False Memory Production: Effects of Self-Consistent

False Information and Motivated Cognition

by

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Dissertation submitted to the Faculty of the

Virginia Polytechnic Institute and State University
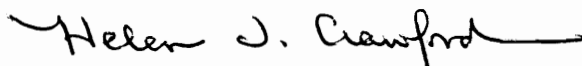
in partial fulfillment of the requirements

for the degree of
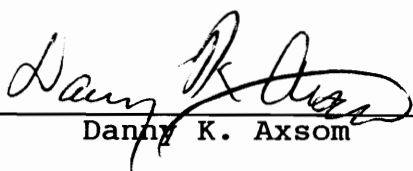
DOCTOR OF PHILOSOPHY

IN

PSYCHOLOGY
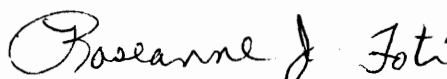
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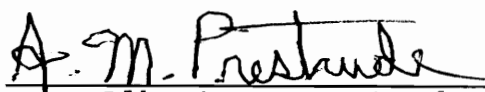

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November 5, 1996

Blacksburg, Virginia

Key words: Self-Schema, Memory, Motivated Cognition, False
            Memory, Self-Consistency, Self-Verification

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(ABSTRACT)

Remembrance of one's personal past and the development
of false memories have recently received intense public
scrutiny. Based upon self-schema (Markus, 1977) and self-
verification (Swann, 1987) theories, two studies were
conducted to investigate the hypothesis that a self-schema
guides cognitive processing of self-relevant information and
thereby influences the construction of a memory that
includes false information, particularly more so if this
information is self-schema consistent than inconsistent.
Study 2 also investigated the hypothesis that the cognitive
processing goal of understanding a negative outcome
(motivated cognition) would interact with self-consistent
expectations to enhance the likelihood that a false memory
would be created. Self-schematic Type A and Type B
individuals (only self-schematic Type A individuals
participated in Study 2) participated in a team problem
solving task (the to-be-remembered event) and returned a
week later for a "questionnaire" session during which a
narrative was read that contained self-consistent or self-
discrepant false information. In both studies, chi-square

analyses showed participants given self-consistent false information were more likely to report this information on a recall and a recognition test than were participants given self-discrepant false information.

Study 2 included team performance feedback (failure or neutral), which was presented just before participants read the narrative containing the false information. The purpose of this procedure was to assess the moderating effect of motivated cognitive processes on the acceptance of self-consistent false information on memory. A loglinear analysis provided confirmation for the expected interaction. The following pattern was obtained for false recall and false self-description (description of team problem solving behavior using the false information trait adjectives): Consistent/failure > Consistent/neutral > Discrepant/neutral = Discrepant/failure. Unexpectedly, this pattern was not obtained on the recognition test data.

These findings expand current understanding of processes that contribute to the production of a false memory and extend the traditional, postevent false information paradigm. The results are discussed in the context of the false memory debate and future research directions are noted.

ACKNOWLEDGEMENTS

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> Herein lies a difficulty in any
> autobiographical [memory]. . . it is a story
> of oneself in the past, read in the light of
> one's present self. There is much
> supplementary inference--often erroneous
> inference--wherein "must have been"
> masquerades as "was so." (Morgan, 1930/1961,
> p. 237)

Remembrance of one's personal past in the context of
childhood sexual abuse has recently received intense public
attention and been the subject of legislation as well. Some
states, including Virginia, have changed their statutes of
limitations to allow persons diagnosed with repressed
memories of sexual abuse to file lawsuits against alleged
sex offenders long after and sometimes decades after the
alleged offense. Indeed, the Virginia state constitution
was recently amended for the purpose of facilitating the
enactment of provisions to expand the scope of such
legislation (Virginia Trial Lawyers Association, 1995).
    Cognitive and clinical psychologists (e.g., Coleman,
1992; Haaken & Schlaps, 1991; Lindsay & Read, 1994; Loftus,
1993) have observed there has been an impressive increase in

recovered memories of childhood sexual abuse in recent years. Some are concerned that this increase may, in part, be attributable to memory recovery techniques advocated by some popular self-help books and some clinical practitioners, and that these techniques may contribute to the creation of false memories. Psychologists, as a result of these current developments, have increased investigations into the processes of repression (e.g., Spiegel & Scheflin, 1994; Wegner, Quillian, & Houston, 1996) and false memories (e.g., Loftus & Coan, in press).

Many nonpsychologists and memory recovery therapists (e.g., Blume, 1990; Claridge, 1992; Olio, 1989) subscribe to the view that information is encoded into memory like a photograph and therefore recovery of this photographic information intact is possible if only the right cues are found. Believing that all memories are veridical accounts of past experience, they assert that false memories about the self could not be created. Recent research has challenged this belief and shown that a false suggestion by a family member can result in the creation of a false memory that is richly detailed and firmly believed to be authentic (Loftus & Coan, in press). Several other studies have also reported similar results with undergraduates and children using similar methods (e.g., Ceci, Huffman, Smith, & Loftus, 1994; Ceci, Leichtman, & White, in press; Hyman, Husband, & Billings, 1993; Leichtman & Ceci, 1995). This recent

research has refuted the claim that vivid memories could never be created, and has demonstrated instead that false memories of mild childhood trauma (e.g., overnight hospital stay, Hyman et al., 1994; being lost in the mall, Loftus & Coan, in press) can be created. The focus of research in this area has been on outcome with less emphasis on acquiring an understanding of the processes involved in the creation of an false memory.

At this juncture in false memory research it is important to examine the processes that produce false memories. Such an approach would be informative for the experimental psychologist interested in memory processes, the clinical practitioner concerned with therapy, as well as the judicial system as it evaluates allegations of malfeasance. Accordingly, this research investigated the hypothesis that processes of schematic retrieval and self-consistency contribute to the creation of a false memory of a past social interaction, or as Morgan (1931/1961) expressed it above, how supplemental information that is consistent with one's self-concept "masquerades as 'was so.'" Also tested was the hypothesis that cognitive processing of false information that is driven by the desire to understand a personally relevant negative outcome moderates the influence of self-schematic reconstructive processes on the production of a false memory.

The proposed research is in the traditions of schematic

reconstruction of memory (e.g., Bartlett, 1932; Bower, Black, & Turner, 1979; Loftus & Palmer, 1974; Snyder & Uranowitz, 1978), self-schema and self-consistency theories (e.g., Lecky, 1945; Markus, 1977; Swann, 1987), and false memory/eyewitness testimony research (e.g., Lindsay, 1990; Loftus, Miller, & Burns, 1978). In order to provide a background for the research hypotheses the literature of schematic reconstruction, self-consistency, and false memories is briefly reviewed in the following sections and the implications of this literature for the proposed research is discussed within the context of memory reconstruction and false memories.

Memory Reconstruction

"Total forgetfulness is not serious, but partial forgetfulness is treacherous. For if we then proceed to give an account of what we have not forgotten, we are liable to fill in from our imagination the incoherent and disjointed fragments furnished by memory" (Jessen, 1855, quoted in Erdleyi, 1990).

There is some conflict among reconstructive memory researchers concerning the potential accuracy of memories. A large body of research has shown memory to be a constructive, conceptually-driven process that is vulnerable to distortion and error. Encoding and organization of information in memory has been shown to

be dependent on meaning and belief structures (schemas, expectancies, stereotypes, etc.) at the time of the memorial event, and meaning and belief structures also influence retrieval of information about the event from memory. For example, research on eyewitness memory (e.g., Loftus & Palmer, 1974), expectancy-guided retrieval (e.g., Hirt, Erickson, & McDonald, 1993), and stereotype biases (e.g., Webb, 1992) have shown that subjects recall schema-consistent, but not presented, information instead of the presented, accurate information. In addition, the inaccurate, but schema-consistent information is integrated with the original memory representation (e.g., Loftus & Loftus, 1981; Snyder & Uranowitz, 1978).

Other researchers have criticized schema-theory approaches for exaggerating the degree of inaccuracy that results from remembering. Research has shown retrieval of accurate memories is possible if the appropriate retrieval cues are provided and the schematic information is not part of the retrieval environment (e.g., Clark & Woll, 1981; Hasher, Attig, & Alba, 1981; Hasher & Griffin, 1978; McCloskey & Zaragoza, 1985). Therefore, it should be acknowledged that schematic errors and distortions are not inevitable when recalling an event. However, this research is concerned with the recall of personal behavior which is considered to be a dynamic,

constructive process. This formulation of the process of personal recall is consistent with Ross's (1989) model of personal recall and other schematic approaches to memory that have provided abundant evidence that this process is susceptible to schematic errors (e.g., Higgins & Lurie, 1983; Hirt, 1990; Johnson & Seifert, 1994).

<u>Construction of Personal Histories</u>

Ross (1989; Ross & Conway, 1986) proposes that recall of information about the self (such as one's standing on a personal attribute) from memory is not a direct retrieval of information from episodic memory but a reconstructive, two-step process. The first step is assessment of an individual's current standing on the attribute and this serves as a benchmark with which to compare past standing on the attribute. Second, an implicit theory for change or consistency is used to guide recall. Implicit theories of stability and change are schematic knowledge structures which include information about the inherent stability of an attribute and general principles regarding the conditions which promote change or stability in a particular attribute. They are implicit because they are not necessarily discussed but firmly believed to be true (Fiske & Taylor, 1991; Ross, 1989). An example of an implicit theory of change is that older adults will become more politically and socially conservative as years progress (Ross, 1989).

Recall, according to the model, will be accurate to the degree that the theory is accurate. Therefore, if the implicit theory stresses stability and there is actual change, the model predicts an exaggeration of the similarity between the past and present. For example, if a person expects political party partisanship to remain stable, this person would report, when asked about party identification four years earlier, the current party identification. A 1980 study found 78% of participants, when asked about their party affiliation, reported no change from 1972 to 1976 (Niemi, Katz, & Newman, 1980). The majority (96%) were accurate. However, for the participants who did change parties during this time period, 91% were inaccurate and reported not changing parties.

On the other hand, if the theory postulates change, and there is no actual change, then there should be an exaggeration of the difference between the past and the present status on an attribute. For example, subjects who participated in an apparently effective, but actually ineffective, study skills program recalled their preprogram assessment of study skills as much lower than their actual assessment (Ross & Conway, 1986). Control subjects did not show this distorted recall. Furthermore, when asked to recall their post program course grades six months after graduating from the study

skills program subjects reported higher grades than they actually received, whereas control subjects did not show this biased recall pattern.

Research has provided further support for the relation between implicit theories of change/stability and memory biases.   Older adults' (average age = 69 years) assessment of their memory abilities as a younger adult in their mid-thirties was found to be consistent with theories of age-related changes in memory reported by another group of older adults, but not consistent with ratings given by adults (average age = 38 years) actually of that age (MacFarland, Ross, & Giltrow, 1992).   Also, women's recall of affective symptoms during menustration were consistent with their theory of menstrual distress but not with their ratings recorded in a daily diary (McFarland, Ross, & DeCourville, 1989).

Expectancy-Guided Retrieval

Ross's model of personal recall has received critical attention from other researchers.   Hirt (1990; Hirt, Erickson, & McDonald, 1993) was concerned results could be influenced by one of two processes: (1) The self-presentational concerns of the subject (although he acknowledged this was not a plausible problem in Ross's studies since subjects' knew their responses were anonymous and the accuracy of their responses could be checked); or (2) Subjects used a present standard of

comparison at retrieval to remember information coded under another standard, similar to Higgins' (e.g., Higgins & Liberman, 1994; Higgins & Lurie, 1983) standard of comparison formulation of distorted recall.

Hirt (1990; Hirt et al., 1993) conducted a number of studies similar to Ross and Conway's (1986) study skills experiment. However, Hirt used a hypothetical other rather than the self as the target to minimize self-presentational concerns, and manipulated both expectancies (rather than just measuring them) and outcome information (final course grade, the benchmark) to observe their independent effects on recall. In addition, he included conditions hypothesized to improve recall accuracy, such as context reinstatement instructions, incentives for accuracy, and compared timing of the expectancy information (beginning, halfway through, or at the end of the study). The results of this research are consistent with those of Ross's and colleagues (e.g., McFarland, Ross, & Decourville, 1989; McFarland & Ross, 1987). Expectancy-consistent information is recalled accurately, but recall of inconsistent information is distorted in the direction consistent with the expectancy, therefore displaying expectancy-guided or theory driven retrieval for all conditions. Conditions to improve accuracy were successful. Hirt also found, as Ross's (1989) model

predicts, that when expectancies were not provided subjects generated their own expectancies and displayed expectancy-guided retrieval accuracy and errors in the same manner as expectancy-provided subjects (Hirt, 1990; Hirt et al., 1993).

Hirt (1990; Hirt et al., 1993) calls his conceptualization of memory reconstruction an expectancy-guided retrieval model. He distinguishes his model from Ross's model. Ross's model of implicit theories assumes subjects are actually inferring or guessing their original standing on an attribute (theory-guided inference). Instead, Hirt proposes subjects are using a schema-guided retrieval strategy in which the episodic memory trace is given some weight along with weights given to the expectancy and outcome information. Therefore, both models include outcome information as benchmarks from which to compare original information and expectancies to guide retrieval, but Hirt includes weighting of the episodic memory trace as influencing accuracy. Support for its inclusion into the process of retrieval was provided by the conditions (e.g., incentives for accuracy) which improved subjects' recall performance. However, it should be noted that both models make similar predictions and produced similar results.

Ross (1989) argues that his model of personal recall

is different from Higgins' (e.g., Higgins & Liberman, 1994; Higgins & Lurie, 1983) formulation of change of standard effects in that it is not just the current context (the benchmark information) that produces the biased reconstruction but the theory of stability or change. Hirt (1990) challenged this assertion, but Ross points to results which show the distorted recall patterns in his research are consistent with subjects' implicit theory and not just a bias produced by the benchmark information (i.e., older adults recalling better memory abilities than younger adults report). It is important to note the point of agreement between Ross's and Higgins' conceptualization of memory reconstruction is that subjects are using their current perspective to guide their retrieval of past information. Higgins & Liberman argue "people can become a prisoner of their current viewpoint when reconstructing or reevaluating a past event" (p. 251).

Schematic Reconstruction of Memory

Hirt's (1990; Hirt et al., 1993), Ross's (e.g., 1989; Ross & Conway, 1986), and Higgins' (e.g., Higgins & Liberman, 1994; Higgins & Lurie, 1983) research provides evidence consistent with other cognitive and social psychological research that expectancies, implicit theories, current context standards, and schemas will affect various stages of information processing and

produce reconstructive errors and distortions. The reconstructive nature of memory through the analysis of memory's error patterns was introduced to American psychologists by Bartlett (1932), although Jessen (1885) was an earlier observer of this tendency to "fill in from our imagination the incoherent and disjointed fragments furnished by memory" (cited in Erdleyi, 1990, p. 21).

After Bartlett (1932) introduced the concept of organized structures of knowledge and experience (schemas) which guide memory for stories, pictures, and patterns his theory received little attention until cognitive psychologists applied it to comprehension and memory for text material several decades later (e.g., Bransford & Franks, 1971). In the time since, psychologists have applied the schema concept to a variety of processes, including story recall and text comprehension, person perception, social inferences and judgements, the cognitive organization of social events, as well as others (Fiske & Taylor, 1991; Ross, 1989; Trafimo & Wyer, 1993). The points of agreement for schema researchers are that (1) schemas serve the functions of cognitive efficiency by simplifying processing of complex information and problems for capacity limited thinkers; and (2) schematic processing serves a role in the active construction of social reality (Fiske & Taylor, 1991).

The research proposed here continues the tradition of schematic reconstructive memory in that it is proposed that a self-schema can be used to reinterpret a past event and can be instrumental in the active construction of a social reality that includes false information about the self (McNulty & Swann, 1994). As this hypothesis is also derived from self-consistency theories (e.g., Markus, 1977; Swann, 1987) this literature is briefly reviewed below.

Self-Knowledge Structures and Consistency

Consider what thou wert, and make it thy business to know thy self . . . [and] from this lesson, thou will learn to avoid the frog's foolish ambition of swelling to rival the bigness of the ox (Cervantes, 1614/1950, p. 926).

In the traditions of self-consistency theorists (e.g., Epstein, 1981; Lecky, 1945), self-schema theory (e.g., Markus, 1977), self-verification theory (Swann, 1987), and the information processing view of the self (Kihlstrom et al, 1988) the self-concept is conceptualized as a cognitive structure developed from multiple experiences that organizes memories about the self and guides the processing and retrieval of self-relevant information. The development of self-knowledge structures are motivated by the need to discover contexts where one can be successful and to avoid

contexts that promote failure, or "to avoid the frog's
foolish ambition." While not disagreeing with the current
consensus in psychology and sociology that the self-concept
is both dynamic and multifaceted (Cross & Markus, 1990;
Fiske & Taylor, 1991), this research is concerned with
aspects of the self that are well-organized, elaborate, and
have central importance, self-aspects for which one is self-
schematic (Markus, 1977).

<u>Self-Schemas</u>

Using an information processing approach to the study
of self-concept, Markus (1977) first used the term self-
schema and operationalized its definition. For the
personality dimension of independent-dependent, Markus found
that individuals who thought of themselves as independent
endorsed more adjectives associated with independence (i.e.,
individualistic or follower for dependence), responded with
shorter latency when making "like me" judgements, were able
to supply more specific examples of independent behavior,
provided more examples when asked about future independent
behavior, and resisted being characterized as dependent.
Participants who thought of themselves as dependent showed
the same pattern of responses for the trait of dependence.
Subjects who did not display systematic patterns of
independence or dependence were considered to be
aschematic.

From Markus's research as well as others, it can be

concluded self-schematic self-views include the following:
(1) certainty, (2) central importance, (3) elaboration in
memory, (4) the individual thinks of the self as extreme,
and (5) certainty the opposite does not hold (e.g., Markus,
1977; Markus & Kunda, 1986; Markus & Sentis, 1982; Pelham,
1991). Attributes of the self which are less clear and do
not meet the aforementioned criteria are aschematic (Markus,
1977).

Research has shown self-schemas influence what is
remembered (e.g., Markus, 1977; Markus, Hamill, & Sentis,
1987; Swann & Read, 1981). For example, subjects who viewed
themselves as likable or dislikable listened to someone make
negative or positive statements about them. Subjects who
viewed themselves as likeable recalled more positive
statements, while those who viewed themselves as dislikable
recalled more negative statements (Swann & Read, 1981).
This tendency to recall self-confirming information
increases over time. In another study, self-perceived
introverts and extroverts who had a conversation judged how
much they had talked immediately after the conversation and
a week later. Their judgements after a week increased (for
the extrovert) or decreased (for the introvert) as compared
to the first rating (Kulik & Mahler, 1986).

