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Information search and creativity: The role of need for cognition and personal involvement

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INFORMATION SEARCH AND CREATIVITY:

THE ROLE OF NEED FOR COGNITION AND PERSONAL INVOLVEMENT

A Thesis

Presented to the

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and the

Faculty of the Graduate College

University of Nebraska

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INFORMATION SEARCH AND CREATIVITY:

THE ROLE OF NEED FOR COGNITION AND PERSONAL INVOLVEMENT

Jody J. Illies, MA

University of Nebraska, 1999

Advisor: Roni Reiter-Palmon, Ph.D.

The effects of type of personal involvement and need for cognition on information search behaviors and creative problem solving were investigated. It was predicted that participants who are involved through the personal relevancy of the outcome of a problem would engage in more information search behaviors and be more creative than participants who are involved through having their values and morals engaged. It was also predicted that participants high in need for cognition would engage in more information search behaviors and would be more creative than would participants low in need for cognition. Results showed that information search behaviors effectively predicted creative problem solving. Results also revealed advantages of high outcome involvement and detriments of high value involvement. Participants who were asked to provide a solution to a high outcome-involvement problem engaged in more information search behaviors and were more creative than participants who were asked to solve either a high value-involvement problem or a low involvement problem. Participants with high value involvement engaged in more information search behaviors but wrote solutions that were even less creative when compared to participants who had a low level of involvement. The effects of type of personal involvement on creative problem solving

were not mediated by information search behaviors. Participants' need for cognition was not related to information search behaviors or creativity. Based on the results, it is suggested that organizations can enhance employee creative problem solving by providing them with the time and resources needed to engage in information search and by creating high personal involvement in organizational outcomes. However, organizations should avoid heavily engaging employees' values and morals because high value involvement can be detrimental to creative problem solving.

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Table of Contents

Discussion

Figures

Tables

Appendixes

Information Search and Creativity:

The Role of Need for Cognition and Personal Involvement

The Study of Creativity

Less than a half century ago, J. P. Guilford (1950) reported that the empirical study of creativity was being seriously neglected. This neglect was occurring, Guilford observed, even though creativity could be measured and a person's creative potential could be determined. The opportunity to increase creative potential through instruction or training underscores the importance of researching the creativity construct. Although research on creativity has increased, Sternberg and Lubart (1996) recently observed that few resources were being utilized in explaining the creative process in comparison to other psychological phenomena of the same importance. They stated that creativity carries the same importance as intelligence due to today's rapidly changing environment that forces people to cope with novel situations. Ward, Finke, and Smith (1995) also emphasized that the changing world demands people be able to develop creative solutions to novel problems as a means of adapting successfully. Thus, the importance of increasing the general understanding of creativity is very evident, despite its slowly developing empirical background.

The lack of empirical investigation on creativity can be attributed to two main issues. Historically, creativity was thought of as only applying to artists, musicians, and the few others, who, through some "divine intervention," solved a complex problem or construed some magnificent idea or product (Kneller, 1965; Sternberg & Lubart, 1996).

In other words, creativity was defined in terms of the "creative" person. For this reason, research attempted to discover what innate personality characteristics produced this type of person (Sternberg & Lubart, 1996). Examples of people who fell into this "creative person" category (e.g., Einstein, Mozart, etc.) were very rare. Despite this, studies focusing on the characteristics that described these people were done to the exclusion of looking at the situations in which creativity happened or of looking at the creative process itself and the outcome of that process (Amabile, 1996). The result was an overall assumption that creativity did not apply to the average individual.

Recently, a very different view of creativity has emerged. It is now widely accepted that creativity is distributed throughout the general population (Houtz, 1994; Treffinger, Isaksen, & Dorval, 1994). Guilford (1950) emphasized that extraordinary skills are not a requirement for creativity. It is possible for all people to be creative in any given situation (Runco & Chand, 1994). All people encounter novel situations that can, and sometimes even must be dealt with creatively (Amabile, 1997; Ward et al., 1995). Recent research, therefore, is being directed towards demonstrating that creativity can be recognized (Amabile, 1996) and can be taught (Frederiksen, 1984; Treffinger et al., 1994). The assumption that creative ability is found and utilized in the general population, along with the fact that it can be recognized and taught, has been fundamental to the recent study of creativity. By looking at the creative product and understanding the processes that lead to that product, along with the personality characteristics of the person producing that product, researchers are better able to understand and apply creativity in

the general population.

The complexity of the creativity construct is a second, albeit similar reason why creativity research has progressed slowly (Finke, Ward, & Smith, 1992; Mumford & Gustafson, 1988). This complexity limited initial attempts at measurement (Amabile, 1996) because each researcher selected his/her own individual aspect of creativity to operationalize and, consequently, ended up explaining only a small amount of the variability in creative ability. This resulted in the development of three different definitions of creativity: (a) those that addressed the creative person, (b) those that addressed the creative product, and (c) those that addressed the creative process (Amabile, 1996).

Mumford and Gustafson (1988) responded by suggesting that research on creativity should not be avoided because of its complexity; it should be studied within that framework. They emphasized that researchers need to study creativity as a "syndrome." Sternberg and Lubart (1996) also found that if creativity is researched as a multifaceted construct, comprised of factors such as intellectual processes, knowledge, thinking style, personality, and motivation, a more complex but much more complete understanding takes form. Thus, the creative person, process, and product should not be looked at as exclusive ways of defining creativity. Each adds to the explanation of the creativity construct and, therefore, all need to be explored theoretically and empirically. This is not to say that individual aspects of creativity should not be studied separately. Results, however, should be interpreted within this complex framework (Mumford,

Supinski, Threlfall, & Baughman, 1996).

Defining creativity. Even though research into creativity as a multifaceted

construct has increased, a universally accepted definition has not fully evolved (Amabile,

1996; Mumford & Gustafson, 1988). In 1996, Amabile stated that there still was not

enough known about creativity to have a consistent, accurate definition. Because the

creativity construct is so difficult to operationalize, past definitions were based on how

each researcher subjectively viewed it (Amabile, 1996). However, Amabile insisted

empirical research on creativity should not wait for the development of an agreed upon,

objective definition. Runco and Chand (1994), after reviewing many articles on problem

finding, also emphasized that creative problem solving, as it is found in real-world

situations, can and should be studied empirically, even without a unified definition.

Recently, many researchers have defined creativity in terms of the product

because operational definitions using the product are the most accessible at this time.

Amabile (1996) stated that definitions based on the creative process are not yet "feasible"

and definitions that look at the creative person are still too subjective. Amabile added that

regardless of whether one's definition looks at the person or the process, s/he must

eventually consider the result in making inferences. A creative product is defined as one

that is both original/novel and appropriate/useful (Amabile, 1996; Feist, 1998; Mumford

& Gustafson, 1988). Also, the path to this product will be ill-defined and heuristic. Thus,

various conditions must be present to make a problem solution creative. At any given

time, problems may be solved in original ways, or in useful ways, or in ill-defined

situations. Individually, these solutions usually will not be creative. Creative problem

solving will be seen when all three conditions are present in a problem/solution.

The creative process. Even though creativity is usually operationalized using the

creative product, positioning creativity in a theoretical framework necessitates an

understanding of the processes leading to the creative result. The creative process can be

construed as an extension of problem solving (Newell, Shaw, & Simon, 1962). Usually, a

problem solver posses an extant knowledge base of facts that is applied in solution

generation (Mumford, Mobley, Uhlman, Reiter-Palmon, & Doares, 1991). This is also

true, but not sufficient, for creative problem solving. Creative problem solving also

entails ill-defined problems that require novel solutions (Frederiksen, 1984; Mumford et

al., 1991). Ill-defined problems usually require different cognitive strategies than well-

defined problems (Schraw, Dunkle, & Bendixen, 1995). This ill-defined situation should

be thought of as necessary but not sufficient for creative solutions to be generated. Ill-

defined problems can be, and many times are, solved without the solution being

considered creative.

In addition to ill-defined scenarios, creativity requires both divergent and

convergent thought. These two styles of thinking are required for the combination and

reorganization of existing schemata needed in the early stages of creative problem solving

(Mumford et al., 1991). Divergent and convergent thought also aid in the generation of

solution alternatives and allow for the flexibility needed in evaluating those alternatives

and selecting the best solution. In contrast, traditional problem solving emphasizes

convergent thought as the person is more likely to satisfice with the first relevant schema encountered (Mumford et al., 1991). In creative problem solving, the problem solver searches and reorganizes many schemata in producing many alternative solutions, some of which will tend to be creative.

Therefore, the creative process usually involves more cognitive activity and flexibility than the problem-solving process. Mumford, Reiter-Palmon, and Redmond (1994) stated that one of the cognitive requirements for creative problem solving in ill-defined situations is knowledge in the form of extant, "organized" schemata. These extant schemata are manipulated in different ways in an effort to develop alternative solutions to novel problems (Mumford et al., 1994). Therefore, the creative process must involve a search of existing schemata or, if a possible matching schema is not found, a search for information that will aid in the development of new problem schemata. Second, this process must also include the cognitive combination and reorganization of these extant or developed knowledge categories in ways that will facilitate generating solutions to ill-defined problems (Baughman & Mumford, 1995; Mobley, Doares, & Mumford, 1992; Mumford et al., 1991).

Thus, the creative problem solver cannot just apply extant knowledge, but must cognitively manipulate this knowledge in new and appropriate ways. In an effort to understand how cognition plays a role in creative problem solving, many researchers have developed models of creativity using a cognitive-processes foundation. These cognitive models attempt to understand the core processes involved in creative thought

and the types of mental representations that are utilized in creative problem solving

(Mumford et al., 1991; Sternberg & Lubart, 1996).

Many cognitive-process models have been developed over the years, differing in

the nature of processing (conscious versus unconscious) and number of core processes

involved. Recently, Mumford et al. (1991) reviewed these creativity models and, based

on them, developed a more comprehensive analytic model of their own (see Figure 1).

According to the relationships among the core processes of creative thought suggested by

this model, if an appropriate or satisfactory solution is not found, the problem solver may

return to any earlier stage. However, Mumford et al. proposed that people usually return

to the stage directly preceding the current stage. The model also clearly displays the

importance of both convergent and divergent thought. The creative person must not only

use divergent thinking in developing new ways to construe and structure a problem but

must also use convergent thinking in selecting the most relevant information and in

deciding on the best method to be used in generating solutions (Mumford et al., 1991).

Finally, and maybe most importantly for creative problem solving, Mumford et al.

(1991) emphasized with their model that the success of the creative process depends

heavily upon the first couple of stages, primarily on the problem construction stage and

the information encoding stage. They alleged that these early stages might be the decisive

factor in transforming traditional problem solving into creative problem solving.

Research has shown that problem finding requires different skills than those used in

traditional problem solving (Smilansky, 1984; Wakefield, 1992). These skills, which aid

Figure 1

Hypothesized relationships among the core creative processes

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        ┌──────────────────────────┐
    ┌──▶│   Problem Construction    │◀──┐
    │    └──────────────────────────┘   │
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    │                 ▼                  │
    │    ┌──────────────────────────┐   │
    │    │   Information Encoding     │◀──┘
    │    └──────────────────────────┘
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    │    │     Category Search       │◀──┐
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    │  │ Specification of Best-Fitting   │◀─┐
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    └────│       Monitoring          │
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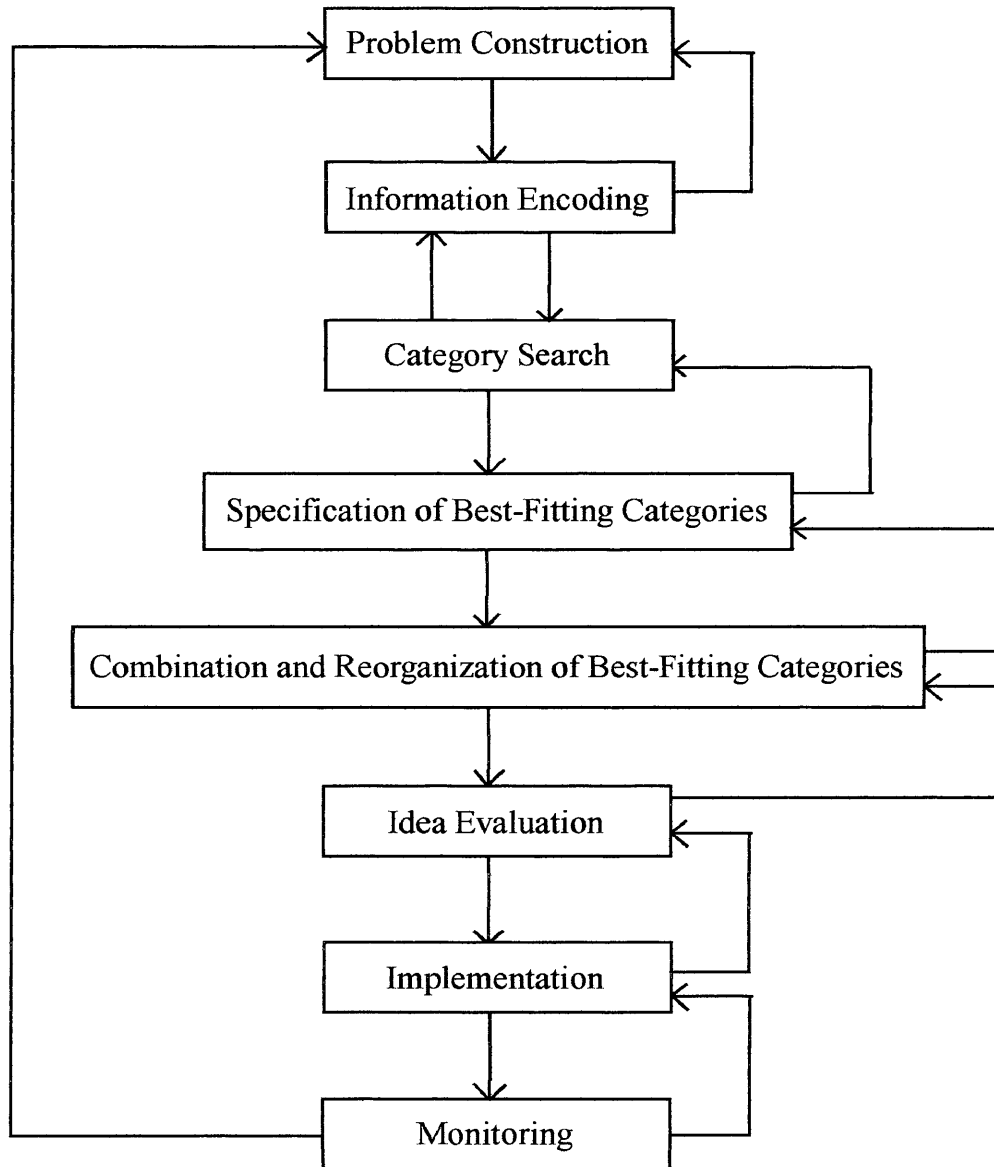
Note: From "Process analytic models of creativity capacities," by
M. D. Mumford, M. I. Mobley, C. E. Uhlman, R. Reiter-Palmon,
and L. M. Doares, 1991, Creativity Research Journal, 4, p. 106.
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in the discovery and construction of problems, are essential to creative performance

(Wakefield, 1985). Mumford et al. (1994) emphasized that the problem construction stage

lays the groundwork on which the remaining creative problem-solving stages are based.

In support of this contention and the model as a whole, Mumford, Supinski, Baughman,

Costanza, and Threlfall (1997) found that problem construction, information encoding,

category selection, and category combination processes are all effective predictors of

creative performance above and beyond divergent-thinking ability and verbal-reasoning

ability.

Information Search and Creativity

Mumford et al. (1991) reported that the information search process, followed by

the information encoding process, needs to be understood because errors made in these

early processes influence the later stages of the creative problem solving. Information

search behaviors are incorporated heavily in the early stages of the creative process and

have been reported as essential in those ill-defined domains that require creative thought

(Frederiksen, 1984). Searching for and encoding faulty or irrelevant information will be

detrimental to effective solution development. Smith (1989), for example, found that

errors in problem representations caused by faulty information search and interpretation

resulted in deficient problem solving. The study of the information search process, then,

is essential to the understanding of creative problem solving.

Guilford (1950) noted that creative individuals have the ability to produce many

ideas on a given topic. Accordingly, a high degree of information search is required for

the development of creative solutions. It was mentioned above that information search is important early in the creative process. Therefore, this search process should affect the early stages of the Mumford et al. (1991) process analytic model. Although beyond the scope of this study, it is speculated that information search behaviors have a large impact during the transition from the problem construction stage to the information encoding stage. Each of these stages will be discussed briefly to illustrate this theory.

Problem construction. Problem construction is one of the most important processes in delineating creativity from traditional problem solving (Mumford et al., 1991). Mumford et al. (1994) defined problem construction as the "plan for process execution serving to structure and direct the problem-solving effort" (p. 6). Runco and Chand (1994) discussed that a very similar process, problem finding, is critical in the solving of real-world problems occurring in natural environments. Tegano, Sawyers, and Moran (1989) reported that the best point in which to develop creative problem solving is in the problem finding stage.

