination, confusion, wonderment, bewilderment, etc.

10.) Surprise is often indicated in the narrative style used to describe an event. This is a style characterized by lack of coherence and cohesion. For example, continuity, predictableness, and narrative "telegraphing" are missing. "We were drawing pictures when this boy next to me pissed in his pants." The conjunction "and" conjoins events that are spatailly and temporally contiguous but does not reflect the narrator's cognitive integration of the events.

11.) Surprise is often indicated by sudden alterations in the perception of self and others, e.g., "My sister and I felt like grown-ups when it happened."

IF SURPRISE-STARTLE IS ABSENT, THE SCORE IS ZERO (0)

LOW INTENSITY SURPRISE (score 1 or 2)

Mild Surprise: "My first day at school was very interesting and I was surprised to find that some children were crying."

Mild Confusion: "I was playing with a ball, and there seemed to be all sorts of other kids around, too, all doing something or other."

MILD INTENSITY SURPRISE (score 3 or 4)

Puzzlement: "I walked back to the car in puzzlement."

Confusion: "I remember how confused I was as to what the big mechanical contraption would be able to do."

Wonder: "I looked over the pantry door and wondered why the servant signal did not work."

Amazement: In amazement I put my hands on my head and looked to the ground and she took my picture.

HIGH INTENSITY SURPRISE (score 5 or 6)

Astonishment: "I can't help remembering how shocked I was the first time I saw her. All of a sudden a pedestrian ran up and pushed me out of the way of the car."

Awe: "I walked around through the debris and was awed at all the damage."

THE ANGER SCALE

0	1	2	3	4	5	6
absent	very slightly	slightly	fairly	strongly	very strongly	extremely

Scoring Criteria

1.) Anger is indicated when the individual reports feelings of anger, hostility, frustration, irritation, etc.; behaviorally, when the individual engages in behaviors such as hitting, pushing, yelling, rough and tumble play, etc.; functionally, by destroying, breaking, harming; and by character traits of punitiveness, aggressiveness and belligerence.

2.) Pride, especially at the expense of others, is partially anger and partially acceptance.

3.) Bitterness toward others is partially anger and partially disgust, or rejection.

4.) Anger is often indicated by references to such affects as: irritation, annoyance, discomfort, and defiance.

5.) Yelling, when done in happy excitement is <u>not</u> scored.

6.) Conventional activities (e.g., games, play, etc.) when involving active, strenuous, physical effort, or activity (e.g., wrestling, chasing, jumping on something) <u>are</u> scored for anger.

7.) Actions engaged in by the hero which do not appear to willfully or intentionally involve destruction, but do have this result, especially through carelessness, <u>are</u> scored. The idea is to score strongly assertive and <u>physically</u> strenuous acts as having the quality of aggressiveness.

8.) Score for the presence of this emotion even if the overall story, or the ending, imply a different emotion is involved as well.

IF ANGER IS ABSENT, OR NOT PRESENT, THE SCORE IS ZERO (0)

LOW INTENSITY ANGER (score 1 or 2)

Annoyance: "They kept looking at me, and I was annoyed at them."

Irritation: "I would become very irritable when awakened from sleep."

MEDIUM INTENSITY ANGER (score 3 or 4)

Attacking People: "When I was about five years old, my sister and I were fighting in a big chair. I knocked her out of the chair and she hit her head on the radiator."

Hostility: "I remember fighting with my sister because I thought my mother liked her better."

Frustration: "I was unable to throw or catch the ball with any accuracy. I had tried everything, but it was impossible because I was so uncoordinated."

HIGH INTENSITY ANGER (score 5 or 6)

Destroying Things: "I threw my bottle on the street and smashed it to pieces."

Frustration: "I would get angry at somebody. I would bang my head against the wall and continue until I got my way. I had been relegated to the seat upon her birth and I deeply resented it."

Rage: "He took my doll and I was so furious I kicked him."

THE FEAR SCALE

0	1	2	3	4	5	6
absent	very slightly	slightly	fairly	strongly	very strongly	extremely

Scoring Criteria

1.) Fear is indicated when the individual reports subjective feelings of fear; behaviorally, when the individual engages in escape or avoidance behavior; functionally, by efforts to protect oneself or others; and by character traits of timidity.

2.) Common events referred to are painful events, or to the experiencing of pain, discomfort or injury.

3.) Often indicated by reports of feelings of fear, anxiety, panic, or apprehension.

4.) Fear is indicated by reference to such related emotion terms as shyness, social inhibition, lack of assertiveness, anticipation of fearful or frightening events, humiliation, terror, obedience (when unwilling), or guilty ruminations.

5.) Often indicated in stories of getting lost, or of being left alone, especially when the emphasis or focus of the narration is upon feelings of fear, panic, apprehension, etc., instead of upon sorrow.