Self-Motives

Cervantes'(1950) assertion that the acquisition of
self-knowledge prevents one from pursuing foolish goals is

also shared by psychologists. This assumption, that it is important to learn the extent of one's capabilities and limitations so that one can effectively respond to the environment, is implicit and explicit in many self and social psychology theories (e.g., self-unity theory, Epstein, 1981; social comparison, Festinger, 1957; attribution theory, Heider, 1958; self-consistency, Lecky, 1945; self-affirmation, Steele, 1988). Developing self-schemas which guide processing of self-relevant information provides a sense of self-consistency (e.g., Markus & Nurius, 1986; Sedikides, 1993; Steele, 1988; Strube, 1990; Swann, 1987; see Markus & Kunda, 1986, for self-concept malleability). Although the current consensus among self-concept researchers is that the self-concept is stable, many self-theories postulate different, but not necessarily conflicting, motivations for the acquisition of self-knowledge. Motives proposed for the pursuit of self-knowledge include accurate self-assessment (e.g., James, 1890; Strube, 1987; Trope, 1986), self-enhancement (e.g., Brown & Dutton, 1995; for a review see Taylor & Brown, 1988), and self-verification (Swann, 1987).

The self-assessment perspective considers people to be motivated to gain accurate knowledge of their capabilities and limitations in order to reduce uncertainty about their ability to effectively manage themselves in physical, social, and intellectual arenas (Trope, 1986). This

perspective postulates a preference for accurate diagnostic information, without regard to the positive or negative valence of that information. This approach focusses on task choices when individuals are uncertain about their ability in a particular area. Research has supported the prediction that individuals choose and persist in tasks that are diagnostic in order to learn more about their capabilities when they are uncertain of current ability in the area in question (e.g., Strube, Boland, Manfredo, & Al-Falaji, 1987).

The self-enhancement perspective, however, assumes people are motivated to acquire positive feedback about themselves and actively avoid negative information in order to protect their self-esteem (e.g., Brown & Dutton, 1995; Greenwald, Bellezza, & Banaji, 1988; Taylor & Brown, 1988). Recent reviews provide support for the ubiquity of self-serving biases and positive illusions, and their contribution to emotional well-being (Brown & Dutton, 1988; Sedikides, 1993; Taylor & Brown, 1988).

Self-verification theory asserts people are motivated to acquire self-confirmatory information for traits and abilities that are central in importance to the self-concept and for which they are certain (e.g., Swann, 1985, 1987; Swann & Read, 1981; Swann, Stein-Seroussi, & Giesler, 1992). Self-verification processes are driven by the need to have a sense of self that is stable and consistent, not just for

the sake of consistency as Lecky's (1945) self-consistency theory asserts, but in order to attain the perceptions of prediction and control in social environments. A self-concept that is always changing and needing revision would create uncertainty and anxiety. A sense of self-consistency is achieved by (1) creating "self-confirmatory opportunity structures" (Swann, 1987, p. 1039) or social interaction systems that support the self-view, and (2) biased processing of social information that confirms the self-concept. Research shows that persons (a) prefer confirmatory feedback versus disconfirmatory feedback, regardless of the valence of the feedback (Swann & Read, 1981), (b) retrieve self-confirmatory information (Swann & Read, 1981), and (c) select self-verifying interaction partners even if the partner confirms negative self-views (Swann & Predmore, 1985).

While the theories of self-appraisal, self-enhancement, and self-verification appear to make conflicting predictions regarding the motivation for self-knowledge seeking and the possible outcomes of this search, the three theories are not truly as contradictory as they appear to be (Fiske & Taylor, 1991; Strube, 1990; McNulty & Swann, 1991; Swann, Stein-Seroussi, & Giesler, 1992). A recent series of studies by Pelham (1991) showed (1) for self-views that are extremely certain, information that is consistent with the self-view is preferred, regardless of its valence; (2) for self-views

that are extremely uncertain, positive information is
desired, especially if the self-view is negative; (3) for
self-views that are the most important and certain, there is
a preference for positive information, and as the most
important self-view is most likely to be positive, this
preference tends to be for self-consistent information.

It can be concluded from the foregoing review that
people use a self-schema to guide retrieval for information
about past personal behavior, and prefer consistent
information for self-views for which they are most certain.
This paper proposes, as Ross's (1989) and Markus's (1977)
models would predict, for traits in which individuals are
schematic (e.g., cooperative or competitive) they will
consider themselves to be consistent in their trait-relevant
behaviors over time. Therefore, if given false feedback
that they behaved in a self-schema consistent manner the
week before, they should be more likely to accept that as
true and include that false information in a memory report.

False Memories

I cannot help concluding that what I am dealing
with is something that never happened at all
but has been unjustifiably smuggled in (Freud,
p. 318, 1899/1962).

Freud, who introduced the concept of repression to
modern psychology, also noted the imperfections and
reconstructive nature of autobiographical memory (Erdleyi,

1990). As this dissertation is concerned with "something
. . . unjustifiably smuggled in," this section will briefly
review problems associated with hypnosis as a memory
recovery technique, anecdotal evidence of false memories,
eyewitness memory research, and experimental research on the
creation of false memories.

Hypnosis is a memory recovery technique that has been
used at least since the time of Freud, if not earlier.
Although memories can be successfully retrieved through
hypnosis, the problems associated with such recollections
are well-documented: (1) There is an increased tendency to
recall in a waking state inaccurate information received in
a hypnotic state as an authentic memory (Smith, 1983;
Spanos, Quigley, Gwynnn, Glatt, & Perlini, 1991); (2)
Confidence in false memories created when in a hypnotic
state is enhanced (Dywan & Bowers, 1983); (3) Individuals
who have attempted memory retrieval first in a waking state
and then later during a hypnotic state find it subsequently
difficult to discriminate between memories that were
retrieved while awake or under hypnosis (Whitehouse, Orne,
Orne, & Dinges, 1991). These effects are particularly
enhanced among the highly hypnotizable persons (Spiegel,
1974).

Recent research has demonstrated that many hypnotized
individuals who have who have been told that children in
times past have often experienced sexual abuse remembered

past selves who had been abused (Spanos, Burgess, & Burgess, 1994). The apparent increase in reports of recovered and false memories have alarmed some hypnotherapists who have cautioned fellow practitioners concerning problems associated with using hypnosis as a tool for memory recovery (Calof, 1993; Frankel, 1993).

There are many anecdotes of false memories (Lindsay & Read, 1994; Loftus, 1993). One famous anecdote is Piaget's vivid and richly detailed memory of an attempt to kidnap him when he was a very young child. When he was an adult he learned the memory was false. This was revealed by a letter his childhood nanny wrote to clear her conscience for a story she had made up for his parents in order to cover her own neglect of duties. Piaget reported he was amazed that he could have a false memory that seemed so clear, detailed, and authentic (Loftus, 1993). Elizabeth Loftus, a psychologist well-known for her false memory research and skepticism for recovered memories, recounted in a recent book her own recovery of a long-buried memory of finding her mother drowned in a swimming pool when she was 13 years-old (Loftus & Ketcham, 1994). She recalled the event after a family gathering 30 years later when a relative told her it was she that found her mother. Her memory was logically coherent, detailed, and vivid, but her brother told her three days later that it was actually her aunt that found her mother, and this was verified by other family members.

She was impressed not only with the ease with which this suggestion resulted in a memory, but also with the causal structure it afforded for certain behaviors and cognitions.

Research on eyewitness suggestibility has provided compelling evidence that exposure to false information after an event can create a false memory that is firmly and confidently believed to be true (e.g., Belli, Lindsay, Gales, & McCarthy, 1994; Lindsay, 1990; Lindsay & Johnson, 1989; Loftus et al, 1978). A recent review identified two factors which contribute to this phenomenon, known as the "misinformation effect." These are: (1) the sensitivity of the retrieval cues, provided by the final memory tests, to the accurate or inaccurate information, and (2) which information (accurate or inaccurate) was most recent (Brown, 1994). Research demonstrates the misinformation effect is a robust effect. For example, in a recent study even when subjects were told the postevent information was totally false and not to report any of it on their memory test, 27% of subjects reported the false postevent information as having been part of the original to-be-remembered event (Lindsay, 1990).

Misinformation has also been shown to influence causal inferences, even when discredited (Johnson & Seifert, 1994). Research using a fire investigation scenario found that false information was more likely to influence inferences about the cause of a fire if it played a causal role in the

scenario. This influence was present even if a correction was made immediately after reading the misinformation. If the false information was incidental to the fire investigation it was still recalled, but fewer inferences were influenced by it. When the correction provided a causal explanation for the fire, the influence of the false information on causal inferences were diminished.

Johnson and Seifert (1994) concluded that false information plays an especially strong role in inferences when it provides an explanatory role in the representation of an event, and it would be more difficult to construct a coherent representation without this false information. The implication of this finding for clinical patients or individuals who have created a false memory of childhood sexual abuse is that this imagined trauma provides a causal explanation for one's present difficulties. Loftus (Loftus & Ketcham, 1994) noted that the childhood trauma of her false memory explained many of the issues plaguing her as an adult.

As a result of the current increase in reported recovered memories, psychologists have begun experimental investigations into the creation of false childhood memories. A recent study showed that five individuals (two children, 8-years old; two adults, 42 and 22-years old; and one adolescent, 14-years old) could create a detailed and vivid memory of a mildly traumatic childhood event (Loftus &

Coan, in press). These subjects were asked to recall
various childhood events by a trusted family member,
including one event that never happened. For example, a 14-
year old boy's older brother (an undergraduate student)
asked him to remember the time he was lost in a mall and
helped by a man who found him crying. Subjects wrote about
their memories for five days and each day the subjects
recalled new details. The 14-year old boy remembered his
feelings of fear, conversations with his mother, detailed
descriptions of his adult rescuer, and details about the
mall itself. All five subjects, with varying amounts of
detail, developed a false memory for an event that never
happened. Interestingly, the 14-year old's mother who was
asked about the same false event with the same procedures
could not remember anything like that happening to her son.

Studies using similar methods have provided further
evidence that individuals can create a false memory of a
childhood event. Hyman et al. (1994) surveyed parents of
undergraduates about childhood events and asked the
undergraduates to recall these events plus one suggested
event (e.g., staying overnight in the hospital for an ear
operation). Some subjects reported information about these
false events in a first interview and more details in the
second interview. Similar results were found with children
examining the effect of repeated questioning about a false
event (Ceci et al., 1994).

These false memory studies have shown that repeatedly being asked to recall an event can create a memory for an event from one's personal history that never happened. An interesting feature of both the Loftus & Coan (in press) and the Hyman et al. (1994) study is that the false event (e.g., being lost in a store) is one that frequently happens in childhood, and is therefore consistent with what one might expect to happen during childhood. Therefore, as Ross's (1989) model of recall of personal histories would predict, if asked to recall an event that never happened, but is consistent with expectations of what might have happened in childhood, subjects are more likely to construct an false memory than when it is consistent with their expectations. Surprisingly, this prediction has not been assessed within the context of the development of false memories. It is this expectancy, consistent or inconsistent, with which the proposed research is concerned.

Laboratory research investigating reality monitoring processes has demonstrated that the memory of something imagined can sometimes be confused with the memory of something actually perceived, and can result in errors on a memory test (e.g., Johnson, Kounios, & Reeder, 1994; Lindsay & Johnson, 1987; Suengas & Johnson, 1988). Reality monitoring research has also shown that discrimination between listened to and imagined words was better when subjects imagined themselves saying the words than when they

imagined someone else saying the words (Johnson, Foley, & Leach, 1988). Moreover, talking about and thinking about the apperceptive qualities of imagined and perceived events decreased the salience of context and sensory cues for these memories which made memories of imagined events phenomenologically similar to perceived events (Suengas & Johnson, 1988). Further, the rehearsal of the perceptual qualities of imagined events increased the clarity of memories for imagined events. These results indicate that rehearsal of memories for imagined events may make them harder to discriminate between memories for experienced events. The rehearsal of the sensory qualities of imagined events has also been shown to influence attributions for the source (perception or imagination) of other persons listening to descriptions of these memories (Johnson & Suengas, 1989). Specifically, imagined events are more likely to be judged by other people to be actually perceived events when they are rehearsed than when they are not rehearsed. These findings imply the rehearsal of a memory for imagined abuse, which is suggested by someone else, increases the perceptions of reality of this memory and makes it more difficult to detect the source of the memory for the person involved and for other people as well.

The research on false memories has provided anecdotal and experimental evidence that the suggestion that something occurred which actually did not occur can result in false

memories, even detailed false memories of mild childhood

traumas. Hyman (1996, reported in Bower, 1996)) recently

noted that more information is needed about the kind and

amount of self-knowledge that contributes to the production

of a false memory. This research directly addressed the

issue of the kind of self-knowledge which contributes to the

creation of false memories as the postevent information is

false information that is self-schema consistent or

discrepant.

Summary

This review of the literature on memory reconstruction

shows that when recalling information about past personal

behavior and events reconstructive errors can occur in a

systematic fashion. Ross's (e.g., 1989; Ross & Conway,

1986; McFarland et al., 1992) research on the construction

of personal histories and Hirt's (1990; Hirt et al., 1993)

research on expectancy-guided retrieval processes

demonstrates that if individuals expect change or

consistency on an attribute from its present status, their

recall of past standings on the attribute are distorted to a

greater degree in the direction of the expectancy than if

they do not expect it. Research on self-schemas (e.g.,

Markus, 1977; Markus et al., 1987) and self-consistency

theories (e.g., Swann, 1987; Swann & Read, 1982) reveals

that for aspects of the self-concept that are schematic,

there is a tendency to preferentially recall self-verifying

information. Eyewitness memory research demonstrates that individuals are strongly influenced in their recall of an earlier event by the most recent information received, especially if that information is part of the retrieval environment, and influences inferences when it provides a causal structure (e.g., Johnson & Seifert, 1994; Lindsay, 1990; Loftus et al., 1978). Furthermore, the recent false memory research has shown that people can create detailed and vivid memories of an event in their personal past that never happened (e.g., Hyman et al., 1993; Loftus & Coan, in press), repeated rehearsal increases the detail of those false memories (Ceci et al., 1994), and that repeated rehearsal increases the similarity between memories for imagined events and perceived events (Suengas & Johnson, 1988).

The Present Research

The foregoing review shows there is converging evidence from diverse areas of psychology that individuals who are self-schematic for an attribute will have an expectancy that they will behave in a self-consistent manner in trait-related behavior, and that their recall of past trait-relevant behavior will be distorted to be consistent with this expectancy. In addition, false memory research demonstrates that individuals can create whole memories of events that never happened, and that false information can strongly affect inferences if it plays an explanatory role. Accordingly, as a logical extension of the reviewed body of research, this research investigates the effect of self-consistency expectations on the acceptance of self-consistent or self-inconsistent false information on memory for past personal behavior, and the effect of those self-consistency expectations on memory when they play a role in a personal failure experience.

The impetus for the application of the self-consistency framework to false memories resulting from suggestions was McNulty and Swann's (1991) explanation for resistance to therapeutic change. McNulty and Swann disagreed with Freud's (1920) explanation that a repetition compulsion is the root cause of resistance and instead argued it is a consequence of self-verification processes. They proposed that clients who have low self-esteem resist receiving

feedback about their positive aspects because it is inconsistent with their self-view and therefore with reality. The need for a stable and predictable reality produces resistance even when there may be an intense desire to hear positive feedback about negative self-views.

Evidence from research on self-verification processes among depressed persons has supported McNulty and Swann's (1991) assertion that some clinical clients resist positive information about themselves. This research showed the following: (1) Depressed subjects, as compared to nondepressed subjects, preferred interacting with partners who evaluated them unfavorably rather than interacting with a favorable evaluator (Swann, Wenzlaff, Krull, & Pelham, 1992) or to participating in another experiment (Swann, Wenzlaff, & Tafarodi, 1992); (2) Depressed subjects preferred friends or dating partners who evaluated them unfavorably (Swann, et al., 1992); (3) When depressed persons received positive feedback that challenged their self-view, they worked to reaffirm their negative self-view (Swann et al., 1992). If self-verification processes produce resistance in therapy, the question arises whether the same processes may result in acceptance of therapeutic suggestions, accurate and inaccurate ones.

I submit that when some therapeutic practitioners suggest to their clients that their current symptoms are indicative of childhood sexual abuse, some clients are more

likely to accept this suggestion if it is consistent with
their self-concept, their memory of childhood relationships
(i.e., with a relative or other authority figure), or a view
of childhood as painful, etc. This may be especially true
if this suggestion provides an explanation for the reason
they are in therapy. Conversely, clients who receive a
suggestion of childhood sexual abuse and it is inconsistent
with their view of their childhood or their present and/or
past self-view, the client would be more likely to reject
this suggestion, not put the effort into guided memory work,
and therefore be less likely to create a false memory.

I propose the process of self-verification initiates
efforts to recover the memory. Therefore, the focus of this
research is on the processes of self-verification and
effortful and goal-directed cognition on the creation of
false memories.

Overview and Hypotheses

To investigate the proposed processes two studies were
conducted. In both studies false information was presented
to subjects as comments directed to them during a team
problem solving session. The false information was either
consistent or inconsistent with their self-concept (Type A/B
behavior pattern). Study 2 added failure performance
feedback (failure or neutral) that was presented just before
the false information. Failure feedback was expected to
stimulate motivation to learn about the causes for the

failure thereby increasing effortful processing of the false information.

The To-Be-Remembered Event and Self-Schema

A to-be-remembered event that is complex, ambiguous, and has begun to fade from memory increases the likelihood of schematic reconstructive processing (Fiske & Taylor, 1991). People and social interactions are complex ambiguous entities, therefore the context of the to-be-remembered event in this research was a social interaction, a team problem solving session that occurred a week before the memory test. The advantages of team problem solving is it is a social interaction where participants are task focussed instead of socially focussed. In addition, each participant had two partners (actually confederates) whose comments needed to be recalled, thereby increasing complexity of the interactions to be recalled.

The Type A/B self-schema was chosen for this research for the following reasons: (a) Team problem solving is a natural setting for the display of Type A/B trait behaviors, therefore false feedback regarding those trait behaviors would seem genuine. Type A behavior is characterized by a competitive drive for achievement, time urgency, aggressiveness, and easily aroused hostility. In contrast, Type B's are characterized by an easygoing, relatively relaxed, and patient approach to life's tasks (Matthews, 1982). (b) Research has shown Type As and Bs respond to

social and self-relevant information in systematically
different ways (e.g., Matthews & Brunson, 1979; Smith &
Brehm, 1981; Strube, 1985; Strube & Boland, 1986). (c) Type
As and Bs have been shown to have well-organized, stable,
self-definitional cognitive structures, or a Type A or B
self-schema (Strube et al., 1986).