Empirically, in the now well-known longitudinal study of problem finding in artists, Getzels and Csikszentmihalyi (1976) found that problem finding was not only predictive of creativity in current situations, but was also predictive of productivity and originality later in life. In a more recent study, Redmond, Mumford, and Teach (1993) found that people who engaged in problem-construction activities spent more time solving problems and produced higher quality and more original solutions. Similarly, Reiter-Palmon, Mumford, and Threlfall (1998) found that not only did problem

construction affect solution quality and originality directly, but that individuals with high problem-construction ability defined and constructed problems in ways that were familiar to them, which in turn also positively affected solution quality and originality.

Many empirical studies have demonstrated that problem construction is essential in defining the information that will be needed in continuing the creative process. Without engaging in problem construction, most problem solvers satisfice with the first relevant problem schema encountered and do not search for the additional information that will make the solution creative (Mumford et al. 1994). Thus, problem-construction ability allows people to recognize alternative plans that may be used to represent and solve a problem.

Mumford et al. (1994) reported that during problem construction a person activates or creates a problem representation that structures the problem and serves as a guide for the remaining stages of the creative process. Most immediately, this representation identifies the information needed in generating solutions to the problem (Mumford, Baughman, Costanza, Uhlman, & Connelly, 1993). Thus, it will guide the information search behaviors of the problem solver. Once a person structures a problem, they will have a better idea of the information they need to search for, either form long-term memory or from external means.

In summary, problem construction lays the foundation for the information search process in creative problem solving (Mumford et al., 1993). Problem construction shapes the creative-process plan and sets the stage for the second process, information encoding.

The problem representation and solution-development plan, identified through the problem construction process, guide the information search process, which in turn, identifies the pertinent information to encode (Mumford et al., 1993; Mumford et al., 1991).

Information encoding. Once a person has searched and retrieved the information needed to generate solutions to a problem, s/he will need to encode that information in a manner that will facilitate the solving of the problem. This encoding process is the second stage of the Mumford et al. (1991) model. As discussed earlier, when solving a novel problem based on the problem representation developed through problem construction, an individual will need both extant and new knowledge. Extant knowledge will be gathered by searching and retrieving relevant information from long-term memory. Non-existing knowledge will be gathered by analyzing given or found information and deciding on the relevance of this information to the given problem; this process is sometimes referred to as information use. The relevant information from both sources will then be encoded into the current problem schemata under the framework of the problem representation.

In an empirical study of the role of information use in creativity, Reiter-Palmon, Mumford, O'Connor Boes, and Runco (1997) demonstrated that information use will have a positive affect on creative problem solving. In this study, participants were given consistent or inconsistent cues to a novel, real-world problem. Inconsistent cues were incongruous with the other information in the problem. After participants solved the problem, Reiter-Palmon et al. looked at whether or not participants were able to use the

discrepant cues in their solutions. Results showed that those participants who were high

in problem construction ability used the inconsistent cues and were more creative as a

result.

Similarly, it has been found that the retrieval and/or use of a larger scope of

information by engaging in extended information search has a positive effect on creativity

(Finke et al., 1992). Emphasizing this idea, Mumford, Baughman, Supinski, and Maher

(1996) stated that the type of information people search for and encode when faced with a

novel, real-world problem will lay the foundation for the creative process. They found

that the time spent on information encoding predicted creative performance. Thus, the

more information one searches for and retrieves, the more information there is to encode,

and the more information that will be available for the later stages of the creative process.

Conclusions regarding information search and creativity. Information search is

fundamental to the creative process and is speculated to have the greatest impact between

the problem construction and information encoding stages of the Mumford et al. (1991)

process analytic model. Once a problem is constructed and a unified problem

representation is identified, the next step is to search for relevant information based on

the problem representation. This information search will be both internal and external.

Next, the resultant information will be encoded in a manner that facilitates solution

generation.

Thus, information search will have a major impact during the rest of the creative

process. Finding a creative solution will be facilitated if a person has a wide range of

information encoded on an issue, which will be dependent upon the amount of time spent searching for information and the amount and quality of information generated from that search.

Mumford, Baughman, Supinski, et al. (1996) hypothesized that there are fundamental differences between people in the type of information searched for when encountering an ill-defined problem. It follows that this individual difference will have a considerable effect on creativity. Mumford, Baughman, Threlfall, Supinski, and Costanza (1996), for example, found that information search activities centered on high quality and appropriate aspects of a chosen problem representation may be more influential in creative problem solving than just a search of original elements. This study demonstrated that determining what influences information search and encoding behaviors in individuals will increase the understanding of the creative process as a whole. The present study will address further the effect of information search on creativity. Hypothesis one addresses the first part of this issue.

Hypothesis 1: Given an open-ended, real-world problem, increases in problem-related information search behaviors will be accompanied by increases in the creativity of the solutions generated for that problem.

Information search is essential for creative problem solving in ill-defined domains. Also, people differ in information search strategies and effectiveness

(Mumford, Baughman, Supinski, et al., 1996). Therefore, determining the characteristics of the person, problem, and/or situation that facilitate or hinder information search will further the understanding of the creativity construct. Chaiken, Wood, and Eagly (1996) reported that there are individual differences and situational differences that affect a person's motivation to process information. Similarly, Amabile (1996) and Feist (1998) discussed that there are two areas of research that address factors affecting creativity: individual differences and social/situational aspects. This study addresses one variable in each domain. Need for cognition was examined as an individual-difference variable and personal involvement was considered as a social/situational variable.

Need for Cognition

Cohen, Stotland, and Wolfe (1955) reported that people have a need to understand what is happening around them. They labeled this characteristic the need for cognition. People differ in the strength of this need (Cacioppo & Petty, 1982), and it would seem that those who have a high need for cognition would have a tendency to spend more time in the early stages of the creative process. The early stages are when an attempt is made to understand and structure a problem through problem construction, information search, and information encoding.

Elaborating on the construct identified by Cohen et al. (1955), Cacioppo and Petty (1982) proposed that the need for cognition was a stable individual difference. They defined this difference as a need to engage in and enjoy thinking. People high in need for cognition are more inclined to organize and elaborate on information and are motivated

by intrinsic motivation (Cacioppo, Petty, Feinstein, & Jarvis, 1996). Cacioppo et al. (1996) reported that people who are high in need for cognition also enjoy thinking about and reflecting on information rather than using heuristics or social comparisons. As a result, they suggested that people high in need for cognition have more information available to them on a wider range of topics. Because of this, they will engage in a more active information search (Cacioppo et al., 1996).

Research has tended to support the need for cognition as a stable individual difference (Cacioppo et al., 1996). Cacioppo, Petty, and Morris (1983) found that participants who were high in need for cognition reported exerting more cognitive effort and were more affected or persuaded by strong arguments on an issue. Participants in this study were given either strong arguments in favor of comprehensive exams or tuition increases being implemented at their school or given weak arguments for these changes. Participants high in need for cognition tended to be persuaded by the strong arguments (unlike those low in need for cognition) even though the outcomes were aversive in nature. This indicated that people high in need for cognition were willing to consider and think about the information given to them to the extent that they were persuaded by strong arguments contrary to their existing attitude.

To further the explanation of the need for cognition construct, Cacioppo, Petty, Kao, and Rodriguez (1986) incorporated it into the Elaboration Likelihood Model (ELM) (Petty and Cacioppo, 1984). According to this model, there are two routes that one can follow when processing information. One is a peripheral route where little effort is

afforded to information processing. The second is a central route where the person diligently looks at the information with his/her full attention. Using the ELM framework, individuals who are low in need for cognition can be thought of as processing information along the peripheral route whereas those high in need for cognition will follow the central route (Cacioppo et al., 1986).

Cacioppo et al. (1986) found support for this relationship by demonstrating that people high in need for cognition were more likely to process and consider strong arguments. Specifically, they found that participants high in need for cognition thought more about the 1984 presidential election and were more knowledgeable about this election than those low in need for cognition, indicating use of the central route by those high in need for cognition. In a very similar study, Condra (1992) found that participants high in need for cognition were more involved in politics, talked politics more often, and were more interested in the 1988 presidential debates.

Many similar studies have explored the need for cognition (Cacioppo et al., 1996), all helping to advance the understanding of the construct. For example, Verplanken (1989) found that need for cognition moderated the attitude-behavior relation. Participants who were high in need for cognition were more likely to behave in a manner consistent with their attitude than those low in need for cognition. In a similar study to those conducted by Cacioppo et al. (1986) and Condra (1992), Ahlering (1987) found that people high in need for cognition were more likely to report the intent to watch the 1984 presidential debates.

Other studies have shown that the need for cognition is positively but moderately related to attributional complexity ($\underline{r}$ = .36, Fletcher, Danilovics, Fernandez, Peterson, & Reeder, 1986), intrinsic motivation ($\underline{r}$ = .69, Amabile, Hill, Hennessey, & Tighe, 1994) and self-esteem ($\underline{r}$ = .42, Osberg, 1987). Need for cognition has also been shown to be negatively related to dogmatism ($\underline{r}$ = -.24, Fletcher et al., 1986), cognitive closure ($\underline{r}$ = -.28, Webster & Kruglanski, 1994), extrinsic motivation ($\underline{r}$ = -.27, Amabile et al., 1994), ambivalence ($\underline{r}$ = -.41 & -.33, Thompson & Zanna, 1995) and social anxiety ($\underline{r}$ = -.28 & -.30, Osberg, 1987). Need for cognition has also been shown to have small to moderate correlations with intelligence ($\underline{r}$ = -.03 with abstract reasoning, Cacioppo et al., 1983; $\underline{r}$ = .32 & .15 with verbal reasoning, Cacioppo et al., 1986 and Cacioppo et al. 1983, respectively). All of these studies have increased the discriminant validity of the need for cognition construct.

Cacioppo et al. (1996) discussed that people high in need for cognition engage in more information processing, have the ability to recall more information, and have more information accessible to them. These characteristics imply that people high in need for cognition would also engage in more information search behaviors and, thus, be more effective problem solvers. Less research exists on the effect of need for cognition on actual information search and problem solving. However, the empirical evidence that does exist indicates that the need for cognition positively influences information search behaviors.

One such study by Verplanken, Hazenberg, and Palenewen (1992) found that

when evaluating a product based on information that could be acquired, people with a high need for cognition desired more information and used more cognitive effort than people low in need for cognition. However, participants in this study did not actually search for information, they simply indicated what information they would desire if in that situation. In a follow-up study, Verplanken (1993) refined these results by actually allowing participants to search and screen information. Results again revealed that participants with a high need for cognition engaged in more cognitive effort, which was measured by the total number of information-relevant responses - those responses that related to the alternatives or dimensions being searched. However, contrary to indications from the Verplanken et al. (1992) results, participants high in need for cognition did not actually search for more information than people low in need for cognition. Verplanken speculated that two factors might have caused these results. First, it is possible that simply identifying the information one desires to see utilizes somewhat different processes than actually searching for that information. If so, the processes used in actually searching for information may not be related to the need for cognition. Secondly, Verplanken used an information-display board, which may have resulted in a ceiling effect for amount of information searched. Because there was only a limited amount of information on the display board, there may not have been sufficient variability to see an effect of need for cognition on amount searched.

Scudder, Herschel, and Crossland (1994), using the Lost at Sea Task, found a correlation of .44 between need for cognition and idea generation (this task requires

participants to assess 15 different survival items given the scenario they are shipwrecked in the South Pacific, Nemiroff & Pasmore, 1975). This study indicated that people high in need for cognition searched and retrieved more information. Sadowski and Gulgoz (1996) encountered similar results. They found that participants who were high in need for cognition were more likely to have an elaborative-processing orientation. Along the same lines, Chang and McDaniel (1995) reported that high need for cognition was related to more directed information search strategies.

These studies all suggest to some degree that people high in need for cognition are adept at searching for information, and/or have a greater motivation to do so. Therefore, the second hypothesis of this study is designed to further discern the effect of need for cognition on information search behaviors.

Hypothesis 2: People high in need for cognition will engage in more information search behaviors than will those low in need for cognition.

Based on the effect of information search in the creative process, hypothesis three was formulated to study the effects of need for cognition on creativity. Mumford et al. (1994) speculated that if a person is not given a reason to engage in problem construction, they will satisfice with the first problem representation encountered. Without problem construction, a person will not engage in laborious information search, negatively affecting the resultant creativity. Thus, if a person is motivated to engage in problem

construction and not satisfice, they should search for more information, which should result in higher creativity. People who are high in need for cognition are hypothesized to have this motivation.

This reasoning is consistent with Heppner, Reeder, and Larson (1983) who found that people who were more confident in problem solving and approached problems were also higher in need for cognition. Scudder et al. (1994) also found that need for cognition was correlated with idea generation, which, in turn, was correlated with the quality of problem solutions (r = .44 & .49, respectively). Although both studies indicated that need for cognition affects problem solving, an alternative explanation might be that this effect was due to experience with problem solving rather than high need for cognition. This issue touches on the debate between the trait model and situational model of personality (Magnusson & Endler, 1977). This disputation is best addressed using the interactionist perspective (Magnusson & Endler, 1977). This perspective suggests that an individual will actively select the environment or situation entered (Magnusson & Endler, 1977). Both environmental characteristics and personality characteristics will affect an individual's behavior in this situation. Also, not only will the environment affect and change the individual, but the individual will affect and change the environment (Buss, 1987).

Therefore, one's experience with problem solving may make him/her more likely to be better or more effective at generating solutions to problems and may also result in him/her developing a higher need for cognition. However, an individual high in need for

cognition has a personality that will influence him/her to seek out problem solving

situations throughout his/her development, and which will increase his/her problem

solving experience. Showing an empirical distinction between the two (or determining

which is more powerful) will be impossible in the design of the present study. In any

case, people do differ in the need for cognition (Cacioppo et al., 1996), and the present

study only predicts that this difference will present itself in the creativity of solutions to

presented, ill-defined problems. Exactly how a high need for cognition is developed is not

addressed by this study.

      Specifically, it is predicted that need for cognition will affect the creativity of

solutions directly and will also have a mediating effect through information search. It was

discussed above that need for cognition may affect creativity through problem

construction. Problem construction, however, will not only increase information search

(Mumford et al., 1994) but will also lay a plan for the whole creative process. Also,

Verplanken (1993) speculated that people high in need for cognition utilize more

cognitive effort but that this effort may not display itself completely in the amount of

information searched. Thus, this cognitive effort may show up in other creative processes.

Thus, the effect of need for cognition on creativity may be only partially mediated by

information search behaviors. Hypothesis three addresses this issue.

Hypothesis 3: People high in need for cognition will produce more creative solutions to

ill-defined problems than will those low in need for cognition. This effect will be partially

mediated by information search behaviors.

Personal Involvement

A second factor that may have an impact on information search is a person's motivation due to his/her involvement with a topic, decision, or problem. Personal involvement is commonly defined as how personally relevant an issue is to a person (Zaichkowsky, 1986). More specifically, Johnson and Eagly (1989) define involvement as "the motivational state induced by an association between an activated attitude and some aspect of the self-concept" (p. 293). Involvement has been discussed as a means to increase the amount of thinking, or control the amount of thinking a person engages in (Chaiken et al., 1996). Petty, Cacioppo and Schumann (1983) reported that people process information more deeply and pay more attention to information when personally involved. Similarly, Runco, Nemiro, and Walberg (1998), after surveying creativity researchers, found that most students of creativity believe that motivation, of any sort, is essential for creative achievement.

Much of the research on personal involvement has centered on its effect on persuasion (Johnson & Eagly, 1989) and advertisement (Zaichkowsky, 1986) with little emphasis on the effect of involvement on decision-making and related areas (Takemura, 1994). However, it has been reported that the attributes of a problem or task play a large role in determining the amount and type of thought directed at a problem or task (Brophy, 1998). Thus, a problem that, due to its nature, produces a high level of involvement

should have positive effects on the creativity of the solutions to that problem. Ruscio, Whitney, and Amabile (1998) alleged that intrinsic motivation affects creativity due to an increased level of task involvement. Their research results supported this assertion by showing that involvement was significantly related to creativity in three different tasks (structure-building, collage-making, and poem-writing). Although involvement was not manipulated, these results indicate that increasing a person's involvement in a task will positively affect creativity.

In a study conducted by Takemura (1994), which directly manipulated involvement, participants were asked to select a dating partner based on different personal attributes. Information on these attributes could be acquired for each of the possible candidates. Involvement was manipulated by informing the participants in the high involvement condition that they would be given the opportunity to meet the person they selected. Participants in the low involvement condition were not told of this opportunity. Results revealed that the involved participants spent more time engaging in information search. Similarly, Atoum and Farah (1993) found that groups of participants with high involvement in a task generated more ideas. Participants in this study generated ideas on why they were against comprehensive examinations being required for graduation from college. High involvement was obtained by telling participants a comprehensive exam was being considered for implementation at their school.

The study by Takemura (1994) and the study by Atoum and Farah (1993) demonstrated that high involvement motivates people to engage in more information

search behaviors. They both also, however, manipulated personal involvement by making the outcome of the decision task affect the participants personally (high involvement) or have no immediate effect on them (low involvement). This distinction is meaningful because Johnson and Eagly (1989) reported that the type of involvement studied can have an impact on the effect it produces. They made a distinction between value involvement and outcome involvement.

Involvement that is value-relevant was described as affecting attitudes through involving the self-concept or ego (Johnson & Eagly, 1989). This type of issue strongly affects aspects of a person's well-established internal values and morals. Johnson and Eagly (1989) reported that most empirical studies of value involvement occurred before 1975, when the operationalization of involvement was influenced by the dominance of social-judgment issues in the research of that time. Value involvement was seen as producing close-mindedness and resistance to persuasion (Johnson & Eagly, 1990). Value-involvement research will be discussed in more detail later.