6.) Guilt is partly joy and partly fear.

7.) Awe is partly fear and partly surprise.

IF FEAR IS ABSENT, OR NOT PRESENT, THE SCORE IS ZERO (0)

LOW INTENSITY FEAR (score 1 or 2)

Painful Events: "I fell down and hurt my knee."

Timidity: "Once I went to the bathroom in my pants because I was too shy to ask to go the girls' room." "Besides, I was too afraid of the toilet because it made so much noise when it flushed."

MEDIUM INTENSITY FEAR (score 3 or 4)

Painful Events: "I remember lying on my bed crying after being punished."

Shame: "The teacher rebuked me sternly and I felt angry and upset."

Fears: "Waking up after an operation and feeling the weight of both casts on my legs. I was frightened."

Embarrassment: "Finally my father insisted I remove the roll from my mouth and when I did the blood rushed down from my mouth. I was pretty embarrassed."

Fleeing: "I remember being afraid of the waves, running away each time one would break."

HIGH INTENSITY FEAR (score 5 or 6)

Humiliation: "I managed to fall over backwards and land on my head, and everyone around laughted. The headache was nothing compared to the humiliation I felt."

Terror: "When I was very small, about two, I vaguely remember my mother hurriedly picking me up and carrying me into a closet and turning out the light; we were both standing in pitch darkness and I was very frightened."

Apprenehsion: "I can remember looking down under the sheets and seeing all sorts of crazy animals and then screaming because I thought they were going to hurt me."

Panic: "I remember being covered with wasps, and being almost hysterical with fear."

THE ACCEPTANCE SCALE

0	1	2	3	4	5	6
absent	very slightly	slightly	fairly	strongly	very strongly	extremely

Scoring Criteria

1.) Acceptance is indicated when the individual reports feelings of acceptance, trust, agreeableness, or linking; behaviorally, when the individual engages in affiliative, friendly actions toward another person, or thing (e.g., caring, soothing, comforting, hugging, grooming and physical care for another); functionally, it is indicated by trust, and incorporation into one's life, feeling, thought, and most fundamentally into one's body (e.g., eating, swallowing, etc.); in the language of traits, acceptance and incorporation are indicated by acquisitiveness, receptivity, cooperativeness, and at the extreme by avarice, gluttony, passive compliance.

2.) Acceptance is often implied in interpersonal acts (make-believe play, family outings, conjoint work, etc.) which presume, or are psychologically predicated upon, the presence of conjointly negotiated or established perspectives on an event or activity. For example, in make-believe play, one person might state, "You be the cowboy, and I'll be the Indian," with the respondent replying, "Bang, I just shot you with my colt 45." The respondent must have accepted the first person's basic psychological perspective upon the ensuing activities for the reply to be interpreted and understood correctly. Joint play implies a medium level intensity score of acceptance. Single play implies a lower level of intensity, unless other information indicates otherwise.

3.) Common events often scoreable as acceptance refer to eating, receiving gifts, affection, accepting favors, and by reference to concern for other's or one's own physical, or emotional status.

4.) Acceptance is often indicated by reference to being with one's family or friends, or by seeking group membership, or cohesiveness; in general, by reference to the desire to be "with" people.

5.) Cooperation between persons, or sharing with others, is often indicative of acceptance. Note, reference to specific individuals often implies joy and acceptance.

6.) Acceptance should be distinguished from joy by the overall "thrust" of the experience. Acceptance involves an "inward movement" of incorporation. Joy-gregariousness usually involves a more "outward" oriented thrust to the experience which is aimed at making contact with the object of the joy.

7.) Acquiescence often indicates acceptance.

8.) Feeling honored by others indicates acceptance.

9.) Stealing implies a medium level acceptance of the stolen object.

10.) Touching another implies a medium level of acceptance.

11.) Friendship implies a medium level of acceptance of the other who is the friend, especially if friendly <u>actions</u> occur.

<u>IF INCORPORATION IS ABSENT, THE SCORE IS ZERO (0)</u>

<u>LOW INTENSITY INCORPORATION</u> (score 1 or 2)

Accepting People: "There was a fat old man who slept in the bunk above me and who used to tell very nice stories./ ". . . my grandfather helping me put on my shoes."

Oral Intake of Food: "Whenever I went to the corner butcher shop I would get a piece of bologna if I could spell it out."

Acceptance: "I remember being given a puppy."

<u>MEDIUM INTENSITY ACCEPTANCE</u> (score 3 or 4)

Receiving Gifts: "She was very nice and brought them down to our apartment. I felt very happy that she had brought us a present."

Liking People: "I also developed my first close relationship with a boy my age playing cowboy and Indian games./ I wanted to be her friend."

Incorporation: "I took the best care of it I could because it was the first animal I could call mine."