The present research employed a Type A/B measure
developed by Strube et al. (1986) in their research
investigating the cognitive organization of the Type A/B
self-concept. This research used the information processing
paradigm developed by Markus (1977) for self-schematicity to
examine the responses to three tasks by subjects classified
as Type A or B, or neither by the Jenkins Activity Survey
(JAS; Krantz, Glass, & Snyder, 1974), responses to three
tasks. This study produced the following results: (1)
Subjects classified as Type A (or Type B) were more likely
to endorse Type A (or Type B) trait adjectives (e.g., A:
driven, competitive; B: cooperative, easygoing; Neutral:
outgoing, pessimistic); (2) Schematic subjects showed faster
decision times to like me/not like me judgements for schema
consistent trait adjectives; and (3) Schematic subjects made
more schema-compatible errors on a memory task for half the
adjective trait list. Strube et al. (1986) concluded Type
As and Bs are self-schematic. Subjects who did not display
this systematic pattern of responses were considered
aschematic.

The current investigation also measured certainty for the Type A/B traits on the self-schema scale as (a) previous research has demonstrated that traits for which one is schematic are those the individual is most certain about (Markus, 1977), and (b) that self-views highest in certainty are the self-views for which self-verifying information is preferred (Pelham, 1991).

Hypotheses

The theories of expectancy-guided retrieval or implicit theories of consistency, self-schema's organizing function, and self-verification processes, predict that a self-schema guides memorial reconstruction of past personal events in a systematic fashion, or in other words, individuals create an expectancy for consistent behavior for traits that are schematic and this expectancy directs retrieval processes. The first goal of this research was to investigate the role of the self-schema in accepting self-consistent false information and creating a memory that incorporates that false information. Two studies were conducted in which false information was provided to participants concerning a comment directed to the participant by one of two partners during a team problem solving session. The false information concerned display of a trait that was rated by the participant as either very high (self-consistent) or very low (self-discrepant) on a Type A/B self-schema measure.

Previous research indicates that when memory search is motivated, false information has a greater influence on recall processes and a false memory is more likely to be created (Johnson & Seifert, 1994; Kunda, 1990; Santioso, Kunda, & Fong, 1990). In addition, it has been proposed that therapists' suggestions to their clients to try to recall instances of past abuse has resulted, for some clients, in an effortful and goal-directed search of memory that produced a false memory (Ceci & Loftus, 1994; Lindsay & Read, 1994; Loftus, 1993). A second goal of this research was to investigate the influence of motivated cognition on acceptance of and memory for self-consistent false information. Motivated cognition, as used in this research, is considered to be cognitive processing of information in working or long-term memory that is effortful and goal-directed, usually due to the self-relevance of the information (Higgins & Bargh, 1987; Kunda, 1990). To increase the motivation to engage in effortful cognitive processing of the to-be-remembered event, team problem solving performance feedback (failure or neutral) was presented to participants immediately prior to the presentation of the false self-consistent/self-discrepant information.

Two hypotheses were tested to investigate the roles of self-schemata (Study 1) and motivated cognition on the creation of false memories (Study 2).

Hypothesis 1: The Role of a Self-Schema. It was
predicted that self-consistency expectations would result in
acceptance of self-consistent false information and would
influence a memory report. Conversely, it was hypothesized
that self-consistency expectations result in rejection of
self-discrepant false information and that this false self-
discrepant information would not influence a memory report.

Hypothesis 2: The Role of Motivated Information
Processing. It was predicted that the likelihood of
creating a false memory for self-consistent information is
moderated by motivated information processing. Therefore,
it was expected that individuals given self-consistent false
information would be more likely to create a false memory of
an event if their processing of information is goal-directed
as compared to individuals given self-consistent information
that is not goal directed. It was assumed that individuals
given failure performance feedback would desire to know the
reason for the failure and therefore devote more cognitive
resources to processing performance information relative to
those without failure feedback. Individuals given self-
discrepant information were expected to reject the false
information, and therefore it was expected there would be no
differences between self-discrepant participants in the
performance feedback conditions.

Study 1:   The Influence of Self-Schemata on False Memories

The goal of Study 1 was to determine the impact of self-schemata on the acceptance of false information about the self, and the effect of this false information on participants' memory for the to-be-remembered event, a team problem solving session. Study 1 included a prescreening for Type A/B self-schematics and two experimental sessions spaced a week apart. Self-schematic Type A and Type B individuals were invited to participate in a two-session experiment described as research on individual differences in team problem solving. Participants in Session 1 solved two problems with two other individuals (both confederates). Confederates were used to provide uniformity of interactions for all participants across sessions, and to guarantee the comments that were to be the false information were not spoken during the session. After participants solved each problem they wrote their recall of the problem solving session, and returned a week later for Session 2. In Session 2 participants read a narrative described as the combined recall (theirs and their partner's) from the problem-solving session that included the false information (self-discrepant or self-consistent), and then completed the dependent measures of memory.

It was assumed that receiving self-schema consistent false information would prime the self-schema for that trait, therefore enhancing the likelihood of accepting false

self-consistent information as true since it would be true about the self. It was also expected that participants would interpret their problem solving behavior through the lens of this schema and describe their behavior as self-schema congruent using the false information trait adjectives or synonymous terms. Consistent with spreading activation theories of memory (e.g., Collins & Loftus, 1975), it was also expected the primed self-schema would contribute to more self-verifying descriptions using other Type A or B trait adjectives in addition to the self-schema consistent false information trait adjectives presented to subjects.

Previous research (e.g., Swann & Read, 1981) has shown self-verification increases when presented with self-discrepant feedback. This was also expected to occur in this research. In addition, it was expected participants given self-discrepant false information would refute this information, denying that the false information occurred during their problem solving session.

This is a 2 (Self-schema: Type A/Type B) X 2 (False information: self-consistent/self-discrepant) design. Given that self-schematicity was proposed to be the process guiding retrieval, and not personality, it was expected that there would be no significant differences between Type A and Type B individuals on the memory measures. In that case, data for Type A and Type B participants could be collapsed,

making Study 1 a two-group design comparing the effects of self-consistent and self-discrepant false information on memory reports.

Method

Participants

Undergraduate students (n = 370) enrolled in psychology classes at Virginia Tech and Roanoke College were recruited for participation in a prescreening for Type A and B self-schematic individuals (titled "Personality Prescreen" on the recruitment folder, see Appendix A for Informed Consent Form). Participants were compensated with extra credit in their course. Seventy-two individuals who met the prescreening criteria (described below) were invited back to a two-session experiment on individual differences in team problem solving, and were compensated with two extra credits. Four participants expressed suspicion of the experimental manipulations, and the length of time between Experimental Session 1 and Experimental Session 2 was longer than the planned one week for two more participants. These six participants were deleted from the sample, and this left 66 participants (Type A: 14 men and 19 women; Type B: 7 men and 26 women). In addition, since some of the participants did not complete all of the dependent measures, the sample sizes for some analyses are somewhat smaller than 66.

In order to attract research participants (there was intense competition for research participants Spring term,

1995), Virginia Tech students were informed they were eligible for a drawing for $20.00 by participating in the first experimental session, and when they returned to participate in the second experimental session they were eligible for a $50.00 drawing. Therefore, participants who participated in both experimental sessions were offered the chance to win $70.00. The informed consent is form provided Appendix B.

Procedure and Materials

Prescreening

To measure Type A or Type B self-schema: A type A/B self-schema measure, developed by Strube et al. (1986) was administered (Appendix C). This measure contains 22 Type A trait adjectives, 22 Type B traits, and 22 neutral (neither Type A or B) traits. Participants were asked to rate themselves on the 66 adjectives by using a 9-point scale with the lowest number (1) indicating *not at all like me* and the highest number (9) indicating *very much like me*. Strube et al. found the trait adjectives in this measure to be equated in terms of social desirability and meaningfulness, and were endorsed in the systematic pattern as expected by participants classified as Type A or Type B on the Jenkins Activity Survey. After rating themselves on these traits, participants indicated the certainty of their self-views on a scale ranging from 1 (*not at all certain*) to 9 (*extremely certain*).

A pilot study was conducted to determine the means and standard deviations for Type A and B scores in order to develop the Type A/B selection criteria for the experimental sample. Participants (N = 175) who completed this scale produced the following results: (1) Type A adjectives, mean = 103.90, S.D. = 19.46; (2) Type B adjectives, mean = 101.64, S.D. = 19.62; (3) Type A certainty, mean = 130.58, S.D. = 22.10; (4) Type B certainty, mean = 126.46, S.D. = 23.29.

Individuals were recruited for the experimental study if they showed a Type A or Type B schematic pattern. To be considered self-schematic Type A an individual would have met the following criteria: Type A scores one standard deviation or more above the mean, and Type B scores equal to or less than the mean. In addition, both Type A and Type B certainty scores were at least one standard deviation above the mean. The criteria for Type B self-schematics was the same. The theoretical range for the both the Type A/B ratings and certainty scores is 22-198. The scope of the ratings for these participants included ratings from 121-162 for Type A traits and 120-151 for Type B traits. Certainty scores for both Type A/B traits ranged from 126-193. Mean Type A and B self-schema and certainty scores for Study 1 participants are displayed in Table 1.

Table 1

Study 1: Mean Type A/B Self-Schema Scores and Certainty

Scores

Participants N = 66	Mean	S.D.
Type A Participants		
n = 33		
Type A score	134.75	10.67
Type B score	85.72	15.65
Type A certainty	152.06	11.41
Type B certainty	137.64	17.28
Type B Participants		
n = 33		
Type A score	91.47	12.26
Type B score	131.44	7.32
Type A certainty	145.31	18.18
Type B certainty	151.31	15.35

Experimental Session 1

In this session participants solved two problems with two partners (who were confederates of the experimenter). After each problem, participants and confederates completed a recall of the problem-solving session.

Problems. The problems included the NASA Moon Landing Survival Task (Appendix D) used in group processes research (e.g., Harris, 1990), and the Lifeboat Survival Task (Appendix E), also used in previous research (e.g., Strube, Keller, Oxenberg, & Lapidot, 1989). Pilot testing showed participants could complete both problems in the allotted 15 minutes for each problem.

Procedure. During the team problem solving participants were given the following instructions: "You are to work together to solve the problems. The goal is to see which teams and individuals produce the best solutions." Participants were told this so that they were focussed on the task but also needed to interact to solve the problem. This was necessary since it was the recall of their interactions that was of interest in this experiment. Problem solving sessions were scripted for the confederates' roles during the problems solving session to provide as much uniformity between conditions as possible (Appendix F). The confederates, undergraduates who posed as the participants' partners, rehearsed the script until they could follow it easily during the problem solving sessions.

After each problem was solved, participants and confederates went into separate rooms and were instructed to write all that they could remember about the problem solving session, including all comments made by themselves and their partners (Appendix G). After participants completed the last recall they were rescheduled for a second experimental session, which they were told was a "questionnaire session," one week later.

The problem solving session was audiotaped, and participants were identified only by their participant number. The audiotapes were checked to confirm that confederates and participants did not make any of the comments used as false information, which was given in the second session.

Experimental Session 2

False Information. Participants' (research participants and confederates) problem solving recalls were combined into a single narrative of the problem-solving session and presented to the participants at the beginning of the second experimental session (Appendix H). The narratives were accurate, except for the inclusion of false information about their partner's recall of comments made during the problem solving session. Examples of Type A false information: "Your partner noted that you seemed to feel strongly about some of your positions on the items, and recalled saying to you at one point, "you seem intense."

Examples of Type B false information: "Your partner reported that you seemed comfortable letting your partners make the final decisions and noted saying to you that "you seem willing to let us make the decisions." All participants had two false statements included in their recalls, one that could be construed as positive or socially desirable, such as a comment on being "a leader" (Type As) or "cooperative" (Type B); and the other comment was negative or socially undesirable, such as "stubborn" for Type As and "hesitant" for Type Bs. Finding a more socially undesirable trait to use as false information was sometimes difficult for Type B participants. They tended, as a group, not to highly rate those traits, such as hesitant, compliant, follower, yielding). I overcame this problem by using traits typically considered positive that they did rate highly, such as "unhurried" or a cluster such as "relaxed", "mild", "mellow", in a more socially undesirable way (e.g., "Your partner reported that you seemed to be more passive during the problem-solving recalled commenting to you that "you seem low-key.")

All participants read a combined narrative of **their** session. The only difference was the condition, Type A or B false information that was either consistent or inconsistent with their self-concepts as assessed on the Type A/B self-schema measure. Since the problem-solving sessions were scripted there was little difference between the narratives.

The inclusion of the participant's own wording showed the narrative consisted of recalls completed during the problem-solving session.

Dependent Measures. Participants completed several memory measures after reading the narrative and an intermediate task. The first measure was a "Team Rating Scale," which included an open-ended question and a likert-type scale, measuring participants perceptions of the roles team members played in the problem solving (Appendix I). This was included primarily to disguise the true purpose of the experiment. However, this measure also included an assessment of task involvement with the question, "Did you seriously work on this task?" Participants rated their seriousness on a scale in which 1 indicated "not at all serious" and 7 indicated "very serious."

Participants next completed a recall test to measure recall memory (Appendix J). This measure included four questions, one question to a page: (1) Describe your behavior and all your comments during the problem solving session; (2) Describe your partners' behavior and all their comments during the problem solving session; (3) Describe as many of your partners' evaluative statements directed toward you that you can remember; and (4) Describe as many of your own evaluative statements directed toward your partners that you can remember.

The second memory measure was a recognition test

(Appendix K). The recognition test included neutral statements from several research participants' Session 1 recalls. For each participant, the recognition test included two neutral statements participants and their partners had included in their recalls written in Session 1, and the two false information items in the recall narrative. Additionally, the recognition test included five or six Type A and five or six Type B comments. These comments were not chosen specifically for the participants as traits they had highly endorsed, but were general Type A or B trait adjectives such as "stubborn" or "hesitant." Therefore, the recognition test included four items specifically chosen for a particular participant. It should be noted that since the problem solving sessions were scripted, many of the "neutral" items were probably spoken during their session or were very similar to comments made in their session. The recognition test also measured level of confidence for each item (1 = *very uncertain*, 9 = *very certain*), and identified who made the statement and to whom it was directed.

Procedure. Upon return one week after session one, each participant was put into a separate room. Participants first read the narratives described above. Participants were told, "In this session you will be completing questionnaires about the problem solving session. Since it has been a week since the problem solving we have combined the recalls you and your partners wrote in the last session

in order to assist you with this task." After the
participant read the narrative it was removed and
participants next completed a 15 minute unrelated task (two
individual difference measures) to eliminate short-term
memory effects. Participants next completed the dependent
measures. Participants were given the "Team Rating
Questionnaire" and the recall questionnaire together for
completion, and these were collected before the recognition
test was given to them.

Participants were debriefed, and the true purpose of
the experiment was explained (for the debriefing procedure,
see Appendix L).

Scoring the Dependent Measures. The recall test was
coded for acceptance of and reactions to the false
information according to the following categories: false
recall, false self-description, self-verification,
inconsistent descriptions, and refute. Participants'
responses were coded in only one category. An item was
coded as **false recall** if any of the participants' responses
indicated an actual belief that a partner made a false
comment during the problem solving session. For example,
one participant wrote, "Mike said I was a perfectionist," or
another participant listed the false information as comments
made by her partners to her. A response was coded as **false
self-description** if the participant described his/her own
behavior during the problem solving session using the false

trait adjective, or a synonymous term. For example, a participant given the false feedback that her partner had made a comment that she was the leader of the team during the problem solving session said that "I sort of assumed a leadership role during the discussion . . ." A response was coded as **self-verification** if the participant described his or her behavior using trait adjectives that had been highly rated (a rating of 7, 8, or 9) and that they were very certain about (certainty ratings of 7, 8, or 9) on the self-schema prescreen measure. For example, a Type A self-schematic who was given the self-discrepant feedback of "you seem low-key" and "you seem comfortable letting us make the decisions" wrote the following description of his own behavior, "I was determined that being rescued was the better plan." This participants' self-rating was 9 for "determined" and his certainty was rated 8. Next, coders examined responses for **inconsistent** self-descriptions. To be coded as inconsistent the participant described her behavior using trait adjectives, or synonymous trait terms, that were rated 3, 2, or 1. For example, a self-schematic Type A noted "Usually I am a total control freak but I just laid back and let others take control, and I didn't speak up for myself." The last coded items were called **refute**. Descriptions that indicated the participant was refuting the feedback, essentially saying the false feedback was not self-descriptive, was coded as a refute. For example, a

Type A participant wrote, "[in the recall] someone [said] I was patient. This is surprising because I am actually <u>very</u> impatient. I never do things unless its convenient for <u>me</u>."

The recognition test was examined for three types of responses: false recognition, self-verification, and inconsistent descriptions. Responses were coded to fall in only one category. The coding scheme for these items was the same as for the recall test. An item was scored as **false recognition** if the participant chose one or both of the two items on the recognition test that were the false information included in the recall narrative. The range for the false recognition score was zero to two.

Undergraduate coders who were blind to conditions were trained to use the coding scheme by scoring measures from a pilot study, practicing with the experimenter using the scheme, and discussing disagreements until few emerged. The dependent measures were coded separately by three members of a team, two undergraduate coders and the experimenter. If there were any disagreements, they were discussed until the group reached consensus on that item. In the first evaluation, the intermember agreement rate before discussions was 77% which is not quite an adequate intermember agreement rate. This problem occurred because the coders tended to code a false self-description statement (e.g., "I was the leader") as false recall. This self-description statement is clearly <u>not</u> the same as a false

recall statement such as "my partner said I was the leader." Each participants' dependent measures were coded again at least two times by the experimenter. To ensure the reliability of the coding, another team was trained to use the coding scheme (whose intermember agreement rate was 88% during training). This team coded the dependent measures and the intermember agreement rate was 95%.

Results

This section presents the results of four categories of data. First, the recall and recognition test data were examined for Type A/B differences. Second, task involvement results are reported. Third, the recall and recognition data was examined for acceptance and reporting of the false information. Fourth, the recall and recognition data were analyzed for evidence of self-verification processes.