Recently, involvement research has focused on another type of involvement, outcome involvement (Johnson & Eagly, 1989). High involvement in this research is usually achieved by giving participants the possibility (through their decisions) to achieve or avoid a personally relevant outcome or goal. Johnson (1994) equates the terms issue involvement and personal relevance with outcome involvement and reports that this research manipulates involvement by making important outcomes salient to highly involved participants. For example, having participants believe that the school program

they are discussing might be implemented at their school (high involvement) or a different school (low involvement) (Atoum & Farah, 1993; Petty & Cacioppo, 1979a, 1979b, 1984), or told they will be given the opportunity to meet a selected dating partner (high involvement) or not meet him/her (low involvement) (Takemura, 1994). Both of these manipulations involve participants by allowing them to believe the outcome of their effort is relevant to them because the consequences will affect them in some way. Neither manipulation engages internal values or morals.

A meta-analysis performed by Johnson and Eagly (1989) found that value involvement and outcome involvement produce different effects because they engage different aspects of the self. Value involvement affects the self's values and morals and outcome involvement affects the self's ability to attain or avoid some outcome. Johnson and Eagly's meta-analysis found that value involvement inhibits attitude change with both high involvement and low involvement, with the inhibitory effect of high involvement being stronger than that of low involvement. Outcome involvement, however, interacts with argument strength in affecting persuasion. High outcome involvement produced more persuasion than low outcome involvement with strong arguments but not with weak arguments. Johnson and Eagly concluded that outcome involvement and value involvement are in fact different constructs and, therefore, produce different effects.

Petty and Cacioppo (1990) countered Johnson and Eagly's (1989) conclusions by emphasizing that degree of persuasion simply centers on whether or not someone is personally involved. The type of involvement is irrelevant. They put involvement on a

continuum where the more involved one is, value or outcome, the more s/he is motivated to actively process information. Thus, high involvement simply increases unbiased information processing. They suggested that people who have high value involvement activate more attitudes and consistent knowledge when that value-relevant issue is encountered. Thus, value involvement is just a higher level of involvement, not a different construct. They also point out that any inhibiting effect of value involvement is probably due to biased processing brought on by this higher level of knowledge on the value issue or by a stronger preexisting attitude, not because of the type of involvement. They reported these aspects as possible confounds that could explain the value involvement results without prescribing a different involvement construct.

This reasoning was almost contradictory to what Petty and Cacioppo had previously reported. At one point, Petty and Cacioppo (1979b) suggested that involvement associated with one's values may be such a high level of involvement that processing stops in the "interest of self-protection" (Petty & Cacioppo, 1979b, p. 1924). Although this already hinted towards their current position of an involvement continuum, they did seem to suggest that something different happens when one's values are involved. Different involvement constructs may be the explanation. Value involvement seems to have an inhibiting effect by addressing a different aspect of the self than outcome involvement. Value involvement affects one's values whereas outcome involvement affects one's concern about the ability to avoid or attain an outcome that is personally and temporally relevant (Johnson and Eagly, 1989). Both Johnson and Eagly

and Petty and Cacioppo agreed, however, that additional empirical evidence is needed to help discern the difference, or lack thereof, between the types of involvement. Similar to Johnson and Eagly (1989), this study considers value and outcome involvement to be different theoretical constructs. Each will be briefly discussed to support this assertion.

Value involvement. Value-involvement research had its beginning in the social-judgment/ego-involvement research of Sherif and his colleagues (Johnson & Eagly, 1989). Sherif and Cantril (1947) theorized that attitudes that affect a person's social norms and values have the biggest impact and, thus, are the most important, on a day-to-day basis. They reported that these attitudes develop in a person as they repeatedly react in a consistent manner to certain social situations. These attitudinal reactions are "judgment activities" and these "social value judgments reveal themselves in the psychology of the individual as established attitudes" (Sherif & Cantril, 1947, p. 29). These social attitudes, developed over time, are based on one's personal values and become ingrained in that person. Thus, they will be very influential whenever that person is involved in a situation that activates that attitude.

Sherif and Cantril (1947) went on to discuss that value-based attitudes, (e.g., attitudes on religion, race, etc.) are ego-involved and have societal significance to a person making them very "enduring." "They become major constituents of the ego" (Sherif & Cantril, 1947, p. 61). The person begins to identify with these attitudes. This identification, Sherif and Cantril reported, greatly influences the person's social behavior. Sherif and Cantril discussed that the degree to which a person identifies with an attitude

and the intensity of that attitude are determined by that attitude's level of ego-involvement. Thus, these ego-involved attitudes will become part of one's self-concept and will dictate how frustrated the person becomes when these attitudes are attacked (Sherif & Cantril, 1947).

Sherif and his colleagues used this social-judgment/ego-involvement basis in their research on attitude change (Sherif, Sherif, & Neberball, 1965). They theorized that if an ego-involved attitude produces frustration when opposed, attempts to persuade a person to change that attitude should be very difficult. Research on attitude change in this arena has used issues such as politics, religion, and race to produce ego-involvement. These issues are usually associated with one's values and social attitudes and therefore, usually produce motivational and emotional reactions (Sherif et al., 1965).

Sherif et al. (1965) asserted that when a person takes a stand on an issue, either positive or negative, a judgment is involved. The attitudes on the issue that is being judged will bring to mind well-established ideas on the issue and will determine whether or not the situation is acceptable. More specifically, Sherif et al. explained that a person has a latitude of rejection and a latitude of acceptance with regards to social issues. The width of these latitudes on any given issue determines whether it is acceptable or not; anything falling within the latitude of rejection is renounced, and anything within the latitude of acceptance is endorsed. Sherif et al. stated that heightened personal involvement leads to a greater latitude of rejection. Recall that the level of involvement in this research depended heavily upon the degree to which the attitude involved reflected

the values that comprised the person's "self-picture" (Sherif et al. 1965).

Sherif et al. (1965) discussed that the acceptance or rejection of an issue is categorical in nature. Also, if a person is not involved in an issue, then the prestige of the communication or communicator can make a difference in attitude change (an idea that would be advanced later by Petty and Cacioppo (1984) with their Elaboration Likelihood Model). Thus, in the case of low involvement, a person's latitude of rejection would not be as large, and s/he could be persuaded by peripheral cues. Sherif et al. discussed a proportional relationship between level of attitudinal involvement and latitudes of rejection or acceptance. A person's major attitudes are ego-related and the more these attitudes are involved, the higher one's latitude of rejection will be for counter-attitudinal messages, and the larger one's latitude of acceptance will be for attitude-consistent messages.

Sherif et al. (1965) performed empirical studies that considered ego-involvement by selecting participants based on specific beliefs in some cause. These participants were then given tasks related to that cause or issue. Another manipulation involved giving participants instructions that informed them their performance on the given task would be included on college records or were told that this performance would indicate some personal attribute to the experimenter (Sherif et al., 1965). Results of both these types of studies found resistance to attitude change under high ego-involvement.

Ostrom and Brock (1968) further clarified Sherif's idea of ego-involvement and how it related to persuasion. They discussed ego-involvement as a determinant of how

much persuasion will occur. The higher the involvement the more resistant one is to change a related value-laden attitude. They agreed with Sherif et al. (1965) that involvement is greater when an activated attitude is based on one's values. They also predicted that the more values activated at any given time the greater the involvement. Ostrom and Brock argued that high ego-involved attitudes are "well embedded in the cognitive structure" (p. 375), and altering this attitude would have to include extensive cognitive restructuring. Because people desire cognitive consistency, this restructuring is very aversive and produces a large resistant to persuasion (Ostrom & Brock, 1968).

Ostrom and Brock (1968) mentioned that many ego-involvement experiments required participants to take a stand on some social value-relevant issue. Researchers would first measure participants' attitude on that issue, then present them with counter communication on the issue and, finally, measure their attitude again, thereby looking at attitude change. One such study had participants read a short story on why some fictitious person should not be allowed admittance to a bank (the result would be a financial loss to the bank) (Ostrom & Brock, 1968). The participants then went through a "bonding" exercise where they would link statements based on the story to a list of personal values. This list of values either included central values (e.g., keeping promises) or peripheral values (e.g., importance of paying taxes). The participants then heard a discrepant message that advocated this fictitious person being allowed into the bank. The dependent measure was attitude towards this person being admitted to the bank. Results were similar to those found by Sherif et al. (1965) in that those participants with activated peripheral

values changed their attitude in accordance with the counter-attitudinal message whereas those having their central values connected were undeterred by the discrepant message.

Both the discussion by Sherif et al. (1965) and Ostrom and Brock (1968) addressed the value-involvement effect alluded to by Johnson and Eagly (1989). Both asserted that value involvement taps a person's central, well-established values leading to close-mindedness and decreased persuasion to counter-attitudinal messages. Value-involved participants hold fast to their position and are unwilling to alter their stance. In a more recent study by Johnson, Lin, Symons, Campbell, and Ekstein (1995), it was shown again that wide latitudes of rejection produce resistance to persuasion. Participants in this study were asked to read a story on the desirability of mandatory AIDS testing. They were then given 2.5 minutes to list all the characteristics and facts they could on the issue. The items on this list were then rated to determine whether the participant generated beliefs for or against AIDS testing. Johnson et al. then used opinion statements to measure each participant's latitude of rejection. A week later participants were called back and given a book containing arguments counter to their beliefs on mandatory AIDS testing.

Results showed that participants who retrieved more beliefs were more persuaded by strong counter-arguments than weak arguments. This held when initial beliefs were positive or negative. However, results also showed that if participants initially had negative beliefs on the issue and had large latitudes of rejection, they were not persuaded by the counter-arguments. Johnson et. al. (1995) discussed that their measure of latitude

of rejection indicated a form of personal value-relevance similar to the value-involvement distinction that was discussed in Johnson and Eagly's (1989) meta-analysis. Results showing inhibited persuasion with large latitudes of rejection were similar to those discussed by Sherif et al. (1965).

Summary of value involvement. Johnson and Eagly (1989) contended that value involvement should be considered a distinct type of involvement. High value involvement results from the activation of value-laden attitudes. These attitudes have been firmly established in a person and are "constituents of his self-picture" (Sherif et al., 1965). Because of this, a person with these attitudes activated will be close-minded and will be resistant to persuasion attempts directed at changing the attitude. Research has tended to support this assertion (Greenwald, 1982; Ostrom & Brock, 1968; Sherif et al., 1965).

There is one distinction within value-involvement research that should be addressed further. This issue concerns the manipulation of value involvement and whether or not the issue addressed in the manipulation affects the self directly or indirectly. Petty and Cacioppo (1990) point out that the most involving issues will be those that involve the self. This distinction would hold true if the involvement were outcome- or value-relevant. A concern that has not been investigated adequately is the impact of affecting the self directly or indirectly when value involvement is manipulated. Freedman (1964) manipulated involvement by telling participants in the high involvement condition that responses they would give on administered scales would

indicate to the experimenter their intelligence and personality. This manipulation (typical of that with ego-involvement research) affected the self directly and resulted in a decrease in the amount of discrepancy the participants needed to reject the persuasion attempt. On the other hand, Johnson et al. (1995) engaged participants' values by affecting the self indirectly. As described above, participants in this study had to generate beliefs on the AIDS issue. Results demonstrated that participants with wide latitudes of rejection on the issue of mandatory AIDS testing were more resistant to persuasion. Whether or not engaging a person's values by getting him/her involved directly or indirectly will produce different results remains to be seen and is beyond the scope of this study. However, based on the above research, it would seem that similar results would be found.

Outcome involvement. Johnson and Eagly (1989) reported that after 1975 a second form of involvement research surfaced, outcome-relevant involvement. Johnson and Eagly discussed that this research produced personal involvement by making an outcome salient to participants (Johnson, 1994). Most of this research was performed by Petty and Cacioppo and their colleagues during the late 1970's and throughout the 1980's. Results consistently revealed that level of involvement interacted with argument strength in affecting attitudes and persuasion. Some of this research will be discussed below.

Petty and Cacioppo (1979a) hypothesized that personal involvement would motivate people to increase their level of processing. This increased level of processing should make highly involved participants more open to strong, counter-attitudinal

messages. To test this assertion, Petty and Cacioppo manipulated involvement by making an outcome either directly or indirectly relevant to their undergraduate participants. The high involvement group was told that their university was discussing a plan to install comprehensive exams as a requirement for graduation. The low involvement group was told that this comprehensive examination would not be installed until after they graduated and another low involvement group was told that this comprehensive exam was being considered for a different school. A second independent variable was whether or not the participants were informed that an attempt was going to be made to persuade them.

Results confirmed the predictions. If participants were forewarned of persuasive intent, resistance to attitude change occurred. This effect was most pronounced in the high involvement group. If there was no forewarning of persuasive intent, highly involved participants demonstrated more attitude change than low involved participants. It was speculated that this effect was due to the increased processing by the highly involved participants. These participants were willing to look more critically at the arguments supporting comprehensive exams at their school. If participants were forewarned they seemed to be less objective. One possible alternative explanation for this is that forewarning participants brought in a value involvement type of manipulation. Telling someone that one is going to attempt to change his/her opinion may produce a defensive reaction in him/her similar to that encountered with value-involvement. This reaction likely would not happen if the person was unaware that an attempt was being made to persuade them.

In a similar study, Petty and Cacioppo (1979b) discussed that the type of involvement they were considering concerned the extent to which an issue under consideration was important to the participant. They reported that the type of involvement used in their studies was similar to that discussed by Sherif et al. (1965) (Johnson & Eagly (1989) disagreed). Experiment one in this study showed that high involvement produced pro-attitudinal persuasion but decreased counter-attitudinal persuasion. The pro-attitudinal message advocated more leniency to coed visitation hours in campus dorms and the counter-attitudinal message advocated more strict visitation hours. Involvement was manipulated by telling participants in the high involvement condition that this issue was being discussed at their school. Participants in the low involvement condition were told this issue was being considered at a different school. The result of this study was consistent with social judgment research. Highly involved participants changed their attitudes less.

Experiment two by Petty and Cacioppo (1979b) was similar except that the issue was changed and quality of arguments was added as an independent variable. The issue used was identical to the one they used before, the comprehensive examination issue. Argument quality was discussed as a modification of the social-judgment research. Specifically, if Petty & Cacioppo were correct in hypothesizing that high involvement increased motivation to think about an issue then participants should be persuaded by strong arguments; these participants will rationally consider the arguments. Petty and Cacioppo speculated that social-judgment theory, however, would predict decreased

persuasion under low and high involvement. Results supported their (Petty & Cacioppo's) hypothesis and not the social-judgment hypothesis. High involvement increased persuasion when strong arguments were given but decreased persuasion when weak arguments were given. Petty and Cacioppo reported that the results of this experiment contradicted social-judgment theory. However, the involvement manipulation in this study was now purely outcome-relevant.

Petty and Cacioppo (1984) then took the results they were finding with involvement and incorporated them in the ELM. Recall from the need for cognition discussion that according to this model, there are two routes that one can take when processing a message. One is the peripheral route where not much effort is put into information processing. The second is the central route where the person diligently looks at the content of a message with their full attention. Under high involvement, people would generally use the central processing route and under low involvement they would use the peripheral route (Petty & Cacioppo, 1984). The ELM, therefore, can explain why strong arguments can produce persuasion under high involvement. The person would follow the central route and carefully consider the arguments.

The experiments by Petty and Cacioppo (1984) that demonstrated this logic are similar to those described above. In a pilot study, they manipulated involvement by either informing participants that their university was considering a tuition increase (high involvement) or another, similar university was considering a tuition increase (low involvement). In the actual experiment, they used the comprehensive examination

manipulation previously described. Results demonstrated that under high involvement participants used the central route and were persuaded by strong arguments. Under low involvement they used the peripheral route and were persuaded by peripheral cues (e.g., number of arguments) not by argument quality. This difference in depth of processing was considered to be the reason for the difference in involvement effects.

Summary of value-involvement and outcome-involvement research. The main distinction that seems to separate outcome-involvement and value-involvement research is the type of manipulated used. Outcome-involvement research has manipulated involvement by having participants make "strategic considerations" about some outcome they can achieve or avoid. On the other hand, value-involvement research has manipulated involvement by engaging participants' values and morals (Johnson & Eagly, 1989). Whether these two types of involvement are two different constructs, as Johnson and Eagly's meta-analysis seemed to indicate, or if they are just different levels on an involvement continuum, as Petty and Cacioppo (1990) suggested, warrants future study. What does seem to hold is that high value involvement has resulted in close-mindedness whereas high outcome involvement has resulted in increased depth of processing when accompanied by strong arguments. Explaining these conflicting results seems to be more easily accomplished by prescribing different involvement constructs.

A recent study by Maio and Olson (1995) looked empirically at the difference between outcome involvement and value involvement in regards to persuasion. They showed with this study that there might in fact be different involvement constructs. Maio

and Olson manipulated type of involvement by using what was labeled as an attitude-function manipulation. Participants in the outcome-involvement group were asked to rate the importance of attaining or avoiding different outcomes (e.g., receiving money, losing respect, etc.). Maio and Olson then took an average of these responses to get an outcome importance index for each participant. Participants were then asked to comply with various academic requests (e.g., write an essay). They were asked to write how each request would support or oppose each of the previously listed important outcomes. The value-involvement condition was similar except participants were asked to rate the importance of certain values (e.g., freedom, individualism, etc.) and how the academic requests would support or oppose these values.