Acquiescence: "Every morning she would kiss us and make a big fuss about us."

Admission: "My teacher took me over to some of the other girls in my class and that day I met one of my closest friends."

Receptivity: "I had three imaginary friends I would have long conversations with them and really believed they were real."

HIGH INTENSITY ACCEPTANCE (score 5 or 6)

Oral Intake of Food: "My mother gave me a piece of chocolate cake. I remember cake as the best one she ever made."

Receiving Gifts: "My grandmother called me to say a friend was at the back door. I opened the door and saw my father, a true friend with a brand new bike for me."

Covetousness: "As I got involved in the game, I decided I wanted all the marbles that everyone had."

Gluttony: "The table was so full of food I remember eating and eating until I was so stuffed that I could hardly move."

APPENDIX E

CODED AFFECT SUMMARY SHEET

Subject no: _____

ER 1		ER 2		ER 3	
1.) Anger	____	Anger	____	Anger	____
2.) Fear	____	Fear	____	Fear	____
3.) Surprise	____	Surprise	____	Surprise	____
4.) Expectancy	____	Expectancy	____	Expectancy	____
5.) Disgust	____	Disgust	____	Disgust	____
6.) Acceptance	____	Acceptance	____	Acceptance	____
7.) Joy	____	Joy	____	Joy	____
8.) Sad	____	Sad	____	Sad	____

ER 4		ER 5	
Anger	____	Anger	____
Fear	____	Fear	____
Surprise	____	Surprise	____
Expectancy	____	Expectancy	____
Disgust	____	Disgust	____
Acceptance	____	Acceptance	____
Joy	____	Joy	____
Sad	____	Sad	____

$\overline{X}$ Affect Score

1.) Anger	____	9.) Sum Pos. Affect (4,5,7)	____
2.) Fear	____	10.) Sum Neg. Affect (1,2,3,5,8)	____
3.) Surprise	____	11.) Sum Affect Score (1-8)	____
4.) Expectancy	____	12.) Score 9/11 (ratio pos.)	____
5.) Disgust	____		
6.) Acceptance	____		
7.) Joy	____		
8.) Sad	____		

APPENDIX F

On Estimating the Variation From the Empirical Matrix of
Correlations That is Used in the Circumplex Analysis

The simple ratio of the variation of the rho-estimates divided
by the variation of the rho-estimates plus the Mean Squared Residual
(MSR) can be used to estimate the variation from the empirical matrix
which is used in the circumplex analysis. The MSR = Sum $(r - r_c)^2$
where r refers to each of the 28 empirical correlations and r_c refers
to each of the rho-estimates. Since the four rho-estimates are
entered into the 8 x 8 theoretical matrix given earlier in Table 3,
the latter can be used to determine which rho-estimate is subtracted
from each empirical r.

The total variation in the empirical matrix of correlations is
given by: Sum $(r - \bar{r}^2)$. This variance can be analytically partitioned
into two independent sources of variation each of which can be esti-
mated by the MSR and the variance of the rho-estimates about their own
mean value. The empirical $\bar{r}$ and the $\bar{r}_c$ are equivalent since the rho's
are estimated from the empirical matrix. Therefore, the variance of
the rho's is predicted variation resulting from circumplexity in the
matrix. However, the MSR is the deviation of the empirical correla-
tions from the rho-estimates. The MSR is, therefore, a direct func-
tion of the extent of departure between the values in the empirical
matrix and the matrix of rho-estimates. In effect it "indexes" how
well the rho-matrix fits the actual empirical correlation matrix.

With this in mind it is possible to demonstrate that the sum of
the MSR and the variance of the rho's is equal to the total variation
in the empirical matrix. The total variation in the empirical matrix
can be partitioned into two components as follows:

$$\Sigma(r = \bar{r})^2 = [(r - r_c) - (r_c - \bar{r})]^2.$$

The first component on the left side of the equation is the MSR while
the second component is the variation of the rho's around the empir-
ical mean r. The latter refers, of course, to variation created by
circumplexity in the matrix. Then:

$$\text{Sum } (r - r_c)^2 + (r_c^2 - \bar{r}) - 2(r - r_c)(r_c - \bar{r}) = \text{Sum } (r - r_c)^2$$
$$+ \text{Sum } (r_c^2 - \bar{r})^2.$$

Thus, the total variation in the empirical matrix can be estimated by
the MSR plus the variance of the rho's around their own mean value.
Then the ratio given earlier estimates the variation from the empir-
ical matrix which is used in the circumplex analysis based on rho-
estimates.

APPROVAL SHEET

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The final copies have been examined by the director of the dissertation and the signature which appears below verifies the fact that any necessary changes have been incorporated and that the dissertation is now given final approval by the Committee with reference to content and form.

The dissertation is therefore accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

12/3/85
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