Verification of Type A/B Similarities

Chi-square analyses were performed to verify that Type A and Type B subjects displayed the same or very similar patterns on the dependent measures. Chi-square analyses showed Type A and B participants differed in self-verification on the recall test, but did not differ on false item acceptance, false self-description, inconsistent, or refute on the recall test or the recognition test, nor did Type A/B participants differ in self-verification on the recognition test. Specifically, more Type A participants (73%) used self-verifying descriptions than Type B

participants (53%) on the recall test, $X^2(1, N = 65) = 2.68$, $p < .05$.

To ascertain if Type As and Bs responded differently to the experimental conditions on the self-verification data a loglinear analysis using SPSS for Windows was performed. Loglinear analysis is a multiway frequency analysis that tests for a relationship between three or more discrete variables. This is a nonparametric statistical technique that makes no assumptions about population distributions (Tabachnick & Fidell, 1989) and assumes independent observations, or random assignment to condition (Hays, 1988). Tabachnick and Fidell (1989) note that the only practical limitation in using loglinear analysis is the size of expected frequency in each cell. Specifically, "each cell should have an expected cell frequency greater than one and that no more than 20% are less than five" (Tabachnick & Fidell, 1989, p. 140) in order to have adequate power for the analysis.

The loglinear analysis did not reveal a three-way association between the dichotomous variables of Self-verification (yes/no), False Information, FI, (self-consistent/self-discrepant), and Type (A/B), $X^2(1) = .07$, $p > .10$. Separate chi-square analyses were performed for Type A and B individuals on the self-verification data to further investigate their self-verification tendencies as responses to false information condition. These analyses supported

the loglinear analysis results that Type A and Type B participants did not differentially self-verify on the recall test as a response to experimental condition, self-consistent or self-discrepant false information: Type A, $X^2(1, n = 33) = .73, p > .10$; and Type B, $X^2(1, n = 32) = .10, p > .10$. Therefore, Type A and B participants were combined for the analyses reported below for a two group analysis (self-consistent versus self-discrepant false information).

<u>Task Involvement</u>

Participants' responses to the question assessing task involvement were analyzed. The possible range was from one (not very serious) to seven (very serious). All participants rated their involvement from 4 (average) to 7 (very serious), indicating they perceived themselves to be committed to the tasks. The total sample mean = 5.60, self-consistent participants' mean = 5.61 (SD = .72), and self-discrepant participants' mean = 5.58 (SD = .67). A 2 (False information condition, self-consistent/self-discrepant) X 2 (Type, A/B) ANOVA revealed there were no differences between cells, either due to an interaction or to the false information condition, all Fs < 1, $ps > .10$.

<u>False Information Acceptance</u>

The number and percentage of participants reporting the false information on the recall and the recognition tests are shown in Table 2. These proportions refer to the

Table 2

Study 1: Number and Percentage of Participants Who Reported

False Recall, False Recognition, False Self-Description, and

Refute (N = 66)

| | False Information Condition | | | | |
| | Consistent | | Discrepant | | |
	No.	%	No.	%	$\underline{X}^2$
False Recall	13	39	6	19	3.35^a
	n = 33		n = 32		
False Recognition	27	82	15	46	9.43^c
	n = 33		n = 33		
False Self-Description	15	46	1	3	15.69^d
	n = 33		n = 32		
Refute	0	0	6	18	7.83^b
	n = 33		n = 32		

Note. No. refers to the number of participants in that cell
and % refers to percent of participants in that cell
displaying the particular response measured.
[a]$p < .05$, [b]$p < .01$, [c]$p < .001$, [d]$p < .0001$

number of participants within each group who reported thefalse information had occurred on the recall test and who chose the false items on the recognition test.

As predicted, significantly more participants in the self-consistent condition incorporated false information into their memory reports than those in the self-discrepant condition. A chi-square analysis revealed 39% of the participants in the self-consistent condition reported on the recall test that the false feedback had in fact occurred during their problem solving session as compared with 19% of the self-discrepant condition participants, $X^2(1, N = 65) = 3.35$, $p < .03$. This finding was even stronger on the recognition test, with almost twice as many of the self-consistent condition participants choosing the false items as compared with the self-discrepant participants, $X^2(1 = 66) = 9.42$, $p < .001$. Closer inspection of self-discrepant condition participants' recall test and recognition test data showed a disparity between their performance on these two measures. These participants were significantly more inaccurate on the recognition test (44%) relative to their recall test performance (19% inaccurate), $Z = 2.05$, $p < .02$.

Self-verification

The proportions of participants who described themselves using the false information trait terms, and who refuted the false information on the recall test are

displayed in Table 2.

The false self-description results provided further support for the false recall hypothesis. The results revealed the predicted difference between conditions on the false self-description data. Significantly more of the self-consistent condition participants used the false information trait adjectives to describe themselves than did the self-discrepant condition participants, $X^2(1) = 15.69$, p < .00001.

In accordance with self-verification theory (e.g., Swann, 1987; Swann, Griffin, Predmore, & Gaines, 1987), it was expected that participants in the self-discrepant condition would self-verify more in their description of their team problem solving behavior on the recall test and the recognition test. Support for this hypothesis was found in the analysis of the inconsistent and refute data on the recall test, but not for the self-verification data analysis.

As expected, and consistent with self-verification theory, few (self-consistent = 3; self-discrepant = 2) of the participants described their behavior using self-discrepant trait terms on the recall test, or chose inconsistent comments on the recognition test as having been directed toward them. Indeed, significantly more of the self-discrepant condition participants refuted the false information as not descriptive of themselves, $X^2(1, N = 65)$

= 7.83, p < .01.

The self-verification data on the recall test produced unexpected results, but not necessarily inconsistent with self-verification theory. Both groups showed a similar pattern of self-verification (self-consistent = .67; self-discrepant = .60), X^2(1, N = 65) = .37, p > .10. Interestingly, more self-consistent condition participants chose self-verifying items on the recognition test than did self-discrepant condition participants (39% vs. 6%), X^2(1, N = 66) = 10.43, p < .001.

Confidence

Previous research has shown those who are most inaccurate (reporting the false information) tend to be the most confident (e.g., Wells, Ferguson, & Lindsay, 1981; Wells & Murray, 1984). It was therefore expected these same differences in confidence would be shown by participants in this study. Confidence for each recognition test item was assessed by a scale which appeared below each item. Participants were to indicate certainty of their memory by circling a number from one to nine (1 = very uncertain, 9 = very certain). An analysis of variance was performed to test whether there was an interaction between receiving self-consistent/self-discrepant false information and being accurate or inaccurate on the recognition test on participants' certainty scores for their choices on the recognition test. This 2 (False Information, self-

consistent/self-discrepant) X 2 (False Recognition, accurate/inaccurate) ANOVA of recognition test certainty scores yielded a nonsignificant interaction, $F(3, 60) = .04$, $p > .10$. In addition, there were nonsignificant main effects for both False Information condition, $F(1, 57) = .05$, $p > .10$ and False Recognition, $F(1, 57) = .02$, $p > .10$. This result indicated self-discrepant or self-consistent condition participants and inaccurate or accurate participants did not differ in their confidence of their recognition test choices; nor was there an interaction between these two factors on certainty scores.

Another ANOVA was performed to examine differences in certainty scores on the recognition test between accurate and inaccurate participants on the recall test. A 2 (False Recall, accurate/inaccurate) X 2 (False Information condition, self-consistent/self-discrepant) ANOVA did not yield a significant two-way interaction, $F(3, 56) = .57$, $p > .10$, nor a main effect for False Information condition, $F(1, 56) = .07$, $p > .10$. Although the ANOVA showed a nonsignificant effect for False Recall, $F(1, 56) = 2.33$, $p > .1$, a Levenes test for equality of variances showed the two groups had unequal variances (accurate participants, S.D. = 2.66, inaccurate participants S.D. = 1.43; $F = 10.31$, $p < .01$), thereby decreasing the power for this test. A t-test for unequal variances was therefore employed.

Interestingly, those who reported the false information

on the recall test tended to be more confident when choosing
the false item (mean certainty = 7.58) than were
participants who did not report the false information on the
recall test (mean certainty = 6.26), t(50.94) = 1.84, p <
.07.

Discussion

These results provide strong support for the hypothesis
that self-schema consistent information will be accepted and
will influence subsequent memory reports. Participants
given self-consistent false information that a partner had
directed a comment to them during the problem solving
session were far more likely to report that it had occurred
on the recall test and the recognition test than were
participants given self-discrepant false information. In
addition, it appears that the false information primed the
self-schema for that trait since almost half of the self-
consistent condition participants used the false information
traits to describe their own behavior during the problem
solving session on the recall test as compared to only one
of the self-discrepant condition participants. This is a
notable finding since there were 22 traits for each type on
the self-schema measure and to be included in this sample
the participants had to have highly endorsed the majority of
the other 22 traits. Yet, there were no differences between
groups on self-verifying for these other traits on the
recall test. This finding suggests that priming the self-

schema for the false-information increased the likelihood that a false memory would be created in which one was confident.

The certainty results clearly show that participants who chose the false information item on the recognition test were just as confident as those participants who did not choose the false information item. In addition, participants who reported the false information on the recall test rated their certainty higher when they chose the false item on the recognition test as compared to those participants who did not report the false information on the recall test. This may be because the inaccurate recall participants were more confident in their false recall to begin with or retrieving the memory a second time for the recognition test increased their confidence.

Swann's (e.g., 1987) self-verification theory predicts, and his research (e.g., Swann & Read, 1981; Swann et al., 1992) has shown, that individuals given self-discrepant feedback will vigorously refute that feedback with self-verifying verbalizations and behavior. The results did not show this expected pattern in the self-verification data, but it was seen in the refute data. Self-discrepant condition participants were more likely to refute the false information as definitely not descriptive of them such as when a Type A participant, told that a partner had commented that he seemed "low-key", wrote on the recall test that "it

is not my nature to be idle in any situation, especially one that calls for group work and leadership."

The finding that participants in both conditions described themselves in self-consistent terms is in accordance with self-schema (Markus, 1977) and self-verification (Swann, 1987) theories, and the lack of differences in self-verification between conditions is not a result that challenges processes proposed by self-verification theory. Indeed, this result may indicate that self-discrepant condition participants were not motivated to self-verify on the dependent measures, either because they were not upset by the self-discrepant feedback, they did not take the feedback seriously, or they may not have recalled it.

The greater proportion of self-discrepant condition participants choosing the false item on the recognition test as compared to the much lower proportion reporting it on the recall test may reflect choosing the false item on the basis of familiarity since it was presented earlier in the narrative. However, this same rather large proportion of self-discrepant condition participants choosing the false item suggests that the self-discrepant participants did not reject the false information immediately as proposed.

Study 2: Effects of Motivated Cognition on
Memory for Self-Consistent False Information

It has been proposed that the recent dramatic increase in false memories of childhood sexual abuse is a result of memory recovery therapy (Garry, Loftus, & Brown, 1994; Lindsay & Read, 1994; Loftus, 1993). In the process of testing a hypothesis that their client is a victim of traumatic abuse, some therapists instruct their clients to try to recall past abuse. This instruction may stimulate effortful and goal-directed memory search processes that produces a false memory.

This formulation of the counselor-client interaction is consistent with research on processes of hypothesis confirmation (also called expectancy confirmation, behavioral confirmation, and self-fulfilling prophecies) (e.g., Copeland & Snyder, 1995; Rosenthal & Rubin, 1978; Snyder, 1995; Zuckerman, Knee, Hodgins, Miyake, & Kunitate, 1995). This body of research has shown that hypothesis testers tend to ask hypothesis-consistent questions that elicit verbal, behavioral, and cognitive responses that confirm the hypothesis. A recent study found that research participants in the role of counselor elicited behavioral confirmation from participants in the role of client when given the goal to make an accurate diagnosis but not when given the goal to establish rapport (Copeland & Snyder, 1995). This finding suggests that counselors' attempts to

confirm a diagnosis can stimulate motivated cognitive processes that result in confirmation by producing a false memory. The current research is concerned with goal-directed and effortful processing of false information and subsequent influence on memory. Previous research has not investigated the role of motivated memory search processes in producing false memories, but research has shown false information retrieved by a motivated memory search influenced causal inferences (Johnson & Seifert, 1994).

The goal of Study 2 was to assess the moderating effect of motivated cognitive processes on the acceptance of self-consistent false information on memory and its subsequent influence on memory for the to-be-remembered event. To compare motivated cognitive processing conditions, participants in Study 2 were given either failure or neutral team performance feedback. Performance feedback is information that has relevance for one's current understanding of one's abilities and implications for future performance (Higgins, 1987; Markus & Nurius, 1987). Given this relevance for the self, performance feedback is typically information that stimulates a higher level of cognitive processing (Higgins & Bargh, 1987; Trope, 1986). Therefore, it was expected that failure feedback would create greater motivation to attend to information relevant to the problem solving session for possible causes for the failure. This increase in cognitive resources to process

the team performance information was expected to increase the likelihood that self-consistent participants would create a false memory for the self-consistent feedback.

This is a 2 (False information: self-consistent/self-discrepant) X 2 (Performance feedback: success/neutral) design. This study used only Type A schematic individuals since there were no differences between Type As and Bs in Study 1, and Type As were more plentiful in this undergraduate sample.

Method

Participants

Students (n = 260) enrolled in psychology classes at Virginia Tech and Roanoke College participated in the prescreening for Type A individuals. Participants were either compensated with $2.00 for their participation (n = 43) or extra credit in their courses (n = 217). Participants (n = 52) who met the criteria described in Study 1 for self-schematic Type A individuals were recruited for participation in a "Team-Problem Solving Study." The Type A scores ranged from 120 to 160, mean = 134, S.D. = 9.98. The Type A certainty scores ranged from 128 to 192, mean = 152.06, S.D. = 14.88. The Type B scores ranged from 33 to 111, mean = 84.88, S.D. = 17.80. Two participants' data were deleted because they were suspicious of the experimental procedure, and another participant was deleted because the delay between first and second session was

longer than the planned one week, leaving 49 participants
(17 men and 32 women) in the sample. Most participants (n =
42) were compensated with two extra credits in their
psychology classes, and five participants were compensated
with $5.00 each.

Procedure and Materials

The procedure and materials for the prescreening, and
Experimental Sessions 1 and 2 were identical to those used
in Study 1 except for the team performance feedback given at
the beginning of the second session just before participants
read the recall narrative which contained the self-relevant
false information.

Team Performance Feedback

When participants returned a week after the first
session for Experimental Session 2 they were given failure
(Appendix L) or neutral (Appendix M) performance feedback
for their team. The failure condition participants were
told: "Your team ranked 7 of the 15 items correctly
according to NASA's rankings. Your team ranked in the 41
percentile of the teams that have solved this problem
according to NASA's statistics." Almost identical team
performance feedback was also given for the Lifeboat
Survival Task except the scores were "6 of the 15 items
ranked correctly" and the team ranked in the 38 percentile."
The neutral condition (Appendix N) used the same form used
in the failure condition except the spaces for the scores

and percentile information were blank, and the following was written at the bottom: "Your team's scores are not yet available."

Results

The first hypothesis to be tested in Study 2 was the prediction of differences between self-consistent and self-discrepant condition participants in reporting self-relevant false information. It was expected the support shown in Study 1 for this hypothesis would be replicated in Study 2. The first section presents the results of this analysis.

The second hypothesis to be tested was the proposed moderating effect of performance feedback on reporting self-consistent/self-discrepant false information. It was expected more of the self-consistent participants given failure feedback would report the false information than participants in any other condition. It was also expected that more of the self-consistent/neutral condition participants would report the false information than both the self-discrepant groups (neutral and failure), who were not expected to be significantly different. The results of the test of Hypothesis 2 are presented in the last section.

Task Involvement

Participants' responses to the question assessing task involvement were analyzed. All participants rated their involvement from 5 (above average seriousness) to 7 (very serious), indicating they perceived themselves to be

committed to the tasks. The total sample mean = 5.95,
consistent/failure participants' mean = 6.33 (SD = .78),
consistent/neutral participants' mean = 6.20 (SD = ..79),
discrepant/failure participants' mean = 5.09 (SD = 1.14),
and discrepant/neutral participants' mean = 6.17 (SD = .94)
A 2 (False Information condition, self-consistent/self-
discrepant) X 2 (Task Feedback, failure/neutral) revealed
there were no differences between cells, all Fs < 1, *ps* >
.10.   These findings replicate those found in Study 1.

<u>Self-Consistent versus Self-Discrepant Conditions</u>

   <u>False Information Acceptance</u>. The number and
percentage of participants reporting the false information
on the recall test (false recall) and the recognition test
as a function of false information condition, self-
consistent or self-discrepant, are shown in Table 3.

   Further support was obtained for the hypothesis that
self-consistent information would influence a memory report
and self-discrepant information would be rejected. As in
Study 1, participants given self-consistent information were
more likely to display false recall by reporting the false
information had occurred during their problem solving
session than were participants given self-discrepant
information on both the recall measure, X^2 (1, N = 49) =
4.06, *p* < .02, and on the recognition measure, X^2 (1, N =
49) = 17.29, *p* < .0001. Also replicated in Study 2 was the
significant disparity between self-discrepant condition

Table 3

Study 2: Number and Percentage of Participants Who Reported False Recall, False Recognition, False Self-Description, and Refute as a Function of False Information Condition(N = 49)

| | False Information Condition | | | | |
| | Consistent n = 24 | | Discrepant n = 25 | | |
	No.	%	No.	%	$\underline{x}^2$
False Recall	12	50	6	25	3.56^a
False Recognition	22	92	10	40	14.43^d
False Self-Description	15	63	4	16	11.15^c
Refute	0	00	7	28	7.84^b

Note: No. refers to the number of participants in that cell and % refers to percent of participants in that cell displaying the particular response measured.
$^a p < .05$, $^b p < .01$, $^c p < .001$, $^d p < .0001$

participants performance on the recognition test (42% inaccurate) relative to their recall test performance (19% inaccurate), $Z = 2.05$, $p < .02$.

Self-verification. The proportions of participants whose self-descriptions included the false trait adjectives (who displayed false-self-description), and who refuted the false information on the recall test (refute) as a function of false-information condition can be seen in Table 3. Also replicated in Study 2 were the findings that participants in the self-consistent condition were more likely to describe their team problem solving behavior using the trait adjectives (false self-description) used in the false information, X^2 (1, N = 49) = 13.49, $p < .0001$, and that self-discrepant condition participants were more likely to refute the false information as being descriptive of their team problem solving behavior, X^2 (1, N = 49) = 7.84, $p < .01$.

As in Study 1, there were no differences between groups on using self-discrepant trait terms to describe themselves (inconsistent data), as again only three participants did so in each condition, or to self-verify in their descriptions (almost half in each group did self-verify), both $ps > .10$. Unlike Study 1 participants, there were nonsignificant differences on the recognition test for self-verifying choices, X^2 (1, N = 49) = 2.00, $p > .10$.