This manipulation controlled for knowledge as a possible confounding variable in an effort to help discern if the different types of involvement found by Johnson and Eagly (1989) were actually due to different constructs and not due to confounds (as Petty and Cacioppo (1990) suggested). Maio and Olson (1995) also used the same dependent variable (comprehensive examinations) that Petty and Cacioppo (1979a, 1979b, 1984) utilized in many of their involvement studies. Lastly, participants were given either strong or weak arguments to support these comprehensive examinations. Again, similar to the arguments use by Petty and Cacioppo (1979a, 1979b, 1984).

Results showed that type of involvement moderated the relationship between argument processing and involvement. This effect was seen only for those participants who reported that the outcomes or values they rated were important. However, 88% of

the participants met this criterion. Breaking down the moderating effects, participants in the high outcome-involvement condition were more persuaded by strong arguments than by weak arguments, regardless of level of involvement. Participants in the high value-involvement condition were not affected by argument strength whereas those in the low value-involvement condition were more persuaded by strong arguments.

Results of the study by Maio and Olson (1995) are interesting in a couple of ways. First, Maio and Olson found no main effect for outcome involvement. The authors speculated that Johnson and Eagly (1989) may have been correct in suggesting that the outcome-involvement manipulation has a weak effect overall. Results also showed that high value involvement resulted in a reduced amount of processing. This is a slightly different effect than that suggested by Johnson and Eagly (1989), who speculated that the inhibiting effect of value involvement was due to biased processing, not a reduction in processing. This was the first study that directly crossed value involvement with argument strength. Recall that the traditional value-involvement studies started by Sherif and his colleagues simply looked at the effect of involvement on persuasion without an argument strength manipulation. Maio and Olson suggested that their results show that value involvement may motivate people to just ignore arguments rather than process them with a biased view. This effect may also be a result of close-mindedness, similar to what was shown by Johnson et al. (1995). Close-mindedness would be able to explain both biased processing and simply ignoring arguments when values are involved. Future research will need to sort out this possible difference.

The present study. The few studies conducted to investigate the effects of involvement on information search and related topics found that high outcome involvement increased information search and idea generation (Atoum & Farah, 1993; Takemura, 1994). Consistent with the proposed difference in involvement constructs by Johnson and Eagly (1989), it is hypothesized in this study that the benefit of personal involvement would decrease under conditions of high value involvement. This prediction is based on the idea that if a person's values are highly involved s/he will have strong feelings and attitudes on that issue. Because of this, the value-involved person will activate a powerful schema on the issue and will not feel the need to search for additional information. They are more likely to be close-minded (Johnson et al., 1995; Maio and Olson, 1995). They will have very strong ideas based on their values and morals and will believe that there are only a few (maybe even one) correct ways to handle the situation, diminishing the need to generate alternatives based on searched information. Hypothesis four follows from these arguments.

Hypothesis 4: A problem that elicits high value involvement will result in a lower amount of information search when compared to a problem that elicits high outcome involvement. Information search behaviors will be lowest if the problem is not involving.

Based on the importance of information search in creative problem solving, it is expected that involvement will have similar effects on the creativity of problem solutions

as it does on information search. Dudek and Cote (1994) reported that problem finding is a product of task involvement and the greater the involvement of the problem solver the more creative s/he should be, provided there is sufficient knowledge and experience. Finke et al. (1992) also reported that people need to be involved to be creative and Ruscio et al. (1998) found that involvement was significantly related to creativity in three different creativity tasks (structure-building, collage-making, and poem-writing).

It is hypothesized in this study that involvement will affect the creativity of solutions to ill-defined problems, and, more specifically, the type of involvement, value versus outcome, will determine the specific effect encountered. It was reported above that people tend to satisfice with the first activated problem representation when not motivated to engage in problem construction, and that this will have a negative impact on creative problem solving (Mumford et al., 1994). Involvement that results from the personal relevance of a problem's outcome should be a motivator to engage in problem construction. However, involvement that results from the engagement of personal values and morals will decrease this motivation because of the close-mindedness it elicits. A person who is value involved may activate a dominant schema on an issue causing them to satisfice with an early developed problem representation. This decrease in problem construction would decrease information search and creativity (Mumford et al., 1994). Because problem construction affects more than just information search (i.e., the rest of the creative process) (Mumford et al., 1991) the effect of involvement on creativity is expected to be only partially mediated by information search behaviors. Determining the

actual effects of involvement and need for cognition on problem construction is beyond the scope of this study. Hypothesis five follows from the above discussion.

Hypothesis 5: A problem that elicits high value involvement will result in less creative solutions when compared to a problem that elicits high outcome involvement. Creativity will be lowest if the problem is not involving. This effect will be partially mediated by information search behaviors.

A Possible Interaction Between Need for Cognition and Personal Involvement

Pieters and Verplanken (1995) discussed that both the need for cognition and involvement affect the amount of reasoning one does. They found that participants who were high in need for cognition and highly involved in an election reasoned more about that election, which in turn affected how they voted in the election. Amount of reasoning would seem to be related to information search behaviors. The more information one has the better able they are to reason on a topic. Because both involvement and need for cognition can affect reasoning (Pieters & Verplanken, 1995), depth of processing (Petty and Cacioppo, 1984, 1986), and information search behaviors (Takemura, 1994; Verplanken, 1993), it is worth speculating that an interaction between need for cognition and type of involvement may occur. Specifically, certain people might be able to overcome the close-mindedness hypothesized to occur under high value involvement. These people would need to be motivated to find a fuller understanding of an issue,

regardless of the value involvement, before they would come to any conclusions about that issue. These people would have to be cognitively oriented and enjoy thinking things out completely. In other words, they should be high in need for cognition.

Scudder et al. (1994) speculated that group members low in need for cognition would be more inclined to "loaf" in situations that are not personally involving. They suggested that more involving tasks would counteract the "loafing" effect of those with low need for cognition. Cacioppo et al. discussed further that under conditions of very high and very low involvement, one's need for cognition would not matter. High involvement would produce a ceiling effect and low involvement would produce a floor effect, both of which would not allow for an additional effect of need for cognition. Because Petty and Cacioppo have done their involvement work with outcome involvement, these hypothesized ceiling and floor effects were probably developed with this type of involvement in mind. People with high outcome involvement would be so concerned about the result of their problem solving or decision making effort that both high and low need for cognition individuals would be motivated to process information. The present study, therefore, predicts this ceiling effect will be found with the outcome-involvement manipulation. However, neither a floor effect under low involvement nor a ceiling effect under value involvement is anticipated. Reasons for these predictions are addressed next.

Axsom, Yates ,and Chaiken (1987) empirically addressed the need for cognition/involvement interaction. A main effect of involvement was found where

participants under high involvement were influenced more by strong arguments whereas those in the low involvement condition were influenced more by peripheral cues (the number of other people agreeing with the message). This result was consistent with the ELM prediction (Petty & Cacioppo, 1984). However, this difference disappeared when participant's need for cognition was considered. High need for cognition produced high message-relevant thoughts under conditions of low involvement and high involvement. For participants low in need for cognition, however, high involvement produced more message relevant thoughts whereas low involvement induced the use of heuristic and peripheral cues.

Axsom et al. (1987) demonstrated that when participants were highly involved they had an increased number of message-relevant thoughts regardless of level of need for cognition, showing the ceiling effect of high involvement discussed by Cacioppo et al. (1996). Involvement in this study was considered outcome involvement. Participants were asked to listen to a debate on whether probation should be used as an alternative to imprisonment. Those in the high involvement condition were told that the experiment was taking place in their community. Thus, the result of the debate would be the outcome of probation in their community, rather than imprisonment. This study adds empirical evidence that outcome involvement may produce a high amount of information search in participants regardless of their need for cognition, as is hypothesized in the present study.

A second relevant finding by Axsom et al. (1987) was that high need for cognition increased message relevant thoughts for participants who were in the low involvement

condition. Thus, the floor effect for low involvement discussed by Cacioppo et at. (1996) was not found. Under conditions of low involvement, there was an effect of need for cognition. Similarly, in the present study, it is predicted that participants with a high need for cognition will have the motivation to actively process information even under conditions of low involvement. Specifically, it is hypothesized that under conditions of low involvement, participants high in need for cognition should engage in more information search behaviors than those low in need for cognition. It should be mentioned that if the low involvement condition in the Axsom et al. study was actually closer to moderate involvement (as Axsom et al. speculated), then the prediction by Cacioppo et al. may still hold true (i.e., a floor effect for low involvement).

The last issue to consider is the effect of need for cognition under conditions of value involvement. If value involvement is in fact found to produce a different effect than outcome involvement, then need for cognition may affect value involvement differently than it does outcome involvement. Specifically, it is hypothesized that people high in need for cognition should be able to overcome the tunneling effect of value involvement and search for as much information as those who are outcome-involved. Value involvement has been found to inhibit persuasion (Johnson & Eagly, 1989) and produce close-mindedness (Johnson et al., 1995; Maio & Olson, 1995). As predicted in hypothesis three, participants in this condition may not feel the need to search for as much information as may those who are in the outcome-involvement condition. However, people high in need for cognition have been shown to enjoy thinking and are better able

to access thoughts on issues (Cacioppo et al., 1996). Thus, these people should be more

motivated to process and search for information and therefore be able to overcome the

close-mindedness brought on by the value involvement. People high in need for cognition

should search for as much information under conditions of value involvement as they

would under conditions of outcome involvement. Hypothesis six follows from this

speculation. See Figure 2 for a graphical depiction of these predictions.

Hypothesis 6: Type of involvement will interact with need for cognition to produce the

following results. Under conditions of outcome involvement, participants will have a high

amount of information search regardless of their need for cognition. Under conditions of

value involvement, participants will have a medium amount of information search if they

have a low need for cognition and a high amount of information search if they have a

high need for cognition. Under conditions of low involvement, participants will have a

low amount of information search if they have a low need for cognition and a medium

amount of information search if they have a high need for cognition.

Consistent with hypothesis two and four, the interaction effect of need for

cognition and involvement is also expected to be found in the resultant creativity.

Hypothesis seven addresses this issue. See Figure 3 for a graphical depiction of these

results.

Figure 2

Hypothesized need for cognition / type of involvement interaction

on information search behaviors
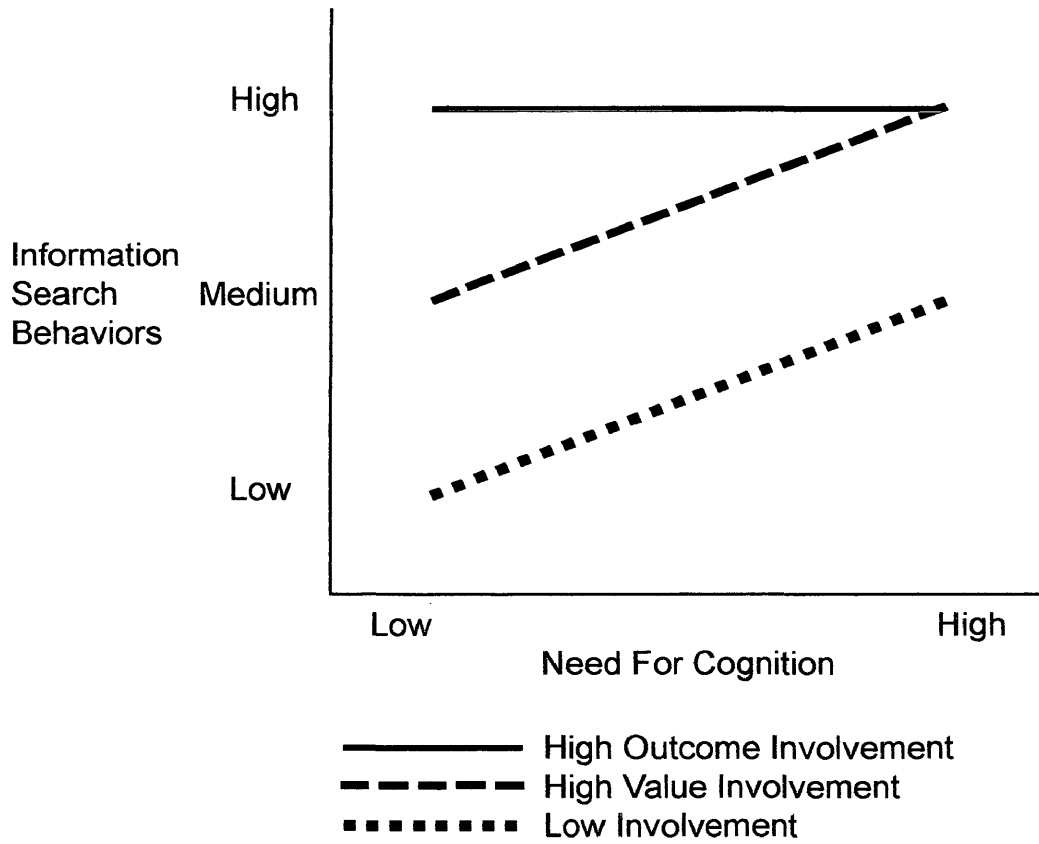
Figure 3

Hypothesized need for cognition / type of involvement interaction

on creativity
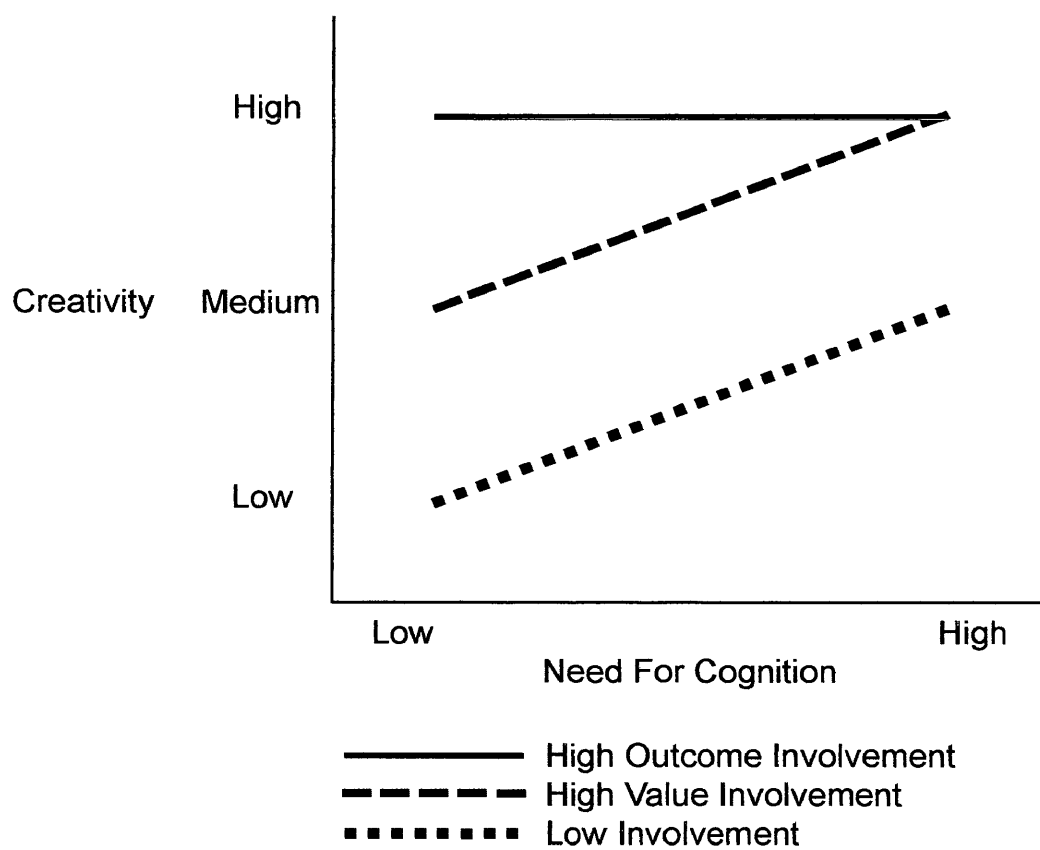
Hypothesis 7: Type of involvement will interact with need for cognition to produce the following results. Under conditions of outcome involvement, participants will produce highly creative solutions regardless of their need for cognition. Under conditions of value involvement, participants will produce solutions with medium creativity if they have a low need for cognition and high creativity if they have a high need for cognition. Under conditions of low involvement, participants will produce solutions with low creativity if they have a low need for cognition and medium creativity if they have a high need for cognition.

Method

Participants

Participants were 170 college students recruited from psychology classes at a Midwestern university. Course credit or extra credit was awarded after participation in the experiment. Data from 20 participants were discarded for a number of different reasons, such as not understanding English very well, correctly guessing the manipulation, not completing the questionnaires, or running into complications with the computer program. The remaining 150 participants were evenly distributed across the three involvement conditions, outcome, value, and low. The sample consisted of 110 females and 37 males (3 participants did not report gender). This breakdown was consistent with the proportion of male/female psychology majors at the university. The average age of the participants was 22.59 years ($\underline{SD}$ = 5.89). Attained education level was fairly evenly distributed: (a)

53 first year students, (b) 34 sophomores, (c) 29 juniors, (d) 28 seniors, (e) 4 others, and

(f) 2 missing answers.

<u>Independent Variables</u>

Need for cognition. Participants' need for cognition was measured using the short

version of a scale developed by Cacioppo and Petty (1982). This scale consists of 18

Likert-type statements (see Appendix A). Cacioppo and Petty found the original 34 item

scale to be reliable (split half = .87) as well as valid (construct, predictive, and

discriminant). These psychometric properties continue to be found with repeated use of

the scale. For example, Thompson and Zanna (1995) found α's = .65 and .78 using the

34-item scale and Venkatraman and Price (1990) found α = .88, also using the full scale.

The 18 item short version of the scale has been shown to be as reliable as the full scale.

Using this scale, Sadowski and Gulgoz (1992) found alpha's of α = .91 and α = .92. Also

using the 18 item version, Sadowski (1993) found α = .86. Finally, using a 15-item Dutch

version of the scale, Verplanken (1993) found α = .80. Reliability of the 18 item scale

was found to be very good in this study also, α = .88.

Personal involvement. Involvement was manipulated by the type of problem

given to the participants. Three problems were used, one to address value involvement,

one to address outcome involvement, and one to address low involvement. The value-

involvement problem (Appendix B) is a modification of a problem found in past research

to engage a person's values and morals (Scherer, Butler, Reiter-Palmon, & Weiss, 1994).

The issue in this problem centered on a first year college student, Sally, whose roommate

smokes marijuana in their dorm room. This problem was referred to as Sally's Problem. The outcome-involvement problem (Appendix C) is a modification of the comprehensive exam issue developed by Petty and Cacioppo (1979a). It was designed so that the outcome of the problem solving effort could have important implications for the participant (Johnson & Eagly, 1989). Specifically, the outcome-involvement problem, referred to as the Exam Problem, informed participants that their university was considering requiring students to pass a comprehensive exam before graduation unless a more effective way of assessing the quality of their education could be discovered. Participants in the outcome-involvement condition were informed that university administrators would consider their responses to the problem when attempting to resolve the issue. This was done in an effort to make them believe their input could make a difference on the outcome of the problem. The low involvement problem (Appendix D) also was adapted from Scherer et al. (1994), and was chosen because it was not found to be personally involving for college students. This problem was referred to as Sam's Problem and described a pest control technician who needs money but is reluctant to take more jobs because of safety reasons.

The three problems used in this study were selected based on the results of a pilot study. Two problems from each of the involvement conditions (value, outcome, and low) were piloted. The high value-involvement, high outcome-involvement, and low involvement problems not chosen (Mark's Problem, Night Classes Problem, and Barb's Problem, respectively) are presented in Appendixes E, F, and G, respectively; the value

involvement and low involvement problems were adapted from Scherer et al. (1994). Those who participated in the pilot study were asked to read the problem presented to them and to list all the additional information they would want to receive or know about the problem in order to provide a good solution. They were asked to provide this information so that it could be used to develop searchable information for the main study.

After participants completed listing this information they completed a manipulation check questionnaire. This questionnaire was constructed to determine if the problems produced the predicted type of involvement. Based on the assertion that value involvement and outcome involvement are different constructs, different items were written to measure each type of involvement, along with items that addressed general high versus low involvement. Thus, the manipulation check questionnaire actually consisted of several subscales, each developed to ensure the problems produced the desired involvement effects. The items developed for each sub-scale are presented in Appendix H.

Similar to the rational scaling method of developing biographical-data measures (Mumford & Owens, 1987), items on this questionnaire were written based on the definition of each type of involvement discussed earlier. Selection of the items included in the final version of each of the subscales was based on an internal consistency analysis. This rational method of scale development based on construct definitions followed by an item analysis used to chose the best items is considered to be a sufficient approach to constructing a scale with content and construct validity (Nunnnally & Berstein, 1994).

Thus, this method was considered adequate for the manipulation check purpose of this scale. The questionnaire was used as a manipulation check in the main study as well as in the pilot study. All items were measures on a five-point scale.

Pilot study results. Analysis of the low involvement manipulation check subscale revealed that Sam's Problem resulted in a lower level of involvement than Barb's Problem (M = 2.87 versus M = 3.19). A lower score reflected lower involvement. Analysis of the outcome-involvement subscale showed that the Exam Problem produced a higher level of outcome involvement than the Night Classes Problem (M = 3.77 versus M = 3.42). Analysis of the value-involvement subscale revealed that Sally's Problem produced a higher level of value involvement than Mark's Problem (M = 3.38 versus M = 3.22). Finally, an analysis of the manipulation check subscale whose items differentiated between high value involvement and high outcome involvement provided evidence that the problems produced the desired different types of involvement (Sally M = 3.24, Mark M = 3.20, Exam M = 2.65, Night Classes M = 2.67; a high score indicated high value involvement and a low score indicated high outcome involvement).

Cronbach's coefficient alpha was used to assess the reliability of each of the four involvement sub-scales. Reliabilities of the low, outcome, and value sub-scales were very good (α = .94, α = .91, and α = .89, respectively). The reliability of the sub-scale used to differentiate between value and outcome involvement was low (α = .50). However, the means were in the correct directions, which was considered sufficient for the purpose of the pilot study. Also, because this subscale measured two different constructs, high

internal consistency was not expected. The subscale was used to ensure that problems used to produce value involvement versus outcome involvement did not result in just general high involvement but in a specific type of high involvement.

Dependent Measures

Information search behaviors. Information search behaviors were measured by calculating the amount of information participants looked at and the amount of time they engaged in information search behaviors. As part of the pilot study discussed above, each participant was asked to provide additional information (other than that given in the problem) they felt would be beneficial in solving each of the three problems (see Appendix I for the instructions read to the pilot study participants). The information gathered during this pilot study was made available to participants to search for in the main study via a computer. Each problem had 51 pieces of information participants could peruse (the information for Sally's problem, the Exam problem, and Sam's problem are presented in Appendixes J, K, and L, respectively). Attempts were made to equate each of the three problems on length of the information statements.

Visual Basic was used to write a computer program that allowed participants to search for desired information. The computer saved to memory the total number of pieces of information each participant viewed along with the total amount of time each participant spent on information search behaviors. Participants also had the option to reread the problem while searching for information in case they forgot specific aspects presented in the actual problem. The time spent on reviewing the problem was included

in the total time spent searching. It was decided that this time was spent on thinking about the problem, and possibly thinking about what additional information to view; both of these activities were considered information search behaviors. Results revealed that the average number of times a problem was reviewed by a participant was less than one and statistically equal in all three involvement conditions, $\underline{F}$ (2,147) = .41, $\underline{MSE}$ = .29, $\underline{ns}$ (value involvement $\underline{M}$ = .62 [$\underline{SD}$ = .81], outcome involvement $\underline{M}$ = .74 [$\underline{SD}$ = .92], low involvement $\underline{M}$ = .76 [$\underline{SD}$ = .77]). Finally, a composite measure of information search behaviors was computed by standardizing and averaging the amount of time spent searching and the number of items searched. This score will be referred to as the information search composite score.

Creativity. The creativity of each solution was determined by obtaining ratings for originality and appropriateness (Feist, 1998; Mumford & Gustafson, 1988; Runco & Charles, 1993). Ratings were obtained using the consensual assessment technique developed by Hennessey and Amabile (1988). This technique is based on the assumption that creativity can be recognized and agreed upon by judges familiar with the creativity domain. Amabile (1996) stated that these judges need to be knowledgeable, but do not need to be experts. She reported that this consensual rating technique can be used to reliably rate the creativity of many different types of tasks. Therefore, two graduate students familiar with the creativity domain were utilized to rate each participant's solution on originality and appropriateness.

Raters were trained before distributing the actual solutions to be rated. During this

training, solutions similar to those actually given to participants were discussed. This

training also involved discussing with raters the consensual rating process. They were

instructed that each person would rate the solution independently and then meet to reach

consensus on any disagreements through open discussion. Also, definitions of the

originality and appropriateness rating scales were discussed until the raters had a firm

grasp of the scale anchors. Raters were instructed to read through all solutions before

assigning ratings. It was also emphasized that the entire rating scale should be used.

Judges were not informed as to the experimental conditions the solutions represented.

Appropriateness was rated using a four-point rating scale and was defined as a

solution that is (a) pragmatic, (b) socially responsible, and (c) ethical (Appendix M)

(adapted from Reiter-Palmon, Collins and Scherer, 1997). Two judges individually rated

the appropriateness of each solution. Interrater reliability was calculated to be .72. The

two independent ratings were identical for 119 of the solutions, differed by one for 24 of

the solutions, and different by two for only 7 of the solutions. Judges resolved the 31

disagreements through discussion. The resulting consensus ratings were used for all

analyses. The frequency distribution of solutions across the four appropriateness ratings is

presented in Figure 4.

Originality was rated using a six-point scale and was defined as: the degree to

which the solution is not structured by the problem presented and goes beyond it, and the

degree of novelty and uniqueness of the solution (Appendix N) (adapted from Reiter-

Palmon et al., 1997). The originality raters were first asked to decide whether or not each

Figure 4

Frequency Distribution of Appropriateness Ratings
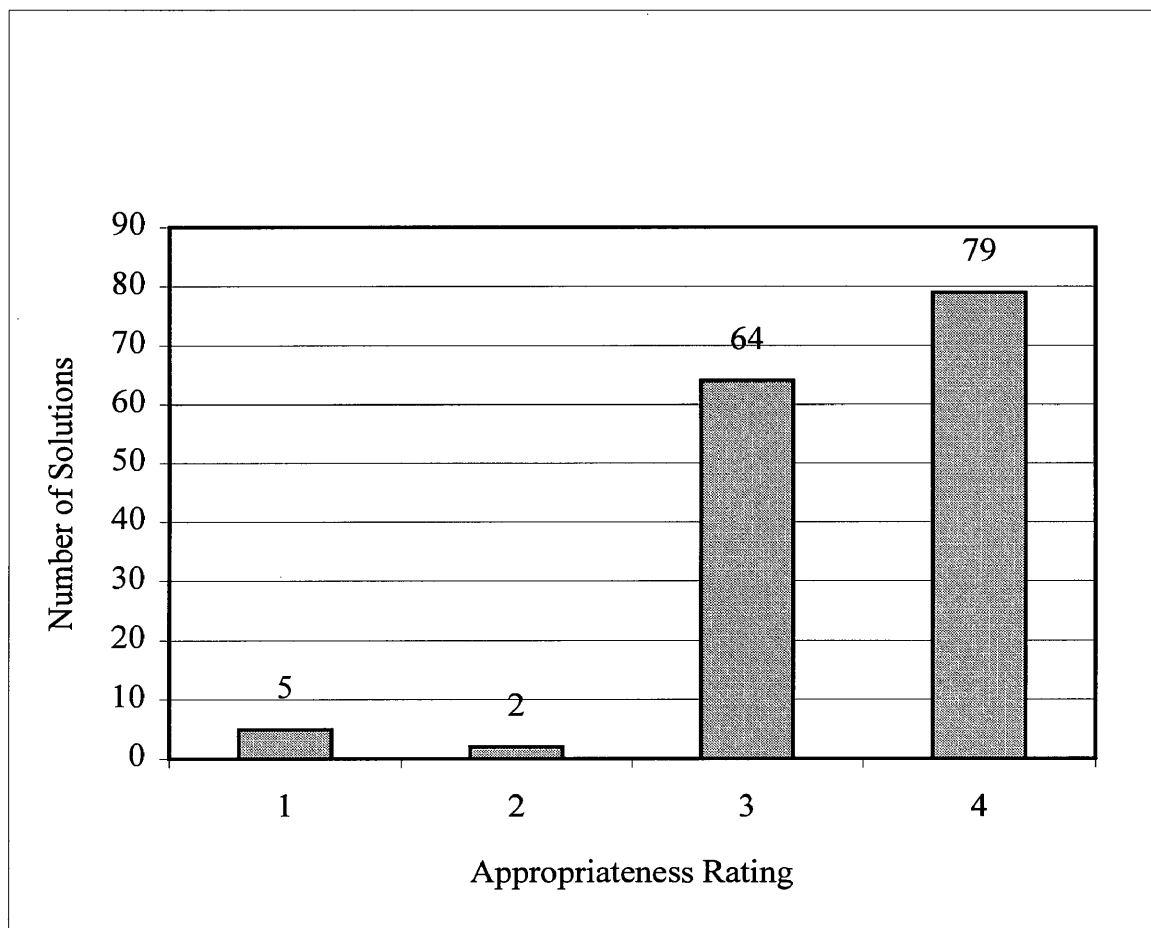
solution was structured by the problem. A solution that was structured by the problem would receive an originality rating of one to three based on the uniqueness of the response. A solution that was unstructured by the problem would receive a rating of four to six, also depending on the degree of uniqueness of the response. The Kappa coefficient of agreement for this structured/unstructured sorting indicated that the judges agreed significantly more often than chance ($\underline{K}$ = .6351, $\underline{z}$ = 9.53, $\underline{p}$ < .001).

After solutions were sorted as being structured/unstructured, they were rated for originality independently by two judges. Interrater reliability for these originality ratings was .95. The two independent ratings were identical for 109 of the solutions, differed by one for 40 of the solutions, and different by two for only 1 solution. Through discussion, raters came to a consensus on the ratings that differed. The resulting consensus ratings were used for all analyses. The frequency distribution of solutions across the six originality ratings is presented in Figure 5. Finally, an overall creativity score was obtained by combining the originality and appropriateness ratings. The ratings were standardized and then averaged for each solution (Harrington, Block, & Block, 1983). This score will be referred to as the creativity composite score.

Additional Measures

Arousal. A perceived arousal scale was developed to measure how aroused each participant became while solving his/her problem (see Appendix O). This scale was a combined and modified version of scales developed by Anderson, Deuser, and DeNeve (1995) and Scherer et al. (1994). This arousal scale was used to determine if arousal

Figure 5

Frequency Distribution of Originality Ratings
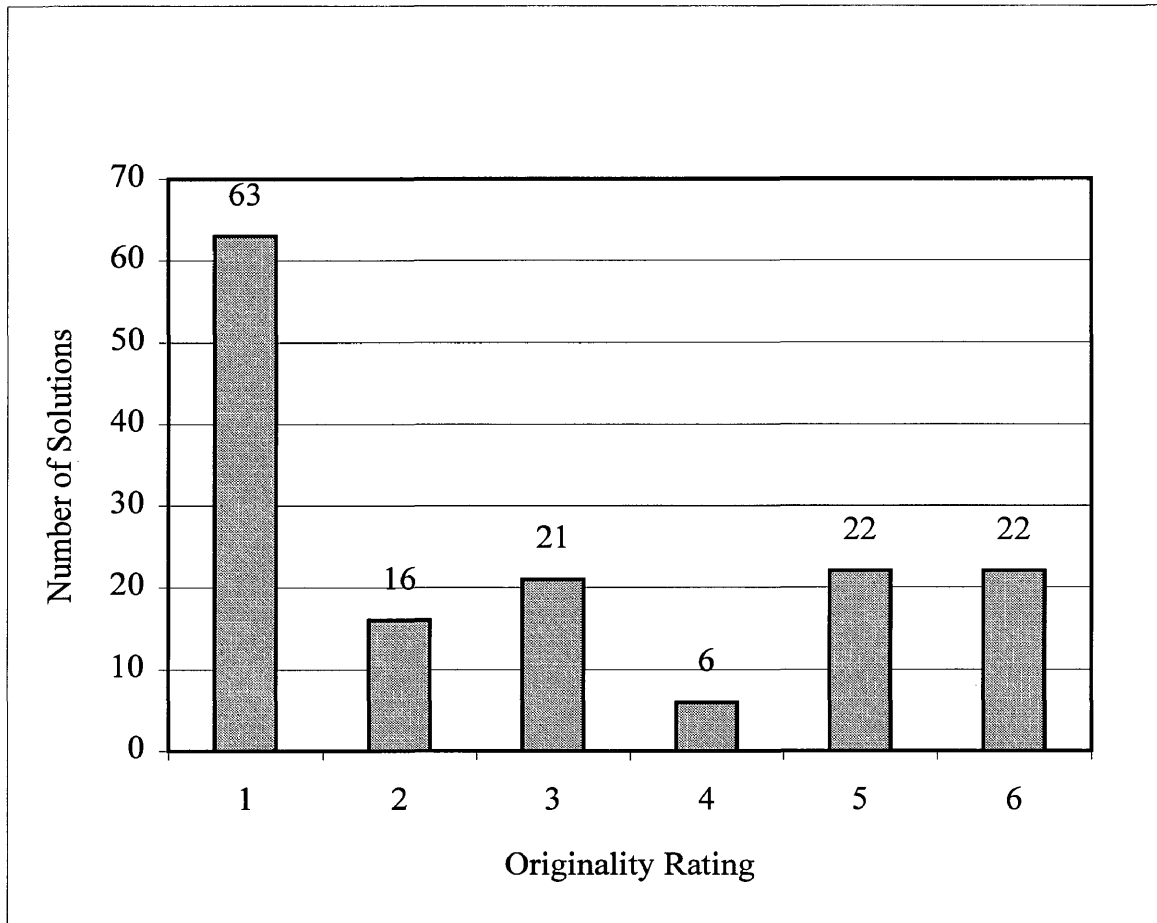
confounds with value involvement in producing a decrease in information search activity and creative problem solving. Specifically, value involvement may produce a close-minded effect that is in part due to this arousal component, a component not present in an outcome-involvement manipulation. An issue that addresses one's values or morals is likely to produce some type of emotional reaction, and arousal is an "integral" part of emotion (Clark, 1982). Clark (1982) pointed out that anything that causes an emotional reaction, whether positive or negative, would usually be accompanied by autonomic arousal. Value involvement, then, may produce increased arousal, which in turn, may partly account for a decrease in information search activity and/or creativity.