Effect of Team Performance Feedback

   <u>False Information Acceptance</u>. Study 2 predicted an
interaction between false information condition and
$p < .01$ as revealed by a chi-square test of significance.
performance feedback condition for reporting the false
information. Figure 1 displays the obtained interaction
between false information condition and task feedback
condition on false recall. The number and percentage of
participants demonstrating false recall on the recall test
and false recognition on the recognition test as a function
of false information condition and team performance feedback
condition are shown in Table 4.

   A three-way frequency analysis was performed to develop
a logit model using SPSS for Windows to test the predicted
interaction. Dichotomous variables analyzed were (1) False
Recall (FR), yes or no; (2) self-consistent or self-
discrepant false information condition (Group); and (3)
failure or neutral performance feedback condition (Task
Feedback). A nonhierarchical loglinear analysis produced a
model that included the third-order effect, one of the two
possible two-way associations (FR X Group), and one of the
three possible first-order effects (FR). The model's
likelihood ratio, $x^2(5) = 3.99$, $p = .55$, indicated a good
fit between observed frequencies and expected frequencies
generated by the model. The FR X Group X Task Feedback
association was marginally significant, $Z = 1.56$, $p < .06$.
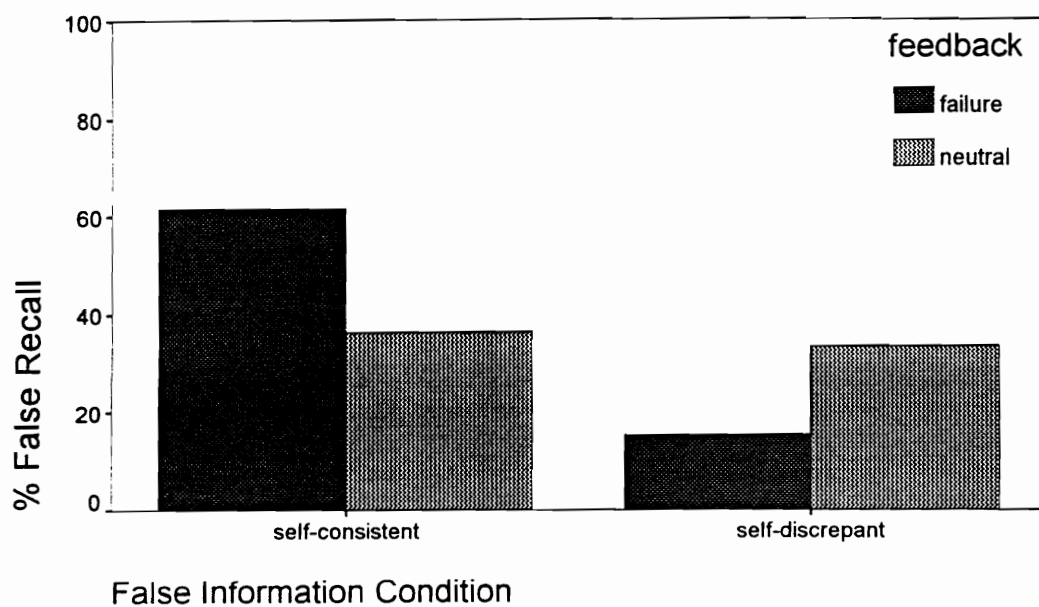
Figure 1. Percentage of Participants Who Reported the False
Information as a Function of False Information and
Performance Feedback Conditions.

Table 4

Study 2: Number and Percentage of Participants Who Reported
False Recall and False Recognition as a Function of False
Information and Performance Feedback Conditions (N = 49)

	False Information Condition			
	Consistent		Discrepant	
Performance Feedback				
	No.	%	No.	%
False Recall				
Failure	8	62_a	2	15_b
	n = 13		n = 13	
Neutral	4	36_{abc}	4	33_{abcd}
	n = 11		n = 12	
False Recognition				
Failure	11	85_a	4	31_b
	n = 13		n = 13	
Neutral	11	100_{ac}	6	50_{bd}
	n = 11		n = 12	

Note. No. refers to the number of participants in that cell
and % refers to percent of participants in that cell
reporting false recall or false recognition. Percentages
not sharing a common subscript differ at .01 level of
significance as revealed by a chi-square test.

The logit analysis supported the chi-square test reported above (between self-consistent and self-discrepant participants reporting false recall) as there was a significant association for the 2-way effect, FI X Group, Z = 1.85, $p < .03$.

To confirm the loglinear analysis, an analysis using the gamma (Y) statistic[1] was performed. The gamma statistic is used to test for a relationship between ordered categorical variables. The gamma statistic is a nonparametric statistic. Therefore, it does not assume normally distributed data, but the gamma distribution, which is approximately normal. The chi-square distribution is a member of the "gamma distribution family" (Gibbons, Olkin, & Sobel, 1977, p. 329) with v degrees of freedom, and scale parameter, 0, equal to one (Gibbons, Olkin, & Sobel, 1977). There is also an assumption of random assignment to group (Schulman, 1992).

The gamma analysis of the recall test false information data tested for the following predicted order: (1) More of the self-consistent/failure condition (CF) participants would report false recall than all other groups; (2) the self-consistent/neutral condition (CN) participants would be next highest; (3) the lowest proportions would be the two self-discrepant groups (neutral, DN, and failure, DF,

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[1]I would like to gratefully acknowledge Dr. Robert Schulman for his advice on using the gamma statistic for this analysis.

conditions).

The gamma analysis revealed that the expected order effects (CF > CN > DF = DN) were significant on the recall test, Y (N = 49) = .50, p < .005. The predicted pattern occurred. Twenty-one percent more of the self-consistent/failure participants (.62) displayed false recall on the recall test than self-consistent/neutral participants (.39). Ten percent more of the self-consistent/neutral participants reported false recall than the average (29%) of the two self-discrepant groups.

Additional pair-wise comparisons were performed to determine how self-consistent/self-discrepant false information interacted with the performance feedback using chi-square analyses. This analysis showed, as expected, the two discrepant groups were not significantly different from each other, X^2(1, n = 25) = 1.10, p > .10, and that the two self-consistent groups were also not significantly different, X^2 (1, n = 24) = 1.51, p > .10. Further comparisons revealed that the self-consistent/failure group was significantly different from the self-discrepant/failure group (X^2 (1, n = 26) = 5.85, p < .01) and marginally significantly different from the self-discrepant/neutral group (X^2 (1, n = 25) = 1.99 p < .08). The self-consistent/neutral group was not significantly different from either of the self-discrepant groups (both p's > .10).

A loglinear analysis of the recognition data showed

that the expected three-way association between proportion of those reporting false recognition, self-consistent/self-discrepant condition, and performance feedback condition was not significant, $X^2(1) = 1.23$, $p > .10$.

Self-verification. Table 5 displays the proportions of participants who displayed false self-descriptions and who refuted the false information on the recall test as a function of false information and performance feedback conditions. Loglinear analysis of the recall data for proportion of participants whose problems solving descriptions showed false self-description as a function of false information condition and performance feedback condition (false self-description X group X task feedback) produced a model that did not support the expected three-way association, $X^2(1) = .02$, $p > .10$.

This finding was surprising not only because it was unexpected, but also because the obtained pattern of results appeared strongly consistent with the hypothesized pattern (see Figure 2) and the opposite result was found using the gamma statistic. The gamma analysis tested whether the groups displayed the expected order for the differences between groups on the false self-description data. The expected order was the same as described above for reporting false information on the recall test (CF > CN > DF = DN). This analysis confirmed the expected order, Y ($N = 49$) = .64, $p < .0002$. Thirty-two percent more of the self-

Table 5

Study 2: Number and Percentage of Participants Who Displayed
False Self-Description and Refute as a Function of False
Information and Performance Feedback Conditions (N = 49)

| Task Feedback Condition | False Information Condition | | | |
| | Consistent | | Discrepant | |
	No.	%	No.	%
False Self-Description				
Failure	10	77_a	3	23_b
	n = 13		n = 13	
Neutral	5	46_{abc}	1	8_{bd}
	n = 11		n = 12	
Refute				
Failure	0	0_a	2	15_{ab}
	n = 13		n = 13	
Neutral	0	0_{abc}	5	42_{bd}
	n = 11		n = 12	

Note. No. refers to the number of participants in that cell
and % refers to percent of participants in that cell
reporting false self-description or refute. Percentages not
sharing a common subscript differ at .01 level of
significance as revealed by a chi-square test.
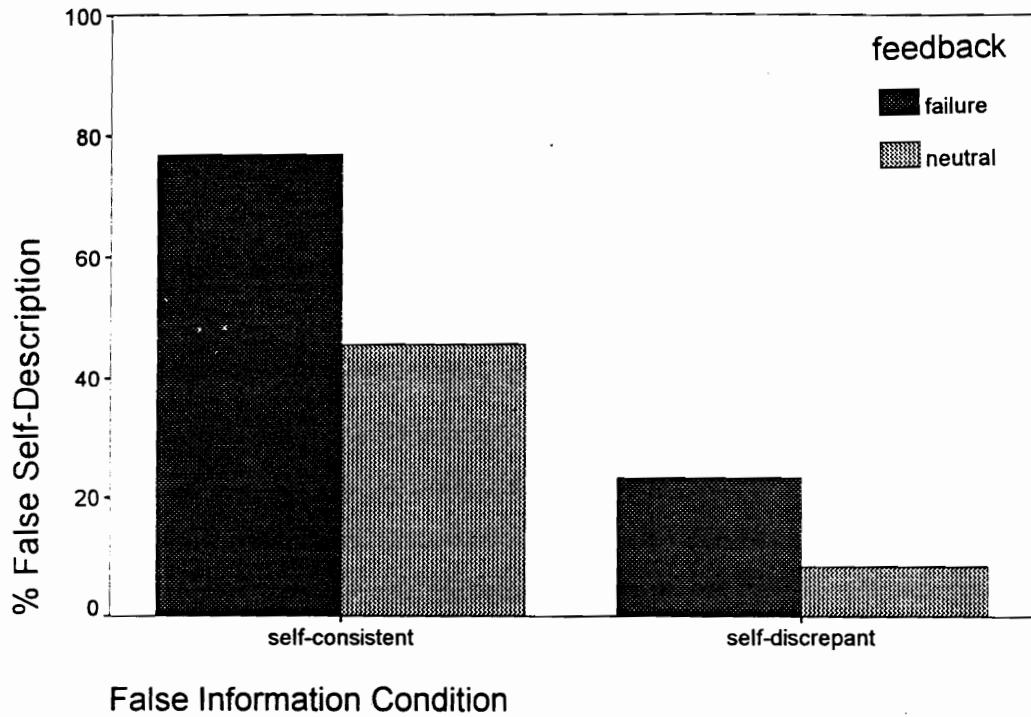
Figure 2. Percentage of Participants Who Displayed False Self-Description as a Function of False Information and Performance Feedback Conditions.

consistent/failure participants, as compared to the self-consistent/neutral participants, showed false self-description (a marginally significant difference, X^2 (1, n = 24) = 2.52 p < .06); and 15% more of the self-consistent/neutral participants used the false trait adjectives than the two self-discrepant groups. The self-consistent/neutral group was only significantly different from the self-discrepant/neutral group, X^2 (1, n = 24) = 4.10 p < .02; whereas the self-consistent /failure group was significantly different from both self-discrepant groups (neutral: X^2 (1, n = 25) = 11.91 p < .0001; failure: X^2 (1, n = 25) = 7.54 p < .002). The two self-discrepant groups were not significantly different from each other, X^2 (1, n = 24) = 1.34 p > .10.

The discrepancy between the loglinear and gamma analyses is very likely due to the number of cells in which the observed frequency is extremely small (less than five). Three of the eight cells had observed frequencies that were less than five, which results in cells with inadequate expected frequencies for a loglinear analysis. The problem with inadequate expected frequencies is that power can be drastically reduced, rendering the loglinear analysis ineffective (Tabachnick & Fidell, 1989). I have more confidence in the results produced by the gamma analysis because the gamma statistics is not vulnerable to the

problems associated with low frequencies (Hays, 1988)[2].

The loglinear analysis revealed there were nonsignificant interactions between false information condition and team performance feedback on the tendency to self-verify on the recall test or the recognition test, to use inconsistent trait adjectives to describe themselves on the recognition test or the recall test, or to refute the false information (all p's > .10). A gamma analysis confirmed this result.

Confidence

To test for a difference in confidence on the recognition test between inaccurate and accurate participants a 2 (False Information, self-consistent/self-discrepant) X 2 (False Recognition, accurate/inaccurate) X 2 (Performance Feedback, failure/neutral) analysis of variance was performed. This analysis yielded a nonsignificant 3-way interaction, nonsignificant 2-way interactions, and nonsignificant main effects, F's < 1, p's > .10.

A 2 (False Recall, accurate/inaccurate) X 2 (False Information, self-consistent/self-discrepant) X 2 (Performance Feedback, neutral/failure) ANOVA did not yield a significant 3-way interaction, any significant 2-way interactions, nor main effects for False Information or Performance Feedback, all F's > 1. It did reveal a

marginally significant main effect for False Recall, $F(1, 37) = 3.35$, $p = .07$. As in Study 1, these groups also had unequal variances, therefore the t-test for unequal variances was employed. This resulted in another replication of Study 1. Participants who reported the false information on the recall test, were significantly more certain they were correct (mean = 8.06, S.D. = 1.34) when they chose the false item on the recognition test than the participants who did not report the false information on the recall test (mean = 6.76, S.D. = 2.71), $t(38.21) = 2.18$, $p < .05$.

Discussion

The results of this investigation offered support for the prediction that performance feedback would moderate the acceptance and reporting of false information by self-schema condition participants. Participants given self-consistent false information and failure performance feedback were more likely to report the false information on the recall test than all other groups. The team performance feedback was given just prior to the recall narrative with the false information. The failure condition participant may have been motivated to attend to the information in the narrative and to search their memory of the problem solving session in order to understand the reason for the failure. This increase in cognitive effort may have increased attention to the false information which contributed to its being

recalled by self-consistent participants when probed for such information on the recall test.

The expected interaction between false information condition and performance feedback was not found for reporting false information on the recognition test. This may be because both self-consistent groups had such high levels of choosing the false items on the recognition test with the neutral group at ceiling (100%) and the failure group also very high (85%). Another potential problem was their cell sizes were different. Both groups had 11 participants choosing the false items, but the self-consistent/failure group (n = 13) had two more individuals than the other self-consistent group (n = 11).

Study 2 replicated the results found in Study 1 in that participants given self-consistent false information were more likely to report the false information and to use the false information traits to describe themselves than participants given self-discrepant false information. Also, self-discrepant participants, as in Study 1, were more likely to refute the false information as not descriptive of themselves. These findings provide further evidence that self-consistent false information primes one's self-schema for those traits thereby enhancing the potential for creating a false memory. In addition, priming a self-schema for a certain trait appeared to contribute to interpreting one's behavior during the problem solving session as

consistent with the false information as compared to other traits for which one is self-schematic.

General Discussion

Without [memory] all life and thought [are] an
unrelated succession. As gravity holds matter
from flying off into space, so memory gives
stability to knowledge; it is the cohesion which
keeps things from falling into a lump, or flowing
in waves (Ralph Waldo Emerson, <u>Natural History of</u>
<u>Intellect</u>).

The present investigation provided valuable information
for understanding the processes that can result in the
creation of false memories. The findings of both Study 1
and Study 2 provide strong evidence that the central role of
self-schemas in the processing of self-relevant information
can lead to the creation of a false memory for one's
personal past. When the false information is self-
consistent, it is more likely to be accepted and thereby
influences memory for the to-be-remembered event. When the
false information is self-discrepant, it is more likely to
be rejected and is less likely to influence further memory
processing. Study 2 showed that the team performance
feedback moderated the self-schema effect on recall of the
false information. More of the participants given self-
consistent false information and failure performance
feedback reported on the recall test the comments (the false
information) had been made by their partner during the
problem solving session than participants in any of the

other conditions.

Self-Schematic Processing of False Information

The results of both studies suggest the presentation of self-schema consistent false information primed the self-schema for that trait, and past behaviors were then interpreted through the lens of this schema. This conclusion is supported by the finding that a greater proportion of self-consistent condition participants described their problem solving behavior in a manner consistent with the false information trait adjectives rather than their other self-schematic traits. Priming participants' self-schema made those particular self-knowledge structures and conceptions more available in memory.

The results of this research support the role of a self-schema in guiding retrieval of memories from our personal past and accepting or rejecting self-relevant false information. I propose there are four steps in this process: (1) Assessment of accuracy, (2) encoding, (3) storage, (4) retrieval. A discussion of each of these steps follows for the processing of both self-consistent and self-discrepant information.

Processing Self-Consistent False Information

First, individuals who have received false self-related information about an event assess the accuracy of that information and the self-schema plays a principal role in

making this judgement. This conceptualization of the influence of self-schemas on memory is consistent with the findings of Ross's (e.g., 1989) implicit self-theories research, Hirt's (e.g., 1990) expectancy-guided retrieval research, as well as other schema-based theories of memory retrieval (e.g., Higgins & Lurie, 1983). Consistent with their research, it is suggested the participants in this research used their self-schema as the benchmark or comparison standard to compare their memory for comments made during the problem solving session with the comments suggested in the narrative, and a judgement of accuracy was made since the trait depicted in the comments is self-schema consistent. This first step of accuracy assessment has been referred to as discrepancy detection (Tousignant, Hall, & Loftus, 1986), the process of detecting a discrepancy between memory for the original, experienced event, and the false information in the postevent narrative. In this research, there was decreased potential for discrepancy detection for self-consistent condition participants since the false information was not discrepant with what was known to be true about the self.

The second step after the self-consistent false information is judged to be accurate is to encode the false information as an accurate self-description and personal experience. The third step is storage of the false information with other memories for the event. The fourth

step would be retrieval. Self-schematic traits are traits for which we are certain, and therefore are traits for which there would be an implicit theory of consistency (Ross, 1989). This implicit theory of consistency would guide the construction of the past, and therefore increase the tendency to create a false memory for self-consistent false information. When asked to recall the event the false information is retrieved with other event-related memories. Evidence that participants had created a false memory is that when reporting the false information on the tests some participants identified the person who made the comment. An example is when a Type B participant recalled "Kristin (a confederate) told me I was easy-going." This is notable since the narrative did not identify the partner reporting the comment and there were two possible partners who could have made the comment.