Divergent thinking. Divergent-thinking ability was measured with two forms of the Uses Test (Guilford, 1967). Participants were asked to list uses for a wooden pencil and a wire coat hanger. Divergent thinking was measured to ensure that any differences found in creative problem solving could not be attributed solely to differences in divergent-thinking ability. The two individual tests were averaged to produce one divergent-thinking score for each participant.

Procedure

A brief description of the study was read to each participant (see Appendix P). After this description was read, students who agreed to participate signed an adult consent form, and were assigned to one of the three involvement conditions. Participants worked alone in a small room that contained one computer to eliminate any social-comparison factors (e.g., limiting search behaviors based on when others finished).

Before typing their solution to the problem, participants had the opportunity to search and receive information they felt would facilitate solution generation. The 51 pieces of information for each problem gathered during the pilot study were made available to participants to search for via a computer. The 51 pieces of information were grouped into categories and were displayed in a type of menu system. Participants had the opportunity to follow any menu item desired. Due to computer availability, half of the participants in each of the three involvement conditions completed the experiment using older model computers (Gateway 2000 386SX/16) and half using modern computers (Gateway E-3200 with Pentium II processors). Therefore, speed of computers was evenly distributed in each condition.

The computer program began by displaying one of the three involvement problems along with the directions on how to use the program (see Figure 6 for the initial computer screen presented to participants). Also on this first screen was a start button. The program asked the participant to click this button when they had finished completely reading the problem and the directions. Once the start button was clicked, the computer recorded the time the participant started and the problem they were working on into two files on a computer diskette, one that would contain the solution the participant developed and one that would record the information requested.

After clicking the Start button, the participant was presented with a main menu screen (see Figure 7). Each problem had four main menu items (see Appendixes J-L). Once one of these four items was selected, a secondary menu was displayed that

Figure 6

Initial computer screen presented to participants

Problem

Welcome!
The purpose of this study is to obtain solutions to the problem presented below. However, before you are asked to provide a solution to this problem you will have the opportunity to look at different items of information about the problem which may help to clarify any questions you have and may also help you offer a better solution. When you have seen all the information you feel will aid in generating your solution you will be asked to type that solution into the computer.
Please click on the white box next to "Participant Number" and type in the number found on the top of your packet.
Thank you for your participation. Please ask the experimenter any questions you may have throughout this process.
Read the problem carefully and click start when you are ready to begin.

Participant Number [   ]   [Start]

Sam's Problem

Sam is a technician in a large pest control company. Each week, Sam provides pest control assessments and treatments for several dozen regular accounts in his territory and handles any "spot jobs" that come up if he has enough time. Sam enjoys his work because the hours are flexible and he is his own boss. In addition, the pay is commission-based and since Sam is an excellent technician, he makes good money. On the other hand, Sam believes that the work can be dangerous becuase it calls for lifting and carrying heavy equipment without assistance. Many technicians in the company have had shoulder and back injuries as a result of such strenuous job demands. In the past few months, Sam's family has had additional expenses that Sam's regular work load cannot cover. Sam is working harder and faster, but the depressed economy has made "spot jobs" scarce and has removed any hope of finding a higher paying job elsewhere. Recently, Sam was offered a "spot job" that would pay enough to cover several overdue bills, but would involve a great deal of highly strenuous lifting, carrying and maneuvering of equipment and supplies. Sam needs the money that this job would provide; however, he is afraid of the considerable personal risk. Sam does not know what to do, can you offer a solution to his problem?

Figure 7

Main menu computer screen

Main Menu

Below is a menu of the information available to you about the problem you read. Just click on the menu item which you would like to read. Use the same procedure for any following screens. Always click on the number of the item you wish to search.

Click on "View Problem" if you would like to read the problem again.
Click on "Solve Problem" when you are ready to type in your solution to the problem. However, once you click "Solve Problem" you will not be able to return and search for more information.

| 1 | Occupational Information |

| 2 | Financial Information |

| 3 | Specific Job Information |

| 4 | Information About Sam |

View Problem

Solve Problem

Remember, you need only look at the information which you feel will be beneficial in solving this problem

contained two to four items. When one of these items was selected the participant was presented with three to five questions that addressed that item. The participant then selected the question they wished to have answered (e.g., What content areas will the comprehensive exam cover?). Once the answer was provided, the computer program returned the participant to the main menu screen and the process started over again. The program was designed to return the participant to the original four-item main menu screen after each piece of information was viewed so that all the information could not be scanned through quickly.

Also present on the main menu screen were a control button labeled View Problem and a control button labeled Solve Problem. When the View Problem button was clicked, the program displayed the problem for participants to reread. After rereading the problem they clicked a button that returned them to the main menu screen. When a participant was finished looking at the information they desired, they were instructed to click the Solve Problem button. Once clicked, the program recorded the time and displayed a screen with a blank white box and directions asking the participant to type their solution to the problem into the white box. They were asked to click a Finished button when their solution was complete. When pushed, this button saved their solution to a computer disk.

Each time the participant requested an answer to one of the searched questions, the information selected was recorded in a computer file using a three letter/number code (see Appendixes J-L). Each article of information viewed, or each answer provided, was

counted as one item of information searched. If an item was selected twice, it was counted twice, although the occurrence of double requests was rare. The total amount of time each participant spent searching was recorded from when the Start button was clicked to when the Solve Problem button was clicked. Thus, participants were not timed while they initially read the problem or while they typed in their solution to the problem.

Once participants finished typing their solution, they were given a packet of questionnaires containing the Need for Cognition Scale, an arousal scale, the manipulation check scale, and a demographics questionnaire. After completing these questionnaires, participants were debriefed and dismissed (see Appendix Q for debriefing statement).

<u>Analyses</u>

T-tests were used to check the effectiveness of the involvement manipulation. A one-way analysis of variance was used to check for differences in arousal based on type of involvement. The effects of information search behaviors on creativity were analyzed using simple regressions. The effects of need for cognition on information search behaviors and creative problem solving also were analyzed using simple regressions. A one-way analysis of variance was used to test the direct effects of type of involvement on information search behaviors and creative problem solving. Contrasts were used to test for differences among the three involvement groups.

Mediation effects were analyzed based on the recommendations by Baron and Kenny (1986). Accordingly, three regression equations were used to test for each

mediated effect. First, the dependent variable was regressed on the independent variable. Second, the mediator was regressed on the independent variable. Third, the dependent variable was regressed on the mediator and the independent variable. Mediation would be shown by significant results in the first two regression equations and a reduced or eliminated effect of the independent variable on the dependent variable in the third equation. Type of involvement was effect coded for these analyses.

The interaction effects of need for cognition and type of involvement were analyzed using multiple regression. Once again type of involvement was effect coded for these analyses. For graphing purposes and to explore trends in the data, need for cognition was split into top third and bottom third scores and then crossed with type of involvement in order to obtain cell means.

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

<u>Manipulation Check</u>

Answers to the manipulation check questionnaire showed that participants reported experiencing the expected type of involvement based on their assigned experimental condition. Those participants in the low involvement group were significantly less involved than were those in the high outcome-involvement group, $\underline{t}$ (98) = -7.68, $\underline{p}$ < .05 ($\underline{M}$ = 2.79 and $\underline{M}$ = 3.59, respectively) and those in the high value-involvement group, $\underline{t}$ (98) = -1.92, $\underline{p}$ < .05 ($\underline{M}$ = 2.79 and $\underline{M}$ = 3.02, respectively). Participants in the high outcome-involvement group were more concerned with the solution or outcome of the problem than were those in the low involvement group, $\underline{t}$ (98)

= 10.35, p < .05 (M = 3.89 and M = 2.75, respectively). Participants in the high value-involvement group reported having their values and morals affected to a higher degree than did those in the low involvement group, t (98) = -2.91, p < .05 (M = 3.16 and M = 2.80, respectively). Finally, analyses revealed that the outcome- and value-involvement problems elicited different types of high involvement, t (98) = -12.52, p < .05 (M = 3.40 for value and M = 2.31 for outcome, a high score represents high value involvement and a low score represents high outcome involvement). Reliabilities for the manipulation check sub-scales were acceptable (low vs. high involvement, α = .90; low vs. outcome involvement, α = .89; low vs. value involvement, α = .85; value vs. outcome involvement, α = .78).

Arousal Check

The arousal scale was analyzed to ensure that any effects found to relate to value involvement could not be attributed to increased levels of arousal. The arousal scale was found to have adequate reliability, α = .83. Means were calculated for each of the three involvement groups (M = 2.83 for low involvement, M = 3.00 for outcome involvement, and M = 2.98 for value involvement). These means did not differ significantly, F (2,147) = 1.56, MSE = .44, ns. Therefore, effects related to value involvement will be considered to result from the value manipulation, not from increased levels of arousal. However, the arousal scale measured perceived arousal as opposed to physical arousal. Thus, an arousal effect would not be seen if participants did not correctly identify their physiological state at that time.

Means and Correlations

Relevant means and standard deviations are presented in Table 1. On average, people viewed about 20 items of information (M = 20.83, SD = 17.92). They looked at this information while spending about 13 minutes searching (M = 12.71, SD = 10.80). On average, participants generated about six items on each of the divergent-thinking measures (M = 6.18, SD = 3.25).

Relevant correlations are presented in Table 2. Of particular interest, time spent searching was correlated with originality, appropriateness, and the creativity composite scores (r = .15, .15, and .20, respectively, p < .05). The amount of information viewed also correlated with originality, appropriateness and the creativity composite scores (r = .22, .14, and .24, respectively, p < .05). The information search composite also correlated with originality, appropriateness, and the creativity composite scores (r = .20, .16, and .24, respectively, p < .05). As expected, amount of information viewed correlated with amount of time spent searching (r = .63, p < .05). The correlation between originality and appropriateness only approached significance (r = .11, p = .09), showing that these two measured were addressing different aspects of creativity.

The absence of certain correlations is also of interest. Divergent-thinking ability did not correlate with the originality, appropriateness, or overall creativity of problem solutions. Also, need for cognition was not related to the originality, appropriateness or overall creativity of the solutions. Need for cognition also did not correlate with the information search measures. Unexpectedly, divergent-thinking ability correlated

Table 1

Relevant Means and Standard Deviations

Variables	M	SD	Min	Max
Divergent thinking uses test #1	5.78	2.98	0	21
Divergent thinking uses test #2	6.59	3.95	0	23
Amount of information searched (items)	20.83	17.92	0	68
Amount of time spent searching (minutes)	12.71	10.80	0	61
Information search composite (z-score)	.00	.090	-1.15	3.18
Originality rating (6-point scale)	2.83	1.93	1	6
Appropriateness rating (4-point scale)	3.45	.69	1	4
Creativity composite (z-score)	.00	.74	-2.24	1.22
Need for Cognition (5-point scale)	3.49	.66	1.61	4.94
Perceived arousal (5-point scale)	2.94	.54	1.42	4.42

Table 2

Pearson Correlations Among Variables

Variable	1	2	3	4	5	6	7	8
1. Need for Cognition	1.00	.08	.01	.06	.04	.03	.07	.07
2. Divergent thinking		1.00	-.22**	-.08	-.17*	.01	-.07	-.04

Information search measures

3. Time spent searching			1.00	.63**	.90**	.15*	.15*	.20**
4. Amount searched				1.00	.90**	.22**	.14*	.24**
5. Search composite score					1.00	.20**	.16*	.24**

Creativity measures

6. Originality ratings						1.00	.11[a]	.74**
7. Appropriateness ratings							1.00	.74**
8. Creativity composite								1.00

*$p < .05$, **$p < .01$, [a]$p = .09$.

negatively with the amount of time spent searching and the information search composite

($\underline{r}$ = -.22 and -.17, respectively, $\underline{p}$ < .05). However, differences in information search

behaviors were predicted to be a direct result of the involvement manipulation, and this

manipulation was achieved by the problem given to participants. Thus, effects of the

manipulation should only be seen in the solution to the problem, not in the divergent

thinking tests. Although, it may be possible that those participants who engaged in a large

amount of information search behaviors were fatigued by the time they were given the

divergent-thinking tests, resulting in the negative correlations. However, this assertion is

purely speculative because no divergent-thinking differences were predicted in relation to

information search behaviors.

Information Search Behaviors

Effects of type of involvement. Table 3 presents the analysis of variance results

for type of involvement on information search behaviors. Table 4 displays the cell means

for these analyses. Results showed that involvement affected the number of items

participants searched for before providing a solution to the problem, $\underline{F}$ (2,147) = 6.12, $\underline{p}$ <

.05, supporting hypothesis four. Contrasts revealed that participants in the high outcome-

involvement condition looked at more information than did those in either the low

involvement condition ($\underline{t}$ (147) = 3.50, $\underline{p}$ < .05) or high value-involvement condition ($\underline{t}$

(147) = 1.88, $\underline{p}$ < .05). Participants in the value condition also looked at more information

than did those in the low involvement condition ($\underline{t}$ (147) = -1.62, $\underline{p}$ = .05).

Similar differences were encountered with involvement and the amount of time

Table 3

Analysis of Variance Results for Type of Involvement on Information Search Behaviors

Source	df	MS	F	p
Number of items searched	2	1839.71	6.12	.00
Error	147	300.61		
Time spent searching	2	748.36	6.92	.00
Error	147	108.11		
Information search composite	2	5.92	7.92	.00
Error	147	.75		

Table 4

Mean Information Search Scores for Each Type of Involvement

Involvement condition	N	Number of items searched		Time spent searching		Search composite	
Low	50	14.92	(13.70)	9.85	(8.38)	-.30	(.72)
Outcome	50	27.04	(19.17)	17.11	(12.42)	.38	(.97)
Value	50	20.52	(18.62)	11.16	(10.00)	-.08	(.88)

Note. Values enclosed in parentheses represent standard deviations. Time spent searching

represents minutes. The search composite is a z-score.

spent on information search behaviors ($\underline{F}$ (2,147) = 6.92, $\underline{p}$ < .05). Participants in the high outcome-involvement condition spent more time searching for information than did those participants in the low involvement condition ($\underline{t}$ (147) = 3.49, $\underline{p}$ < .05) and those in the high value-involvement condition ($\underline{t}$ (147) = 2.86, $\underline{p}$ < .05). Participants in the high value-involvement condition did not spend significantly more time searching for information than did those in the low involvement condition ($\underline{t}$ (147) = -63, $\underline{ns}$), although means were in the correct direction (value $\underline{M}$ = 11.16 minutes and low $\underline{M}$ = 9.85 minutes).

Finally, type of involvement significantly affected participant's information search composite scores ($\underline{F}$ (2,147) = 7.92, $\underline{p}$ < .05). Participants in the high outcome-involvement condition had higher composite scores than did the participants in either the low involvement condition ($\underline{t}$ (147) = 3.90, $\underline{p}$ < .05) or the high value-involvement condition ($\underline{t}$ (147) = 2.64, $\underline{p}$ < .05). Participants in the value and low involvement conditions did not differ significantly from one another ($\underline{t}$ (147) = -1.25, $\underline{ns}$). Means in these condition were again in the correct direction (value $\underline{M}$ = -.08 and low $\underline{M}$ = -.30).

<u>Effects of need for cognition.</u> Need for cognition did not predict information search behaviors. Specifically, need for cognition did not predict number of items viewed ($\underline{F}$ (1,148) = .46), amount of time spent searching ($\underline{F}$ (1,148) = .01), or the information search composite score ($\underline{F}$ (1,148) = .19). Therefore, hypothesis two was not supported. A summary of these regression analyses is displayed in Table 5.

<u>Creativity</u>

<u>Effects of information search behaviors.</u> Table 6 presents the analyses of the

Table 5

Simple Regression Analyses of the Effects of Information Search Behaviors on Need for Cognition

Variable	R^2	B	SE B	β	t
Number of items searched	.003	1.51	2.22	.06	.68
Time spent searching	.000	.15	1.34	.01	.11
Information search composite	.001	.05	.11	.04	.44

Table 6

Simple Regression Analysis of the Effects of Information Search Behaviors on Creativity

Variable	R^2	B	SE B	β	t	p
Originality ratings						
Number of items searched	.05	.02	.01	.22	2.79	.01
Time spent searching	.02	.03	.01	.15	1.79	.08
Information search composite	.04	.44	.17	.20	2.54	.01
Appropriateness ratings						
Number of items searched	.02	.005	.003	.14	1.71	.09
Time spent searching	.02	.01	.005	.15	1.84	.07
Information search composite	.03	.12	.06	.16	1.97	.05
Creativity composite						
Number of items searched	.06	.01	.003	.24	3.06	.00
Time spent searching	.04	.01	.01	.20	2.46	.02
Information search composite	.06	.20	.07	.24	3.06	.00

effects of information search behaviors on the creativity ratings. These analyses crossed the three information search variables (number of items searched, time spent searching, and the composite score) with the three creativity variables (originality ratings, appropriateness ratings, and the composite creativity score). These analyses were a test of hypothesis one.

Regression analyses revealed that information search behaviors predicted the originality of problem solutions. The number of items viewed predicted the originality of solutions ($\underline{F}$ (1, 148) = 7.80, $\underline{p}$ < .05). The effect of time spent searching on originality was marginal ($\underline{F}$ (1, 148) = 3.21, $\underline{p}$ = .08). The information search composite score also predicted the originality of the solution ($\underline{F}$ (1, 148) = 6.45, $\underline{p}$ < .05). The amount of information searched and the time spent searching had marginal effects on the appropriateness of solutions ($\underline{F}$ (1, 148) = 2.92, $\underline{p}$ = .09 and $\underline{F}$ (1, 148) = 3.37, $\underline{p}$ = .07, respectively). However, the information search composite effectively predicted the appropriateness ratings ($\underline{F}$ (1, 148) = 3.86, $\underline{p}$ = .05). The number of items searched predicted the creativity composite ($\underline{F}$ (1, 148) = 9.34, $\underline{p}$ < .05), as did the amount of time spent searching ($\underline{F}$ (1, 148) = 6.04, $\underline{p}$ < .05). Finally, the information search composite score was a good predictor of the creativity composite score ($\underline{F}$ (1,148) = 9.39, $\underline{p}$ < .05).

Effects of type of involvement. Table 7 presents the analysis of variance results for the effects of type of involvement on the creativity ratings. Results revealed that type of involvement predicted the appropriateness and originality of solutions and the creativity composite scores. Cell means are presented in Table 8. These results provided

Table 7

<u>Analysis of Variance Results for Type of Involvement on Creativity Ratings</u>

Source	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Originality ratings	2	16.01	4.49	.01
Error	147	3.56		
Appropriateness ratings	2	3.93	9.13	.00
Error	147	.43		
Creativity composite	2	6.05	12.61	.00
Error	147	.48		

Table 8

<u>Mean Creativity Scores for Each Type of Involvement</u>

Involvement condition	<u>N</u>	Originality rating		Appropriateness rating		Creativity composite	
Low	50	2.98	(1.99)	3.46	(.61)	.05	(.75)
Outcome	50	3.30	(2.01)	3.72	(.67)	.32	(.60)
Value	50	2.20	(1.63)	3.16	(.68)	-.37	(.72)

<u>Note.</u> Values enclosed in parentheses represent standard deviations. Ratings were on a 5-point scale. The creativity composite is a z-score.

partial support for hypothesis five.

Type of involvement influenced the originality of participants' solutions ($\underline{F}$ (2,147) = 4.49, $\underline{p}$ < .05). Contrasts revealed that participants in the high outcome-involvement condition were more original than were those in the high value-involvement condition ($\underline{t}$ (147) = 2.92, $\underline{p}$ < .05). Contrary to predictions, participants in the low involvement condition wrote more original solutions than did participants in the high value-involvement condition ($\underline{t}$ (147) = 2.07, $\underline{p}$ < .05). Although means showed that solutions were more original in the high outcome-involvement condition ($\underline{M}$ = 3.30) than in the low involvement condition ($\underline{M}$ = 2.98), this difference was not statistically significant ($\underline{t}$ (147) = .85).

Type of involvement also had an effect on the appropriateness of participants' solutions ($\underline{F}$ (2,147) = 9.13, $\underline{p}$ < .05). Participants in the high outcome-involvement condition wrote more appropriate solutions than did those in the low involvement condition ($\underline{t}$ (147) = 1.98, $\underline{p}$ < .05) and those in the high value-involvement condition ($\underline{t}$ (147) = 4.27, $\underline{p}$ < .05). Contrary to predictions, solutions from participants in the low involvement condition were more appropriate than were solutions from participants in the high value-involvement condition ($\underline{t}$ (147) = 2.29, $\underline{p}$ < .05).

Finally, type of involvement also affected the creativity composite scores ($\underline{F}$ (2,147) = 12.61, $\underline{p}$ < .05). Participants in the high outcome-involvement condition produced more creative solutions than did those in the low involvement conditions ($\underline{t}$ (147) = 1.96, $\underline{p}$ < .05) and those in the high value-involvement condition ($\underline{t}$ (147) = 4.98,

$p < .05$). Once again contrary to predictions, participants in the low involvement condition wrote solutions that resulted in higher creativity composite scores than did those in the high value-involvement condition (t (147) = 3.03, $p < .05$).

Effects of need for cognition. Participants' need for cognition did not predict the creativity of the problem solutions. Need for cognition did not predict originality ratings (F (1,148) = .13), appropriateness ratings (F (1,148) = .81), or the composite creativity scores (F (1,148) = .71). Thus, hypothesis three was not supported. Results of these regression analyses are presented in Table 9.

Information search behaviors as a mediator. Hypotheses three and five predicted that information search behavior would act as a mediator between need for cognition and creativity and between involvement and creativity. Due to the absence of a direct effect of need for cognition on information search behaviors or creativity, analyses were not performed to test if information search mediated the relation between need for cognition and creativity.

Although involvement was found to affect both participants' information search behaviors and the creativity of their solutions, information search behaviors did not act as a mediator. The absence of a mediated effect was seen with all three information search measures (amount of information searched, amount of time spent searching, and the information search composite) crossed with all three creativity indicators (ratings of appropriateness and originality, and the creativity composite).

Table 9

Simple Regressions of Creativity on Need for Cognition

Variable	R^2	B	SE B	β	t
Originality ratings	.001	.09	.24	.03	.36
Appropriateness ratings	.005	.08	.09	.07	.90
Creativity composite	.005	.08	.09	.07	.84

Type of Involvement / Need for Cognition Interaction

Type of involvement did not interact with need for cognition in affecting

information search behaviors (see Table 10) or creativity (see Table 11). Regression

analyses revealed that the interaction term did not result in a significant effect above and

beyond the main effects when considering number of items searched ($\Delta R^2 = .00$, $\underline{F} = .15$),

amount of time spent searching ($\Delta R^2 = .02$, $\underline{F} = 1.30$), or the information search

composite score ($\Delta R^2 = .01$, $\underline{F} = .71$). Similarly, there was no interaction affect on

appropriateness ratings ($\Delta R^2 = .01$, $\underline{F} = .53$), originality ratings ($\Delta R^2 = .00$, $\underline{F} = .37$), or the

creativity composite scores ($\Delta R^2 = .01$, $\underline{F} = .86$).

Because this was an exploratory analysis, need for cognition was split into top

third and bottom third scores and then crossed with involvement in order to compute cell

means and explore any trends that might be present but hidden due to small statistical

power. Figures 8 to 13 display the graphs of these results. Consistent with predictions,

these graphs showed that under conditions of low involvement and high value-

involvement, participants higher in need for cognition had higher scores on the

information search measures than did those low in need for cognition. Contrary to

predictions, participants in the high outcome-involvement condition with a high need for

cognition actually had lower scores on the information search indicators than did those

low in need for cognition.

When looking at the interaction effects on creativity, it was found that participants

in the low involvement and high outcome-involvement conditions had about the same

Table 10

Hierarchical Regression Analysis Results for the Interaction of Type of Involvement with Need for Cognition on Information Search Behaviors

Variable	R^2	F	p	ΔR^2	F	p
Number of items searched						
Main effects (301.58)	.08	4.24	.01			
Interaction effect (305.11)	.08	2.58	.03	.00	.15	ns
Amount of time spent searching						
Main effects (108.81)	.09	4.60	.00			
Interaction effect (108.37)	.10	3.29	.01	.02	1.30	ns
Information search composite						
Main effects (.75)	.10	5.34	.00			
Interaction effect (.75)	.11	3.48	.01	.01	.71	ns

Note. Values enclosed in parentheses represent mean square residuals.

Table 11

Hierarchical Regression Analysis Results for the Interaction of Type of Involvement with Need for Cognition on Creativity

Variable	R^2	F	p	ΔR^2	F	p
Appropriateness ratings						
Main effects (.43)	.12	6.59	.00			
Interaction effect (.43)	.13	4.14	.00	.01	.53	ns
Originality ratings						
Main effects (3.58)	.06	3.08	.03			
Interaction effect (3.61)	.06	1.98	.08	.00	.37	ns
Creativity composite						
Main effects (.48)	.15	8.93	.00			
Interaction effect (.48)	.16	5.69	.00	.01	.86	ns

Note. Values enclosed in parentheses represent mean square residuals.

Figure 8

Need for cognition / type of involvement interaction

on amount of information searched
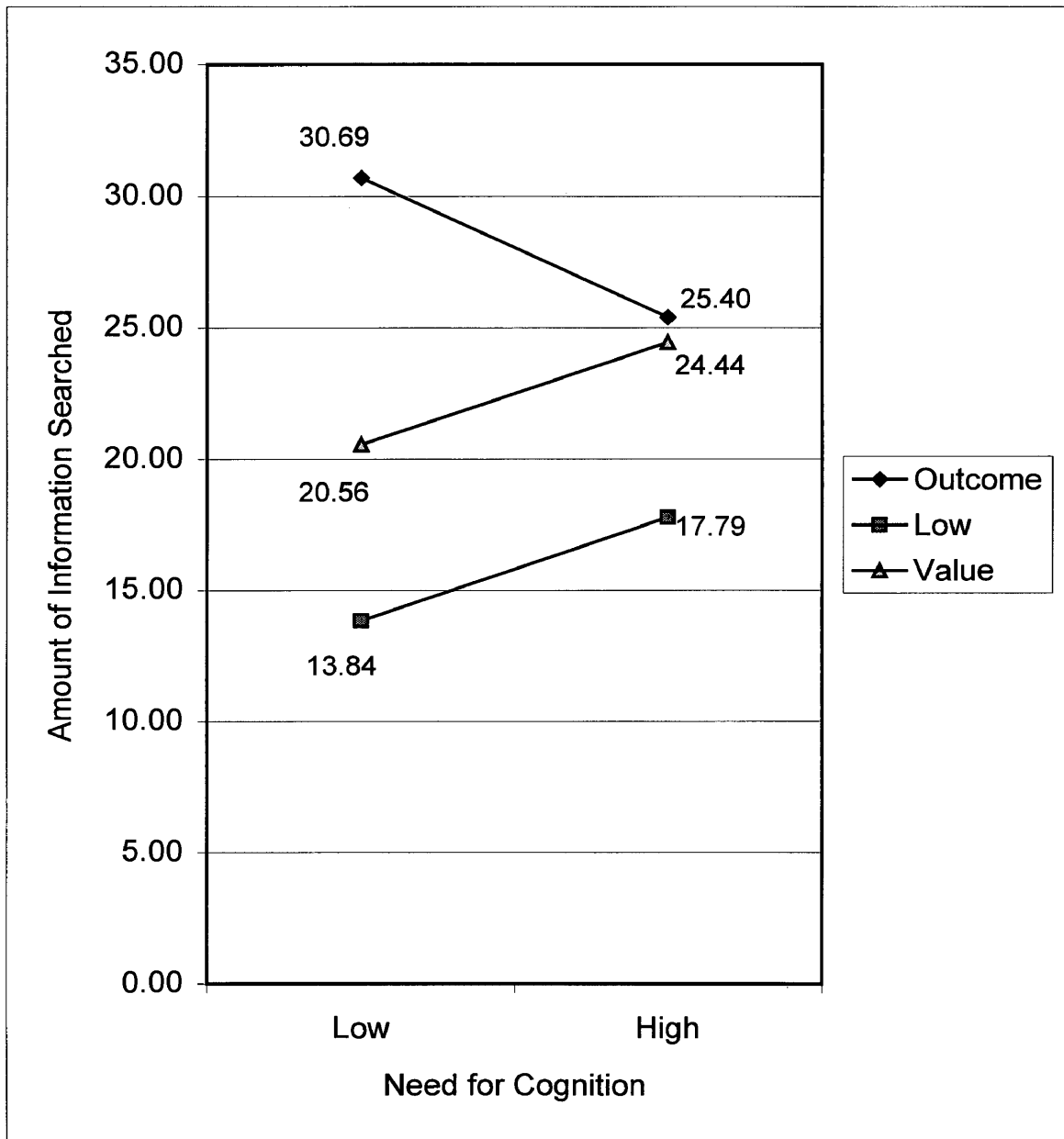
Figure 9

Need for cognition / type of involvement interaction

on amount of time spent on information search behaviors
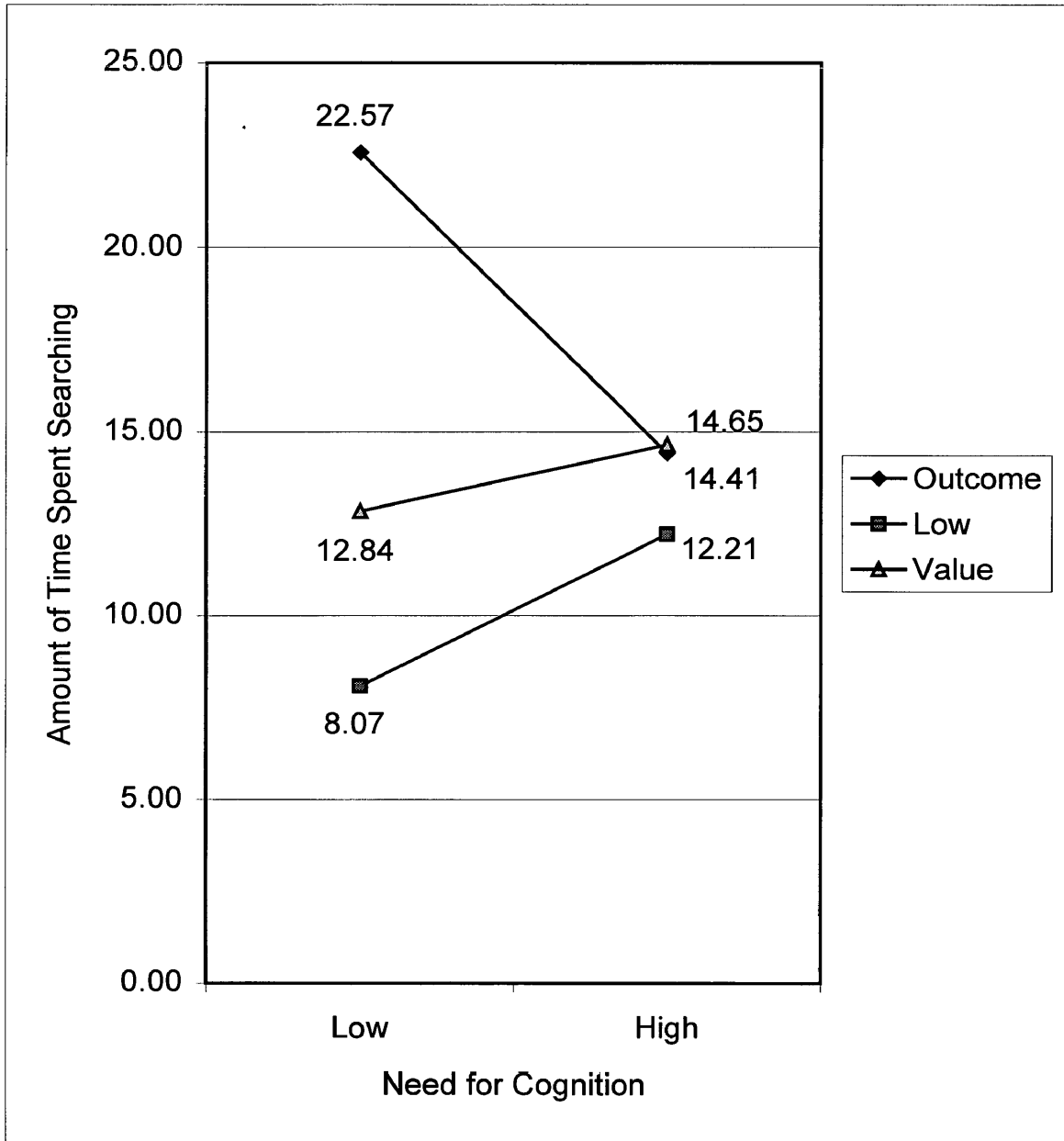
Figure 10