In addition, if the false information is accepted as accurate it is the most recent problem solving session memory stored in long-term memory. Memories that are recently stored are more likely to be readily accessible from memory. Therefore the false information is more likely to be retrieved. The effects of recency and availability on cognitive processes have been shown to be robust in the social cognition literature (e.g., Tversky & Kahneman, 1974; Wyer & Srull, 1989) and the false memory literature (e.g., Brown, 1994; Loftus et al., 1978).

Processing Self-Discrepant False Information

When self-discrepant information is given to the participant the first step is a judgement of inaccuracy. Using their self-schema as benchmark to judge the accuracy of the false information, self-discrepant participants would immediately notice the disparity between what they consider to be true about the self and the traits depicted in the false information. The second step is to either encode the false information as inaccurate or reject the false information and cease further processing. If the false information is not discarded from working memory, the third step is to store the false information with information from the recall narrative. The fourth step is retrieval. If the false information is retrieved in response to cues from a memory test it is not reported because it is labelled as inaccurate, or it may not be retrieved as the retrieval cues will not match the encoding cues.

Wyer and Srull (1989) postulate that information that is initially judged to be inaccurate is labelled as such when it is stored in long-term memory or it is discarded from working memory and never stored. While this was not directly assessed in this research, I observed five categories of responses made by self-discrepant condition participants upon hearing that the false information was an experimental manipulation during debriefing. First, some participants mentioned either not remembering reading the

false information, or that they had read something like it
but could not recall what it was, supporting Wyer and
Srull's discard postulate. Second, some participants
reported reading the comments but noted that they
disregarded them because they were certain these comments
were not directed to them during their session, consistent
with Wyer and Srull's inaccurate label postulate. Third,
self-discrepant participants who accepted that comments were
directed to them, and reported the false information on the
recall test, seemed to put a more than average level of
cognitive effort into processing them, either because they
were upset (e.g., the Type A participant who was disturbed
someone would say he was "low-key") or because they were
pleased (e.g., a Type B participant who was flattered
someone commented on her "perfectionism"). This third
response is consistent with another Wyer and Srull (1989)
postulate, namely that when something, such as a behavior,
is inconsistent with an expectation, it is thought about
more in order to resolve the inconsistency. This leads to
more associations being formed with the inconsistent
behavior, increasing the likelihood it would be recalled. A
fourth observation is that some self-discrepant participants
who accepted the false information and reported it on the
recall test distorted the false information to be consistent
with their self-schema. For example, a Type A participant
told his partner had commented he seemed to be a follower

asserted that his partners had misinterpreted his leadership strategy of withholding information as "following." Fifth, some self-discrepant participants accepted that comments were made during the session, but attributed the comments as being directed to one of the participant's partners, usually the partner whose demeanor "fit" the trait in the false information.

The processing of inconsistent information appears to be a more complex and variable process than the processing of consistent information. These post hoc content analyses of participants' responses suggest further false memory research can verify the above observed differences in a more systematic manner. (See Stangor & McMillan, 1992, for a recent meta-analysis and discussion of the processing of congruent and incongruent information.)

Self-verification research has shown that people's self-schemata, their stable and reliable self-knowledge structures, provide a sense of knowing what is real and not real, as well as a sense of living in a stable and predictable environment (McNulty & Swann, 1991; Swann, 1987). In this research this sense of knowing what is "real" contributed to recalling what was "not real." An important aspect of these results is the role played by self-schemata in rejecting the false information. This suggests that when feedback is provided to a person that is inconsistent with self-schemata it may be rejected, whether

it is accurate or inaccurate. These implications are important for arenas where individuals are given self-relevant feedback, not only during psychotherapy sessions, but also the workplace, school, and home.

The Moderating Effect of Performance Feedback

Study 2's findings demonstrated that the influence of self-consistent false information on memory is augmented when the cognitive processing of the information is motivated. It was assumed that participants given the failure feedback would have a desire to understand the negative outcome of their team's problem solving efforts. Subsequent processing of information related to the problem solving session would have therefore been more focussed and purposeful than the information processing of the neutral participants. Since the performance feedback was presented to participants just before they read the narrative, failure condition participants may have been motivated to attend to the information which resulted in encoding of the false information at a deeper level than the neutral participants. Evidence for this interpretation is that the self-consistent participants in the failure condition recalled more of the false information than the neutral condition participants.

This interpretation of the effects of motivated cognition is congruent with recent and past theorizing and research on self-motives for seeking self-knowledge (Higgins & Bargh, 1987; James, 1890; Klein & Kihlstrom, 1986; Markus

& Nurius, 1986). Cognitive processing of self-relevant information (information about one's traits, abilities, and performance) has a motivational function due to its implications for the current and future self, or in other words, its adaptive value (Fiske & Taylor, 1991; Markus & Nurius, 1986). Indeed, as most people desire to avoid having foolish ambitions like Cervantes' frog and wish to place themselves in contexts that provide opportunities for success, or at least that minimizes failure, then self-relevant information is especially important. Several psychologists have proposed that self-relevant information, because of its motivational implications, stimulates cognitive processes that are goal-directed (Higgins, Bond, Klein, & Strauman, 1986; Higgins & McCann, 1984; Markus & Nurius, 1986) and strategic (Showers & Cantor, 1985). Recent research revealed that negative information about the self, such as failure feedback, increases self-evaluative concerns and stimulates a desire for improvement (Taylor, Neter, & Waymont, 1995).

The team problem solving feedback would be relevant for the participants in this research as they are individuals who are preparing for future jobs or further education in which team problem solving may be an important aspect. In addition, it has been proposed that self-relevant information for which there is an uncertain self-assessment has relative importance as compared to a certain self-

assessment (Swann & Schroeder, 1995; Trope, 1986).
Participants in this research were uncertain of their own
contributions to the team's problem solving outcome. It is
logical that the degree of self-relevance and uncertainty
about their own contribution to the team's outcome would
have increased motivation to understand why their team
failed, as this information would have implication for
future problem solving efforts. It may be that this
increase in the degree of cognitive effort to process the
recall narrative enhanced the likelihood that self-
consistent false information would be recalled relative to
individuals given neutral team problem solving feedback.
Evidence for this interpretation is the finding that self-
consistent/failure condition participants were more likely
to report the false information on the recall test than
participants in the other three conditions. Future research
which compares post and pre-false information presentation
orders of the performance feedback could test the effect of
motivation on information processing.

Recent research has demonstrated that self-relevant
information processing influenced evaluation of and memory
for autobiographical advertisements (Price, 1996), and that
false information retrieved by motivated memory search
processes influenced causal inferences (Johnson & Seifert,
1994). Extrapolating from Johnson & Seifert's findings to
the present research, I suggest that the false information

in Study 2 may have explained the team's failure

performance, and this causal structure may have contributed

to the increase in false memories in the self-

consistent/failure feedback group. The attribution

literature on self-serving biases would suggest, however,

that the failure condition participants would not make an

internal attribution of failure interpretation regarding the

self-relevant information (e.g., Greenberg, Pyszczynski, &

Solomon, 1982; Weary, 1980). I note, however, that the

present research was investigating the role of false

information on memory, not causal inferences as in Johnson

and Seifert's experiments, so participants' inferences

regarding the cause of their team's problem solving

performance was not assessed. Future research could compare

explanatory structure conditions of false self-consistent

information with self-discrepant false information on

memory.

Sensitivity of Recognition Memory to the Old and Familiar

The recognition test showed the expected self-

consistent/self-discrepant false information differences in

both studies, however, Study 2's recognition test results

did not parallel the significant false information by

performance feedback interaction seen in the recall test

analysis. The lack of interaction may be attributed to both

the unequal group sizes for the two self-consistent

conditions and the relatively high levels of inaccuracy

demonstrated by self-consistent participants in both
performance feedback conditions. It is notable that an
impressively large proportion of the self-consistent
participants in Study 1 also chose the false item on the
recognition test.

The nature of recognition memory should be considered.
Recognition memory is the process of discriminating new from
old items (Glanzer, Adams, Iverson, & Kim, 1993).
Participants in this research were instructed to
discriminate actual comments from their problem solving
session from comments made during other participants'
sessions, not actual comments from false comments.
Therefore, the old items on this recognition test included
the two false information items previously presented. Given
that the false information items were "old" items, it is
understandable that such large proportions of self-
consistent participants chose the false information. The
sensitivity of recognition memory to new/old distinctions,
therefore, may have contributed to the high degree of
inaccuracy of both self-consistent groups.

This sensitivity may have also contributed to the
disparity between self-discrepant condition participants
performance on the recognition test relative to their recall
test performance. Previous false information research
exploring source misattribution errors (Lindsay & Johnson,
1987, 1989) has found that the mere familiarity of an item

leads participants to choose the false item on recognition tests, as would be expected by a memory mechanism designed to make old/new discriminations. In addition, the significant degree of inaccuracy displayed on the recognition test suggests the self-discrepant groups did not completely reject the false information outright as hypothesized. Future research on self-relevant false information effects on memory should include a control group to further investigate the decision processes of self-discrepant condition participants.

Previous postevent false information studies have shown that false information condition participants choose the false item on a recognition test with a high degree of certainty (Loftus, Donders, Hoffman, & Schooler, 1989; Loftus & Hoffman, 1989; Tversky & Tuchin, 1989). The certainty results in the present research moderately supported past research. The expected differences in certainty between participants who were accurate on the recognition test with those who were inaccurate was not found in Study 1 or Study 2. However, in both studies, the inaccurate recall test participants were reliably more certain of their inaccurate recognition test performance than were the accurate recall test participants. Three possibilities are suggested for this finding: (1) Inaccurate recall test participants had indeed completed the initial step of judging the false information to be accurate

as postulated earlier; or (2) the process of recalling the false memory on the recall test increased certainty levels when choosing the false item on the recognition test; and (3) as the two possibilities are not mutually exclusive, both could have contributed to the increased certainty found in this research.

Postevent False Information Research

The influence of postevent false information on memory for an event, shown by more than two decades of postevent research, was robustly supported by the present research. Moreover, the present research demonstrates the influence of self-consistency on the creation of a false memory for one's personal past. This finding supports the proposal that false memories are more likely to result from a therapist's suggestion that a person's present difficulties are the result of past abuse if it is consistent with a particular self-schema. In addition, the moderating effect of motivated cognition in producing a self-consistent false memory seen in this research supports the proposal that a therapist's encouragement to recall past abuse initiates motivated memory search processes which increases the likelihood that a false memory would be created.

Recently, false information researchers have extended the postevent information paradigm to include repeated retrieval procedures which results in producing elaborated, fully detailed memories for events that never happened. It

is therefore expected that further investigations of the effects of self-consistency processes on the creation of a false memory that include repeated retrieval procedures would result in the creation of more elaborate and detailed memories than produced by participants in this research. The increased confidence of inaccurate recall test participants indicates this elaboration process may have begun on the second retrieval, the recognition test.

Limitations of the Research

The Nature of the To-Be-Remembered Event. A possible criticism of this research is that although the processes of self-consistency and motivated cognition may contribute to the creation of a false memory of a relatively trivial, innocuous event, it is inappropriate to make inferences to a psychotherapy situation in which the client recalls a more traumatic experience. It is acknowledged that an experimental problem solving session lacks the penetratingly disturbing quality of childhood sexual abuse. However, in answer to this potential charge of generalizability the following is noted: (1) Laboratory research has demonstrated false memories of suggested childhood traumas (albeit mild) have been produced (e.g., Ceci, Leichtman, & White, in press; Hyman, Husband, & Billings, 1994; Loftus & Coan, in press); (2) This research was more concerned with investigating processes that influence false memory production of one's personal past than investigating false

memory production of a traumatic memory. Future research
(subject to ethical constraints) could investigate whether
the processes investigated here contribute to the creation
of a false memory of an event of a traumatic nature.

Method to Investigate the Proposed Processes. The goal
of this research was to investigate the processes of self-
consistency and motivated cognition in false memory
production. The method used to investigate these processes
was to manipulate the self-nature (consistent/discrepant) of
the false information and the valence (failure/neutral) of
performance feedback, and then infer from the memorial
outcome that the processes of self-consistency and motivated
cognition had produced the differences seen in the four
cells of this 2 X 2 array. Future research could do a finer
analysis of these processes using traditional, cognitive
measures of reaction time, eye-tracking, and cognitive
workload that have been employed successfully in research
investigating the misinformation effect (Tousignant et al.,
1986), attributional processes (e.g., Gilbert, McNulty,
Guiliano, & Benson, 1992), and reactions to self-relevant
feedback (Swann, Hixon, Stein-Seroussi, & Gilbert, 1990).
Implications for future research employing such procedures
are also discussed in the next section.

Implications for Information Processing Models

This research demonstrates failure to detect a
discrepancy between false postevent information and

information about the original event stored in memory.
Previous research has shown that the time in which this
detection is most likely to occur is when the postevent
information is first processed, either because participants
have been warned that the postevent information may contain
inaccuracies (e.g., Greene, Flynn, & Loftus, 1982) or
because participants have been instructed to read the
postevent narrative slowly (Tousignant et al., 1986).
Longer time intervals between the event and processing of
the postevent information decrease the probability that the
false information will be noticed and increase the
probability that a false memory will be created (Loftus et
al., 1978). In addition, the form of the postevent
information influences whether it will be detected: (1)
False information included in a minor rather than major
clause is less likely to be detected (Loftus, 1981); and (2)
As shown in this research, schema-consistent false
information is also less likely to be discovered.

If there is detection of the discrepancy between
postevent information and memory of the original event when
the postevent information is first presented, it most likely
occurs when the postevent information enters working memory.
If the postevent information seems inaccurate then the
memory of the original event would be retrieved into working
memory in order to compare the two information items.
Participants who have been warned there are inaccuracies in

the postevent information or who have been instructed to read slowly are less likely to display false recall (Greene et al., 1982). This is evidence that they have noted the false information and may be retrieving the original event memory and comparing the two items. When the false information is schema-consistent, as in this research, its inaccuracy is less likely to be noted since it is consistent with what the participant knows to be the "truth." Therefore, the step of retrieving the original memory into working memory is never carried out. Future research investigations of the processing of schema-consistent false information could employ eye-tracking and reaction time to explore whether the false information is or is not processed more fully when it is schema-consistent or inconsistent. In addition, comparison of working memory workload conditions could provide information on whether cognitive "busyness" interferes with detection of schema-consistent false information.

If detection of inaccuracies in the postevent information does not occur when it is first presented, then the false information is stored in longterm memory with other information about the event. If the false information is to be detected it will next occur when asked about the to-be-remembered event. If the question about the to-be-remembered event contains retrieval cues that include encoding cues of the false information, the false

information will be retrieved (Tulving & Thomson, 1973). If
the question does not contain retrieval cues which match the
encoding cues of the false information, then the false
information will not be retrieved and reported (Brown, 1994;
McCloskey & Zaragoza, 1985). Investigation of this
hypothesis could also employ reaction time and eye-tracking
procedures during the reading of and responding to memory
test questions. Previous research has shown that there are
faster response times to questions which probe false
information as compared to original event information
(Tousignant et al., 1986). This is very likely because the
false information is more accessible in memory than the
original event information since it is more recent (Brown,
1994; Tversky & Kahneman, 1974).

This discussion of the processing of false information
is consistent with most memory models (e.g., Anderson, 1990;
Hastie, 1988; Norman, 1976) . Wyer and Srulls' (1989) model
postulates that a chronically accessible concept such as a
bias or a self-schema, if primed, will affect encoding and
retrieval. Processing schema-consistent behavior creates
links between the behavior being perceived (a node) and the
concept node (self-schema) and an inference (another node).
These increased links would therefore enhance the likelihood
the behavior or inference would be retrieved if the self-
schema is primed again. This conceptualization is
consistent with the results seen in Study 1 and 2.

The earlier discussion of motivated cognition is also consistent with Wyer and Srull's (1989) model. Their model specifies that goal directed processing will also affect the encoding and retrieval of information and the inferences that are made. However, Wyer and Srull's model does not include the motivational effects of processing self-relevant information explored in this research.

Conclusion

This investigation expands our understanding of processes that contribute to the production of a false memory and extends the traditional, postevent false information paradigm. Specifically, a self-schema guides cognitive processes and increases the likelihood that participants will confidently recall a self-relevant comment that was never spoken because it is consistent with what is known about the self. Furthermore, this result is amplified when a self-schema's principal role in guiding self-relevant information processing is motivated by the desire to understand an unexpected failure experience. Indeed, this research provides experimental evidence for Morgan's (1930/1961) observation that autobiographical memory often includes "supplementary inference . . . wherein 'must have been' masquerades as 'was so.'"

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Appendix A

Personality Prescreen, Experiment Number 1054

Informed Consent Form

Principal Investigator: Martha Brown

<u>Purpose of this Research</u>:

You are invited to participate in a study about personality differences. The purpose of this research is to prescsreen subjects on a personality measure. This is a prescreening for a 2 extra credit team problem-solving study.

<u>Procedures</u>:

The procedures to be used in this research are completing personality tests. You will receive one hours extra credit for your participation. You will be free to withdraw your participation at any time without penalty.

<u>Benefits of this Project</u>:

Your participation in the project will provide information about your responses on a personality measure.

No guarantee of benefits is being made to encourage you to participate.

You may receive a synopsis or summary of this research when completed. Please leave a self-addressed envelope.

<u>Extent of Anonymity and Confidentiality</u>:

The results of this study will be kept strictly confidential. You will be assigned a subject number in the problem solving study and this will be used on all your data. Therefore, only a subject number (not your student ID number) will identify you during analyses and any written reports of the research.

<u>Compensation</u>:

You will receive 1 hour extra credit for the psychology class in which you are enrolled. Please consult your class syllabus for how many extra credit points allowable in your class, how much of your grade they are worth, and the alternative ways of earning extra credit.

<u>Freedom to Withdraw</u>:

You are free to withdraw from this study at any time without penalty. If you choose to withdraw, you will be compensated with the extra credit. There are alternative choices for receiving extra credit for the course evaluation.

<u>Approval of Research</u>:

This research project has been approved, as required, by the Institutional Review Board for projects involving human subjects at Virginia Polytechnic Institute and State University and by the Department of Psychology.

<u>Subjects Permission</u>:

I have read and understand the above description of the study. I have had an opportunity to ask questions and have had them all answered. I hereby acknowledge the above and give my voluntary consent for participation in this study.

I understand that I will receive one extra credit in my Psychology class for participation in this research. I understand that I may be called back and invited to participate in team problem solving research. I understand that my participation in the personality prescreen does not obligate me to further participation in the problem solving research. I further understand that if I participate I may withdraw at any time without penalty.

I understand that should I have any questions regarding this research and its conduct, I should contact any of the persons named below.

Martha L. Brown, Principal Investigator 387-2786
Helen J. Crawford, Faculty Advisor. 231-6520
Richard Eisler, Chair, Human Subjects Committee. . 231-7001
    Department of Psychology
Ernest Stout, Chair, Institutional Review Board . . 231-9359

SUBJECTS SIGNATURE_____

DATE_____

SUBJECTS ID _____

Appendix B

Team Problem Solving, Experiment Number 1050

Informed Consent Form

Principal Investigator: Martha Brown

<u>Purpose of this Research</u>: You are invited to participate in a study about individual differences in team problem solving. This study involves experimentation for the purpose of studying cooperative team problem solving. This study involves participation with other subjects.

<u>Procedures</u>: The procedures to be used in this research are completing personality and cognitive measures, participating with another subject in solving problems in one session, and then completing some questionnaires about your reactions to the problem solving task in the second session. You will receive one hours extra credit for each session, for a total of two extra credits.

The possible discomfort that you may experience is similar to the pressure one feels when playing Trivial Pursuit when there is limited time to solve a problem with another person.

Safeguards to minimize your discomfort will be that you are free to withdraw your participation at any time without penalty. However, if you only come to the first session you will only receive just the one extra credit for that session.

<u>Benefits of this Project</u>: Your participation in the project will provide information of how different individuals interact cooperatively to solve problems.

No guarantee of benefits is being made to encourage you to participate.

You may receive a synopsis or summary of this research when completed. Please leave a self-addressed envelope.

<u>Extent of Anonymity and Confidentiality</u>: The results of this study will be kept strictly confidential. At no time will the researchers release the results of the study to anyone other than individuals working on the project without your written consent. The information you provide will have your name removed and only a subject number will identify you during analyses and any written reports of the research.

The experiment will be audiotaped. These tapes will only be reviewed by Martha Brown, and other experimenters. The tapes will only be identified by a subject number and will be confidential.

<u>Compensation</u>: You will receive 2 hours extra credits for

your psychology class in which you are enrolled. Please consult your class syllabus for how many extra credit points allowable in your class, how much of your grade they are worth, and the alternative ways of earning extra credit. If you sign-up for this research and agree to come to both sessions and do not show up for one of the sessions your credits can be debited for the session that you missed.

<u>Freedom to Withdraw</u>: You are free to withdraw from this study at any time. If you choose to withdraw, you will be compensated with the extra credit for the experimental session in which you participated. There are alternative choices for receiving extra credit for the course evaluation.

<u>Approval of Research</u>: This research project has been approved, as required, by the Institutional Review Board for projects involving human subjects at Virginia Polytechnic Institute and State University and by the Department of Psychology.

<u>Subjects Permission</u>:

I have read and understand the above description of the study. I have had an opportunity to ask questions and have had them all answered. I hereby acknowledge the above and give my voluntary consent for participation in this study.

I understand that I will receive 2 extra credits in my psychology class for participation in this research. I understand that I will receive 1 extra credit for each experimental session in which I participate and that my participation is needed in each experimental session. I further understand that if I participate I may withdraw at any time and will be compensated only for the experimental session in which I participated; and if I agree to come to a session and do not notify the experimenter of my withdrawal my extra credit points may be debited for the session missed.

I understand that should I have any questions regarding this research and its conduct, I should contact any of the persons named below.

Martha L. Brown, Principal Investigator 387-2786
Helen J. Crawford, Faculty Advisor. 231-6520
Richard Eisler, Chair, Human Subjects Committee. . 231-7001
Ernest Stout, Chair, Institutional Review Board . . 231-9359

SUBJECTS SIGNATURE_____

DATE_____

SUBJECTS ID _____

Appendix C

Directions: This questionnaire has to do with how you describe yourself. Use the following scale to indicate how much like you the following adjectives are.

not at all like me   1 2 3 4 5 6 7 8 9   very much like me

Rating	Adjective		Rating	Adjective
1.___	contemplative		24.___	driven
2.___	perfectionist		25.___	yielding
3.___	funny		26.___	indulgent
4.___	quick-tempered		27.___	accepting
5.___	relaxed		28.___	energetic
6.___	mellow		29.___	content
7.___	casual		30.___	stubborn
8.___	leader		31.___	sociable
9.___	punctual		32.___	active
10.___	calm		33.___	untroubled
11.___	determined		34.___	trusting
12.___	outgoing		35.___	tireless
13.___	private		36.___	compulsive
14.___	compliant		37.___	hesitant
15.___	artistic		38.___	composed
16.___	restless		39.___	competitive
17.___	serious		40.___	critical
18.___	insensitive		41.___	adaptive
19.___	cautious		42.___	satisfied
20.___	carefree		43.___	flexible

21.___	unhurried	44.___	workaholic
22.___	cooperative	45.___	proud
23.__	creative	46.___	forgiving
47.___	mild	57.___	easy-going
48.___	intense	58.___	ambitious
49.___	religious	59.___	pessimistic
50.___	sentimental	60.___	persevering
51.___	nonchalant	61.___	precise
52.___	patient	62.___	tolerant
53.___	enthusiastic	63.___	follower
54.___	fearful	64.___	kind
55.___	aloof	65.___	peaceful
56.___	aggressive	66.___	pressured

Directions: Please indicate your degree of certainty about your rating for each of the traits you just rated. Use the following scale to indicate how certain you are of your previous rating.

extremely uncertain 1 2 3 4 5 6 7 8 9 **extremely certain**

Rating	Adjective	Rating	Adjective
67.___	contemplative	80.___	driven
68.___	perfectionist	81.___	yielding
69.___	funny	82.___	indulgent
70.___	quick-tempered	83.___	accepting
71.___	relaxed	84.___	energetic
72.___	mellow	85.___	content
73.___	casual	86.___	stubborn
74.___	leader	87.___	sociable

75.___	punctual		88.___	active
76.___	calm		89.___	untroubled
77.___	determined		90.___	trusting
78.___	outgoing		91.___	tireless
79.___	private		92.___	compulsive
93.___	compliant		113___	hesitant
94.___	artistic		114___	composed
95.___	restless		115___	competitive
96.___	serious		116___	critical
97.___	insensitive		117___	adaptive
98.___	cautious		118___	satisfied
99.___	carefree		119___	flexible
100___	unhurried		120___	workaholic
101___	cooperative		121___	proud
102___	creative		122___	forgiving
103___	mild		123___	easy-going
104___	intense		124___	ambitious
105___	religious		125___	pessimistic
106___	sentimental		126___	persevering
107___	nonchalant		127___	precise
108___	patient		128___	tolerant
109___	enthusiastic		129___	follower
110___	fearful		130___	kind
111___	aloof		131___	peaceful
112___	aggressive		132___	pressured

130

Appendix D

NASA MOON LANDING SURVIVAL TASK

You are members of a space crew originally scheduled to rendezvous with a mother ship on the lighted surface of the moon. Due to mechanical difficulties, however, your ship was forced to land at a spot some 200 miles from the rendezvous point. During landing much of the equipment aboard was damaged, and since survival depends on reaching the mothership, the most critical items available must be chosen for the 200-mile trip. Below are listed the 15 items left intact and undamaged after landing. Your task is to rank-order them in terms of their importance to your crew in helping them to reach the rendezvous point. Place the number 1 by the most important item, the number 2 by the second most important item, and so on, to the least important, #15.

A team of experts from NASA rank-ordered the items, and this ranking is considered as the "correct" answer against which rankings are compared. Your goal is to work as a team so that we can determine which individuals and teams work can come up with the most correct solution.

Please contact the experimenter if you have any questions.

_____ box of matches

_____ food concentrate

_____ signal flares

_____ fifty feet of nylon rope

_____ parachute silk

_____ portable heating unit

_____ two .45 caliber pistols

_____ one case of dehydrated Pet milk

_____ two 100-lb. tanks of oxygen

_____ stellar map (of the moon's constellations)

_____ life raft

_____ magnetic compass

_____ five gallons of water

_____ first-aid kit containing injection needles

_____ solar-powered FM receiver-transmitter

Appendix E

The Lifeboat Survival Task

You are crew members of a ship that is about to sink. As the ship's crew you will need to decide what items from the list below should be transferred to a life raft before the ship sinks. Not all items will fit in the life raft, nor will there be time to transfer all items before the ship goes down in 15 minutes. Your task is to rank-order the items in terms of their importance to our crew in surviving an indeterminate amount of time in a life raft in some point in the ocean. Place the number 1 by the most important item, the number 2 by the second most important item, and so on, to the least important. Please contact the experimenter if you have any questions. A team of experts has rank-ordered the items, and this ranking is considered as the "optimal solution" against which rankings are compared. Your goal is to work on these rankings together so that we can determine which teams can come up with the most correct solution.

____   sextant

____   shaving mirror

____   one case of U.S. Army C-rations

____   mosquito netting

____   maps of the pacific ocean

____   seat cushion (flotation devise approved by the U.S. Coast Guard)

____   Simex star finder

____   5-gallon can of water

____   fishing kit

____   ship's compass

____   2-gallon can of oil-gas mixture

____   small transistor radio

____   20 square feet of opaque plastic

____   15 feet of nylon rope

____   2 boxes of chocolate bars

Appendix F

NASA MOON LANDING SURVIVAL TASK

The problem-solving session begins with:
    (1) One partner suggesting to the subject that he/she
read through   the   whole list;
    (2) One partner then asks if the team wants to start
        with most important or the least important items
        first

As the items are discussed these points are made by the
confederates. After one point is made **wait** for the subject to
respond, if the subject does not make the second point the
second confederate does. If the subject responds with the
scripted point, then the second confederate responds
appropriately.

1.   box of matches
       a. no oxygen--useless, we should put it last

2.   food concentrate
       a. need food for survive
       b. true, but you can go without food for several days
          so maybe other things could go ahead of it.

3.   signal flares
       a. do you need oxygen to light them?
       b. some flares work under water so they would probably
          work on the moon

4.   fifty feet of nylon rope
       a. seems worthless--can't use it for anything
       b. rope has multiple uses--could use to carry
          supplies, tie people together

5.   parachute silk
       a. can't use it anywhere, seems like we wouldn't need
          it
       b. can carry supplies, use as shelter

6.   portable heating unit
       a. May be really cold; no atmosphere
       b. spacesuits are insulated

7.   two .45 caliber pistols
       a. use for propulsion
       b. need oxygen to fire

8.   one case of dehydrated Pet milk
       a. could be source of food supply that would be
          lighter and easier to carry

b. concentrated food just as light and more nutritious

9. two 100-lb. tanks of oxygen
   a. no oxygen on the moon--definitely need it

10. stellar map (of the moon's constellations)
    a. need to know where you are going
    b. could we use the radio and have the mothership direct us?

11. life raft
    a. use to carry supplies and people
    b. the parachute silk could serve the same purpose and is easier to handle.

12. magnetic compass
    a. no poles on the moon
    b. we have a stellar map--don't need a compass

13. five gallons of water
    a. essential for survival

14. first-aid kit containing injection needles
    a. what are the injection needles for?
    b. but the first aid kit is useful--what if someone gets injured?

15. solar-powered FM receiver-transmitter
    a. could use it to communicate with the mothership
    b. yes, but we don't its range

Things that are not on the list. These should only be addressed if the subject brings them up. Of course you can address them but don't allow them to lead to argument. It's okay to say you don't think so, or that you disagree--just don't let it drag on.

1. You can't get hurt in a spacesuit so we don't need a first-aid kit.

2. We could inject water (or food) through suit into blood stream (Yuch!)

3. Heater: Could it connect to suits and if it did could it only connect to suits one at a time and the others wait.

The Lifeboat Survival Task

The problem solving session begins with:
   (1) one partner suggesting to the subject that he/she read through the list;

(2) One partner then asks if the team wants to start with
the most important items or the least important
items.

As the items are discussed these points are made by the
confederates. After one point is made **wait** for the subject to
respond, if the subject does not make the second point the
second confederate does. If the subject responds with the
scripted point, then the second confederate responds
appropriately

_____   sextant
a.   What is it used for?
b.   Its a navigational device that measures the angle
     from the ship to the sun and the horizon. Somehow
     it helps in pinpointing a location.

_____   shaving mirror
a.   Why would we need a shaving mirror?
b.   It could be used as a signal

_____   one case of U.S. Army C-rations
a.   Well, food is essential.
b.   Space is tight in a life raft, what about the fishing
     kit for food.

_____   mosquito netting
a.   no mosquitoes in the middle of the ocean
b.   we could use it as a fishing net
c.   Is it strong enough--it seems too flimsy for that
d.   yes, if you double it over

_____   maps of the pacific ocean
a.   We need to know our location
b.   Since we don't have any form of propulsion, a map
     really wouldn't help

_____   seat cushion (flotation devise approved by the U.S.
          Coast Guard)
a.   If the raft sinks, could use the cushion to stay
     afloat
b.   that's true, but one cushion alone wouldn't do
     anything
c.   If someone falls overboard we could throw them the
     seat
     cushion

_____   Simex star finder
a.   this would be helpful t pinpoint our location on
     the map
b.   With no engine we couldn't go towards any location

_____   5-gallon can of water
    a.   water is absolutely essential
    b.   would get dehydrated really fast in an open life raft

_____   fishing kit
    a.   Would need that as a source of food--don't know how long we'll be out there
    b.   Should we put it before or after the C-rations?

_____   ship's compass
    a.   What good would knowing north and south be?
    b.   Well, it would help us find our way to an island on the map
    c.   could use the sun for that

_____   2-gallon can of oil-gas mixture
    a.   What go is that to us?
    b.   Could use it as a sterilizer--it kills bacteria
    c.   Could use it to make a torch to signal
    d.   c-rations contain matches to light

_____   small transistor radio
    a.   Is it a 2-way radio?
    b.   We could use it for entertainment

_____   20 square feet of opaque plastic
    a.   seems useless
    b.   could be used to catch rainwater and for shelter from the sun
    c.   could also use to capture evaporated sea water by having it condense on the plastic and drains it into the water container

_____   15 feet of nylon rope
    a.   don't see how that would help us
    b.   it has multiple uses--could be used to tie us down in a storm, or to tie down supplies

_____   2 boxes of chocolate bars
    a.   no nutritional value
    b.   that's true, but it is a source of carbohydrates

Things not on the list and should not be said. If the subject says them they can be addressed, but don't get into an argument over them.
1. raft will catch fire
2. chocolate will melt
3. ships today automatically put out signals when they capsize
4. fishing kit has a net

Appendix G

Problem _____   Subject # _____

On the sheet below (and back if needed) write everything you
can recall about the problem solving session. This includes
all comments made by you and your partners, even if they seem
trivial. Let me stress it is important that you write
EVERYTHING, even that which seems unimportant!

Appendix H

Subject #: 2044

NASA Moon Landing Survival Task

Your partner reported reading through the list at the beginning of the session. Your other partner reported then asking if the group should start with the least or most important items. You reported stating that the team didn't need the matches since to have a fire you need oxygen and there is none on the moon. Your partner reported saying the oxygen was most important, and asked if the group was trying to survive or find the mothership. You reported the group decided the oxygen tanks were most important, followed by the water next. Your partner reported you suggested taking the water and then the map and compass. This partner reported then noting that the compass wouldn't work because there are no poles on the moon, and your other partner agreed. Your partner reported suggesting the radio could be used to call the mothership and they could come and pick the group up, so it should be taken. Your partner reported you asked about the silk and this partner thought it could be used to carry things. This same partner reported you agreed, but thought it might rip. You reported the group decided the raft was unimportant along with a few other items, like the pistols. You reported the group then decided the raft could be important along with the nylon string because you could drag the raft after putting some of the equipment into it. Your

partner reported noting that the raft might be useless since there is no water. You reported it was suggested that you take the parachute silk and put one of the oxygen tanks in it and shoot it with the gun and it would propel the group to where it needed to go. You reported the idea was then dropped and the parachute silk was determined to be useless. Your partner reported pointing out that the rope was useful. Your partner reported asking about the heating unit, asking if it's cold on the moon. This partner reported you said it was, if the group was on the dark side. Your partner reported asking what the injection needles were for, and that your other partner answered they were to inject heroine. Your partner reported feeling impatient when one of your teammates made a couple of off-the-wall suggestions, but that it didn't seem to bother you. This partner recalled saying to you that "you seem patient."

Lifeboat Survival Task

Your partner reported reading through the list of items at the beginning of the session. You reported the group began with noting that with no way of propulsion, such as a motor, that the maps and star finders would be useless. Your partner reported you thought the mosquito netting would be useless, but that your other partner thought it could be used to protect everyone from the sun. You reported the group decided the water would be the most important followed by the plastic, because the plastic could shield you from the sun and other

elements and it could catch rainwater. You reported the army rations were decided to be next in the line of importance followed by the shaving mirror, which could be used to signal other boats, or planes, or helicopters passing by. Your partner reported asking if the group could get anywhere and you answered "no, not unless we have paddles." This same partner reported suggesting that you burn the oil/gas mixture as a signal for nighttime or on a cloudy day. Your partner reported you asked where it could be burned, and you reported it was decided that you could use the rope, floating seat, and gas mixture to also signal planes by pouring the gas on the seat and lighting it and pulling it behind with the rope. You reported the fishing kit came next in case the group ran out of food. Your partner reported deciding to take the chocolate bars, and the mosquito netting to tie stuff down during a storm. Your partner reported taking the radio because everyone could dance around the raft. You reported this was the item placed before the maps and navigational tools, which your partners reported were ranked last. Your partner noted that you seemed the more passive member of the team and reported saying to you that "you seem low-key."

Appendix I

Describe yourself and your partner's as members of a team and the role each played in the task. Complete this question right in the space provided below. You can use the back of the paper, if needed.

1. How successful do you think the team was arriving at the decisions?

>   not at all successful   1   2   3   4   5   6   7   very successful

2. How clear was your understanding of the task?

>   not at all   1 2 3 4 5 6 7 very much

3. Did you help clarify the steps necessary to accomplish the task?

>   not at all 1 2 3 4 5 6 7 very much

4. Did your partners help clarify the steps necessary to accomplish the task?

>   not at all 1 2 3 4 5 6 7 very much

5. Which partner was the most helpful in clarifying the steps necessary to accomplish the task?

6. How much leadership did you display in accomplishing this task?

>   none 1 2 3 4 5 6 7 very much

How much leadership did your partners display in accomplishing this task?

7. Partner's name _____

>   none 1 2 3 4 5 6 7 very much

8. Partner's name _____

>   none 1 2 3 4 5 6 7 very much

9. How much control did you display during the problem solving?

>   no control at all 1 2 3 4 5 6 7 very much control

How much control did your partner's display during the problem solving?

10.   Partner's name _____

no control at all 1 2 3 4 5 6 7 very much control

11.   Partner's name _____

no control at all 1 2 3 4 5 6 7 very much control

12. How much did you determine the procedures followed by the group?

not at all 1 2 3 4 5 6 7 very much

How much did your partners' determine the procedures followed by the group?

13.   Partner's name _____

not at all 1 2 3 4 5 6 7 very much

14.   Partner's name _____

not at all 1 2 3 4 5 6 7 very much

15.   Did you feel free to discuss your ideas with the group?

not at all 1 2 3 4 5 6 7 very much

16.   Was there a member of the team who discouraged other members from   discussing their ideas?

a. yes   b. no

if yes, who? _____

17. Is there a member of the team who made team members feel or look   foolish because of their ideas?

a. yes   b. no

if yes, who? _____

18. Did you seriously work on this task?

   not at all 1 2 3 4 5 6 7 very much

19. Did you feel your own ideas were taken into consideration in the   final rankings?

   not at all 1 2 3 4 5 6 7 very much

20. Was this a personally satisfying experience?

   not at all 1 2 3 4 5 6 7 very much

21. How satisfied are you with the manner in which the decisions were   reached?

   not at all 1 2 3 4 5 6 7 very much

22. How well would this team be expected to perform on a similar task   in the future?

   very poorly 1 2 3 4 5 6 7 extremely well

23. What percentage of the total time did each member spend in group participation? (Please make sure your numbers, when added, equal   100%)

   yourself _____ %

   Partner's name _____   _____%

   Partner's name _____   _____%

Appendix J

On the following pages are open ended questions about the problem solving session.

Please answer each one as thoroughly as you can. Please do not omit any details, no matter how trivial or inconsequential they may seem.

Describe your behavior and all your comments during the problem solving session.

Describe your partners' behavior and all their comments during the problem solving session.

Describe as many of your partner's evaluative statements directed toward you that you can remember.

Describe as many of your own evaluative statements directed toward your partners that you can remember.

Appendix K

Subject # _____

Below are several verbal statements that were reported in
the recalls as being made during problem solving sessions.
These statements came from all subjects's recalls tested
this week. Some statements are from your problem solving
session and other sessions as well, therefore some
statements are not from your session. Please identify who
made the statement during your problem solving session and
your level of certainty about who made the statement. I am
interested in how **you** remember the problem-solving session.

1. "Oh, yeah, tie it with the rope."

a. me b. my partner _____ c. neither my partner or I
                          name
very uncertain 1 2 3 4 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?_____

2.   "I don't think I could eat raw fish."

a. me b. my partner_____ c. neither my partner or I
                        name
very uncertain 1 2 3 4 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?_____

3. "Well, if it takes a long time to be rescued and we run
out of food, we'd need the chocolate bars."

a. me b. my partner_____ c. neither my partner or I
                        name
very uncertain 1 2 3 4 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

4. "We could use the guns in case we need to commit
suicide."

a. me b. my partner_____ c. neither my partner or I
                        name
very uncertain 1 2 3 4 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

5. "You are creative today, aren't you?"

a. me b. my partner_____ c. neither my partner or I
                        name
very uncertain 1 2 3 4 5 6 7 8 9   very certain

6. "You're persistent."

a. me b. my partner_____ c. neither my partner or I
                    name
very uncertain 1 2 3 4 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

7. "The Simex starfinder must be like a Timex for navigation."

a. me   b. my partner_____ c. neither my partner or I
                    name
very uncertain 1 2 3 4 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

8. "Rope rules in survival problems."

a. me b. my partner_____ c. neither my partner or I
                    name
very uncertain 1 2 3 4 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

9. "A sextant is a navigational thing--I read about it in Robinson_ Caruso."

a. me   b. my partner_____ c. neither my partner or I
                     name
very uncertain 1 2 3 4 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

10. "Right on, my brother!"

a. me b. my partner_____ c. neither my partner or I
                    name
very uncertain 1 2 3 4 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

11. "I haven't learned about this moon stuff since the 3rd grade!"

a. me b. my partner_____ c. neither my partner or I
                    name
very uncertain 1 2 3 4 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

12. "You seem hesitant."

a. me   b. my partner_____   c. neither my partner or I
                        name
very uncertain 1 2 3 **4** 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

13. "I don't mean to use the mosquito netting to catch bugs."

a. me   b. my partner_____   c. neither my partner or I
                        name
very uncertain 1 2 3 **4** 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

14. "Seems like you're to be the leader."

a. me   b. my partner_____   c. neither my partner or I
                        name
very uncertain 1 2 3 **4** 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

15. "I shaved yesterday so we don't need the mirror."

a. me b. my partner_____   c. neither my partner or I
                        name
very uncertain 1 2 3 **4** 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

16. "There is something about the oil-gas mixture that is important."

a. me b. my partner_____   c. neither my partner or I
                        name
very uncertain 1 2 3 **4** 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

17. "The chocolate would make us fat and weigh down the boat."

a. me b. my partner_____   c. neither my partner or I
                        name
very uncertain 1 2 3 **4** 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

18.   "You're assertive."

    a.   me   b.   my partner _____   c.   neither my partner or I

<div align="center">name</div>

    very uncertain 1 2 3 4 5 6 7 8 9   very certain

    If you chose a or b, who was this comment directed to?

19.   "Chocolate is in the top ten so how bad can it be?"

    a.   me   b.   my partner_____   c.   neither my partner or I

<div align="center">name</div>

    very uncertain 1 2 3 4 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

20. "I never made anything like that when I was little."

    a.   me   b.   my partner_____   c.   neither my partner or I

<div align="center">name</div>

    very uncertain 1 2 3 4 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

21.   "I wish we had the flares now."

    a.   me   b.   my partner_____   c.   neither my partner or I

<div align="center">name</div>

    very uncertain 1 2 3 4 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

22.   "I'm impressed with your vast wealth of knowledge."

    a.   me   b.   my partner_____   c.   neither my partner or I

<div align="center">name</div>

    very uncertain 1 2 3 4 5 6 7 8 9   very certain

    If you chose a or b, who was this comment directed to?

23. "You seem tolerant."

    a. me   b. my partner_____   c. neither my partner or I

                                    name

    very uncertain 1 2 3 4 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

24. "If we're gonna go down we might as well take a baby seal with   us!"

    a. me   b. my partner_____   c. neither my partner or I

                                    name

    very uncertain 1 2 3 4 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

25. "You're laid-back."

    a. me   b. my partner_____   c. neither my partner or I

                                    name

    very uncertain 1 2 3 4 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

26. "The parachute could be used like a giant sack like Santa Claus."

    a. me   b. my partner_____   c. neither my partner or I

                                    name

    very uncertain 1 2 3 4 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

27. "You seem like a perfectionist."

    a. me   b. my partner_____   c. neither my partner or I

                                    name

    very uncertain 1 2 3 4 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

28. "The mosquito netting could be used as a stylish bee keeper   thing."

     a. me   b. my partner_____   c. neither my partner or I

                                name
     very uncertain 1 2 3 4 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

29. "I'll bet you never hurry."

     a. me   b. my partner_____   c. neither my partner or I

                                name
     very uncertain 1 2 3 4 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

30. "If the pistols do fire the person would just go flying off because of the propulsion."

     a. me   b. my partner_____   c. neither my partner or I

                                name
     very uncertain 1 2 3 4 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

31. "At least we'd have fun while we're stuck here."

     a. me   b. my partner_____   c. neither my partner or I

                                name
     very uncertain 1 2 3 4 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

32. "We should take Dr. Jenkins with us to help with the fishing."

     a. me   b. my partner_____   c. neither my partner or I

                                name
     very uncertain 1 2 3 4 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

33. "It's possible to eat raw fish just try to avoid salmonella."

    a. me   b. my partner_____ c. neither my partner or I

<div style="text-align:center">name</div>

    very uncertain 1 2 3 4 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

34. "You seem kinda stubborn."

    a. me   b. my partner_____ c. neither my partner or I

<div style="text-align:center">name</div>

    very uncertain 1 2 3 4 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

35. "I remember seeing something about plastic catching rainwater on   3-2-1 Contact"

    a. me   b. my partner_____ c. neither my partner or I

<div style="text-align:center">name</div>

    very uncertain 1 2 3 4 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

36. "You seem willing to follow us on this task."

    a. me   b. my partner_____ c. neither my partner or I

<div style="text-align:center">name</div>

    very uncertain 1 2 3 4 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

37. "Everything was freezing in 'Apollo 13'."

    a. me   b. my partner_____ c. neither my partner or I

<div style="text-align:center">name</div>

    very uncertain 1 2 3 4 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

38. "We could listen to tunes on the radio while we die."

    a. me   b. my partner_____   c. neither my partner or I
                                   name
    very uncertain 1 2 3 4 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to? _

39. "If we're not no it the Pacific Ocean there's no point to having the maps."

    a. me   b. my partner_____   c. neither my partner or I
                                   name
    very uncertain 1 2 3 4 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to? _

40. "Thank you, Vanna."

    a. me   b. my partner_____   c. neither my partner or I
                                   name
    very uncertain 1 2 3 4 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

41. "We need the professor from Gilligan's Island on our raft."

    a. me   b. my partner_____   c. neither my partner or I
                                   name
    very uncertain 1 2 3 4 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

42. "You can't put a hole in the spacesuits."

    a. me   b. my partner_____   c. neither my partner or I
                                   name
    very uncertain 1 2 3 4 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

43. "There aren't any babies on this trip!"

     a. me   b. my partner_____ c. neither my partner or I

                           name
     very uncertain 1 2 3 4 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

44. "MacGyver is my hero"

     a. me   b. my partner_____ c. neither my partner or I

                           name
     very uncertain 1 2 3 4 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

45. "We could use the map to tell us where the waves are."

     a. me   b. my partner_____ c. neither my partner or I

                           name
     very uncertain 1 2 3 4 5 6 7 8 9   very certain

If you chose a or b, who was this comment directed to?

Appendix L

Debriefing

"The study is over. However, before you leave I would like to tell you a little bit more about the study and ask you a few questions. First, we'd like to know what you think the study is about, so on the back of your sheet (have the subject use the back of their last questionnaire) write what you think this study was investigating."

When the subject is done ask the following question: "(1) Do you have any questions regarding this study? (2) Was every aspect of the study perfectly clear?" (Experimenter: take notes on their comments.)

"People react to things in different ways, so it would be helpful to us if you would comment on how this study may have affected you and why you responded as you did." **Experimenter,** ask the following questions and again take notes: (1) Did you find any aspect of the study odd or confusing? If so, Why? (2) Do you think there may have been more to the study than meets the eye? If yes, please explain. If yes, please explain how this might have affected your behavior.

"This research was investigating the effects of a person's self-concept on recall of a social interaction. Some subjects were given false information in the combined recalls you read at the beginning of the session and some were in a control condition."

Experimenter: Ask and take notes on the following--"Which condition do you think you were in: (1) The false information condition or the control condition (where there is no false information)." If the subject asks which condition they are in tell them that you do not know--that the experimenter is blind to the subject's condition.

"You should be aware that the combined recall you read at the beginning of this session contained some incorrect feedback about your partners' comments and behavior. Your partner did not say or do any of those things. You were told this to see if you would include this feedback in your memory measures. This research is investigating how false memories can be created--the condition is either self-consistent or self-inconsistent false information.

I want you to know that your partners were not actual subjects, they worked for the experimenter. Their role in this experiment was to just solve the problem, their purpose

is to make sure that all subjects in this experiment have essentially the same problem solving interaction--for experimental control.

I regret that in order to study how false memories are created we needed to use deception--if there were any way to study false memories without using deception I would. This information helps experimental and clinical psychologist understand memory processes and the factors that contribute to the creation of false memories."

"If you are uncomfortable with any aspect of this study you may withdraw your consent for use of the audiotape or other information you provided in this experiment. If you would like we will simply erase the tape. Would you like to withdraw your consent? I would like to explain that anyone can create a false memory and the results of this research will be used to inform counselors, social workers, and other clinical practitioners."

Experimenter: "Do you have any questions you would like to ask about the experiment?" The experimenter will answer any questions about the experiment the subject may have and the answers will put the experiment into the context of memory research.

Experimenter: "Are you experiencing any discomfort as a result of participating in this research?" The experimenter will discuss the subject's reaction to the procedures here to make sure he/she is comfortable. If there is any discomfort the experimenter will explain that referral resources (e.g., the University Counseling Center) are available to the subject if needed or desired.

Information from this research provides us with an understanding of the role of the self-concept in recalling memories about ourselves in social interactions, and particularly its role in the creation of illusory memories.

Please do not talk about this research with anyone. You can understand that if other subjects know the purpose of our research they could not act naturally and therefore obstruct our progress in gaining an understanding of self-concepts and the creation of illusory memories.

Thank you very much for participation in this research.

Appendix M

NASA Landing Survival Task

Your team ranked _____ of the <u>15</u> items correctly according to
NASA's rankings.   Your team ranked in the _____
percentile of the teams that have solved this problem
according to NASA's statistics.

Lifeboat Survival Task

Your team ranked _____ of the <u>15</u> items correctly according to
Department of the Navy's rankings.   Your team ranked in
the _____ percentile of the teams that have solved this
problem according to Department of the Navy's statistics.

Appendix N

NASA Landing Survival Task

Your team ranked _____ of the <u>15</u> items correctly according to
NASA's rankings.   Your team ranked in the _____
percentile of the teams that have solved this problem
according to NASA's statistics.

Lifeboat Survival Task

Your team ranked _____ of the <u>15</u> items correctly
according to Department of the Navy's rankings.   Your team
ranked in the _____ percentile of the teams that have
solved this problem according to Department of the Navy's
statistics.

your teams scores are not
yet available.

Appendix N

NASA Landing Survival Task

Your team ranked _____ of the 15 items correctly according to NASA's rankings.   Your team ranked in the _____ percentile of the teams that have solved this problem according to NASA's statistics.

Lifeboat Survival Task

Your team ranked _____ of the 15 items correctly according to Department of the Navy's rankings.   Your team ranked in the _____ percentile of the teams that have solved this problem according to Department of the Navy's statistics.

Your team's scores are not yet available.

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EDUCATION

Virginia Polytechnic Institute and State University
Blacksburg, Virginia, 24061
December, 1996, Doctoral Candidate, Applied
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Virginia Polytechnic Institute and State University
Blacksburg, Virginia, 24061
May, 1992, Master of Science, Applied Experimental
Psychology

Roanoke College
Salem, Virginia 24153
May, 1989, Major: Psychology
Bachelor of Arts, magna cum laude

AWARDS

Karl Beck Award, Psychology, Roanoke College, 1989

Guy Eckman Independent Study Award, Roanoke College,
1989

TEACHING EXPERIENCE

Lecturer, courses in Introductory Psychology, Social
Psychology, and Learning, Roanoke College, August 1995-
present. Responsible for teaching classes consisting
of approximately 11-32 students. Supervisor: Ronda
Carpenter, Ph.D.

Lab Instructor, Laboratory course in Cognitive
Psychology, Virginia Polytechnic Institute and State
University, January 1992-May 1994. Responsible for the
teaching of laboratory classes consisting of
approximately 15-20 students each. Supervisor: Helen
Crawford, Ph.D.

Teaching Assistant, Introductory Psychology,
Virginia Polytechnic Institute and State University,
January 1990-May 1991. Responsible for discussion
classes consisting of approximately 35 students each.
Supervisor: Robert Brill

Chair, Travel and Tourism, National Business College, Salem, September 1983-December 1986. Responsible for development, supervision, and teaching of the travel and tourism curriculum. Supervisor: Frank Longaker

RESEARCH EXPERIENCE

Graduate Researcher, Cognitive Processing Laboratories, Department of Psychology, Virginia Polytechnic Institute and State University; September, 1989-present. Conduct on-going research on social influences on memory, including eyewitness memory and false memories, and relationships between visuospatial reasoning and analytical reasoning to mathematic achievement. Supervisor: Helen J. Crawford, Ph.D

Intern, Learning Center, Roanoke College, January, 1989-June, 1989. Assisted in research on the predictors of academic success in college, and other institutional research projects. Supervisor: Catherine Cook, Ph.D.

Undergraduate Researcher, Department of Psychology, Roanoke College, January, 1989-December 1990. Assisted in research on women's expectations of parturition as mediated by individual differences. Supervisor: Galdino Pranzarone, Ph.D.

UNPUBLISHED MANUSCRIPTS

Brown, M. L. (1994). Retrieval Processes Producing the "Misinformation Effect" in Eyewitness Memory: Application of Wyer and Srull's Model of Social Information Processing. Preliminary Examination Paper, Virginia Polytechnic and State University.

Cook, C., & Brown, M. L. (1989). Effectiveness of the Career Center's Services as Perceived by Faculty and Administration. In-house publication, Roanoke College, Salem, Virginia.

Cook, C., & Brown, M. L. (1989). Report of Students' Evaluations of the Learning Center Counselors at Roanoke College. Roanoke College, Salem, Virginia.

PUBLICATIONS

Brown, M. L., & Crawford, H. J. (1996). Geometry Achievement in High School Boys and Girls: Differential Contributions of Visuopsatial Skills, Logical Reasoning, and Working Memory Capacity. Presently under review for <u>Journal for Research in Mathematics Education</u>.

PRESENTATIONS

Brown, M. L. False Memory Production: Effects of Self-Consistent False Information. Paper submitted for presentation May 23, 1997 at American Psychological Society, Washington, D.C.

O'Berry, J. L., Holt, M. J., Brown, M. L., and Crawford, H. J. Happy Andre and Sad Jack: Effects of Mood Induction on Recall; paper presented July 2, 1995; Southeastern Psychological Association.

Brown, M. L., and Crawford, H. J. Visuospatial and Analytical Skills, and Span of Short-Term Memory: Relations to Geometry Achievement; August 14, 1992, American Psychological Association, Washington, D.C.

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Pranzarone, G. F., and Brown, M. Erotophobia/Erotophilia and Childbirth Scenario as Predictors of Women's Expectation of Experience during Parturition; November 2, 1990, The Society for the Scientific Study of Sex, Minneapolis, MN.

Brown, M., Kitner-Triola, M, Clarke, S., & Crawford, H. Visuospatial Skills and Mathematics: Relationships and Gender Differences; April 4, 1990, Southeastern Psychological Association, Atlanta, GA.

PROFESSIONAL MEMBERSHIPS

American Psychological Society
American Psychological Association
Society for Personality and Social Psychology