Need for cognition / type of involvement interaction

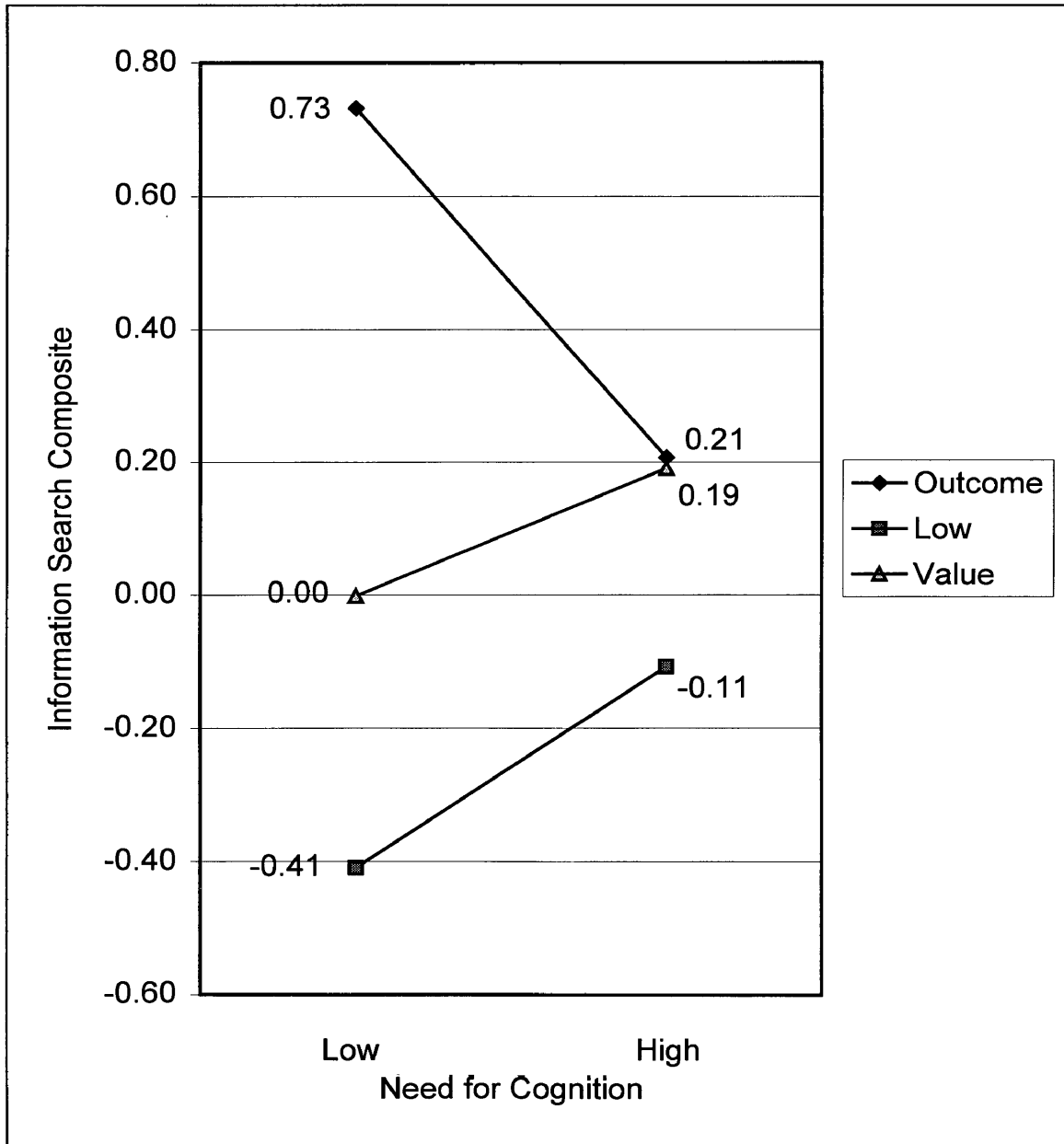on the information search composite scores

Figure 11

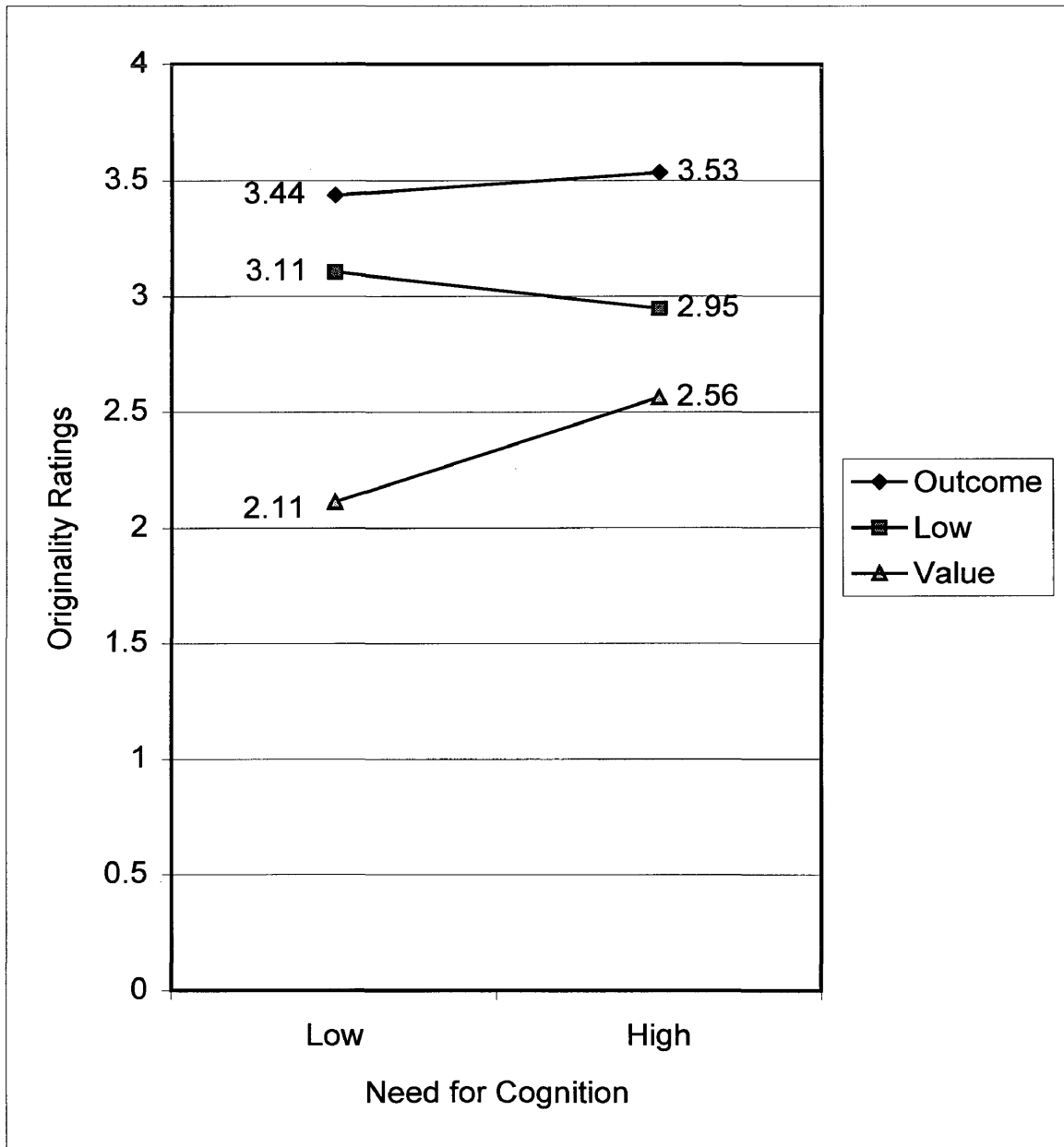Need for cognition / type of involvement interaction

on originality ratings

Figure 12

Need for cognition / type of involvement interaction

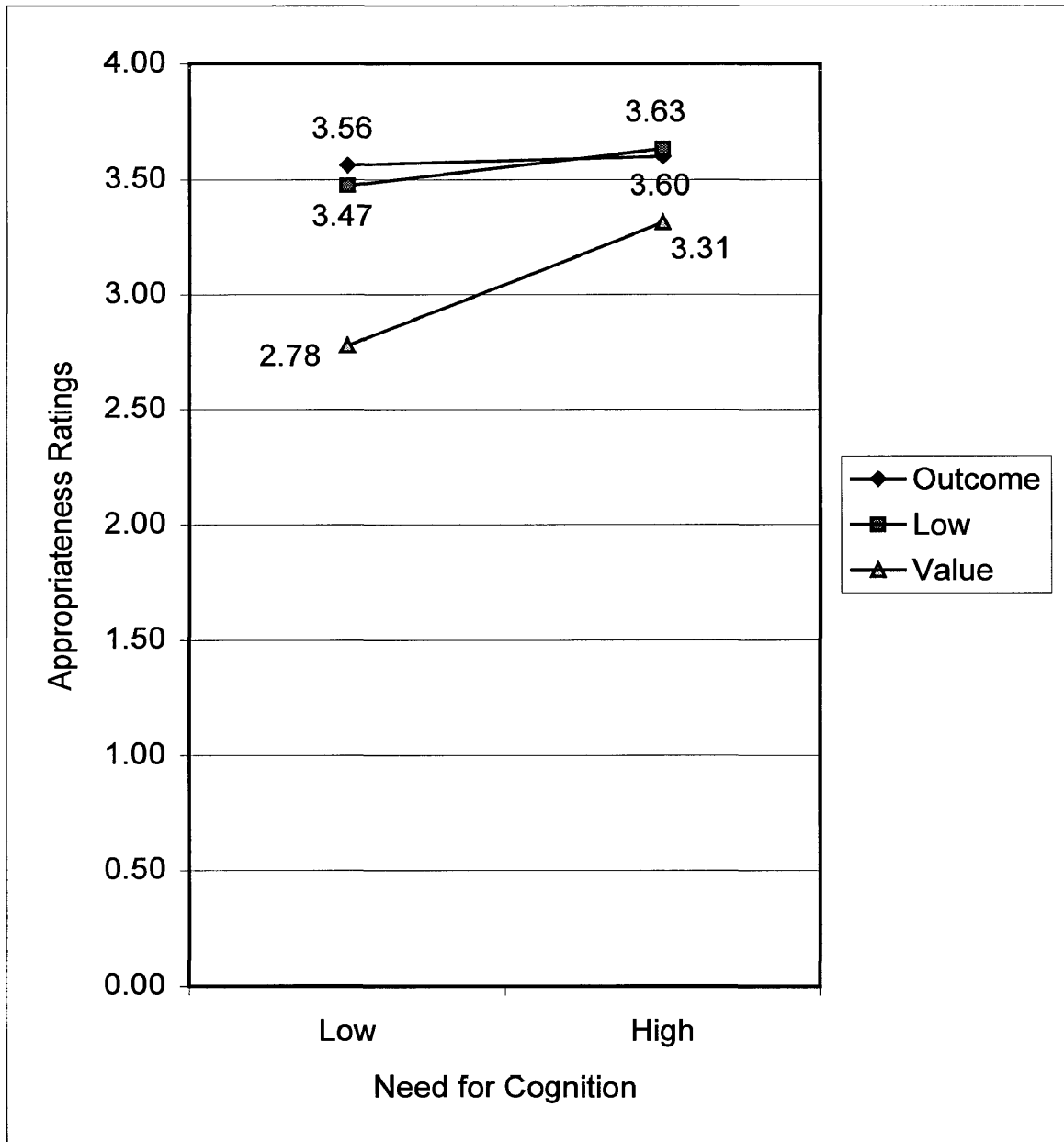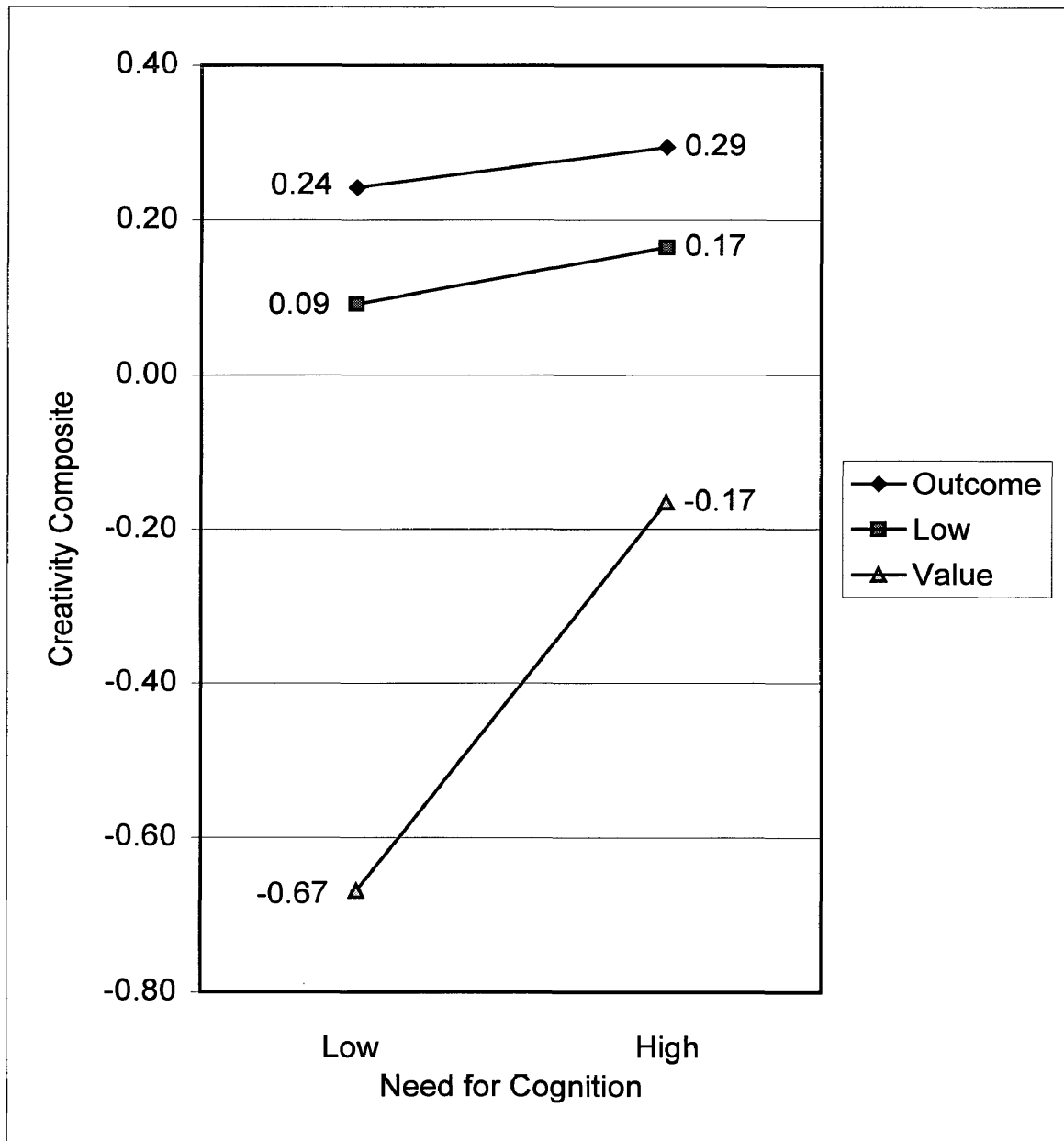on appropriateness ratings

Figure 13

Need for cognition / type of involvement interaction

on the creativity composite scores

creativity scores regardless of their need for cognition. However, as predicted, within the high value-involvement condition, participants with a high need for cognition had higher originality, appropriateness and creativity composite scores. The reader should remember that none of the interaction analyses were statistically significant. Therefore, all trends presented in the graphs are purely speculative.

Discussion

Overview of Discussion

The major theoretical purpose of this study was to explore factors that had the potential to influence information search behaviors and creative problem solving. Predictions centered on the supposition that if information search behaviors positively affect creative problem solving, then variables that increase information search behaviors should also positively affect creativity. Need for cognition and personal involvement were explored to this end.

Results of the study were mixed. The following discussion will attempt to sort through these results and the many analyses conducted. Also, basic and applied interpretations and implications of the findings will be explored. Finally, the limitations of the study will be discussed, leading into suggested avenues for future research.

A Brief Recapitulation of Results

Effects of information search behaviors on creative problem solving. This study provided evidence that a high level of information search enhances creative problem solving. Composite information search scores, comprised of amount of information

searched and amount of time spent searching, effectively predicted the originality, appropriateness, and overall creativity of problem solutions. Individually, amount of information searched significantly predicted originality and overall creativity of solutions and marginally predicted appropriateness of solutions. Amount of time spent searching significantly predicted the creativity of solutions and marginally predicted the appropriateness and originality of solutions. Thus, results demonstrate that information search behavior is a very important contributor to creative problem solving, supporting hypothesis one.

Effects of need for cognition on information search behaviors and creativity. It was predicted that participants who were high in need for cognition would be motivated to engage in more information search behaviors than those who were low in need for cognition. This assertion was not supported. Need for cognition was also expected to affect creativity directed and indirectly through information search behaviors. The mediation prediction was not supported. Need for cognition also did not affect creativity directly. Thus, hypotheses two and three were not supported.

Effects of type of involvement on information search behaviors and creativity. Participants in the high outcome-involvement condition searched for more information, spent more time searching, and had higher information search composite scores than participants in the low involvement condition and participants in the high value-involvement condition. Although means revealed that participants in the high value-involvement condition searched for more information, spent more time searching, and

had higher information search composite scores than participants in the low involvement condition, only the difference in amount searched reached statistical significance. Therefore, hypothesis four was partially supported.

Hypothesis five predicted that type of involvement would affect creativity directly and indirectly through information search behaviors. Analyses revealed that type of involvement affected originality ratings, appropriateness ratings, and the creativity composite scores. However, this effect was not mediated by information search behaviors. Considering the direct effects of involvement on creativity, results revealed that high outcome-involvement enhanced the appropriateness, originality, and overall creativity of participants' solutions. High value-involvement, on the other hand, had detrimental effects on participants' creative problem solving. Solutions from participants in the high value-involvement condition were even less original, appropriate, and creative in general than solutions from participants in the low involvement condition. Therefore, hypothesis five received partial support.

To summarize, increases in information search behaviors lead to increases in the creativity of problem solutions. In regards to personal involvement, information search was highest in the high outcome-involvement condition, second highest in the high value-involvement condition, and lowest in the low involvement condition. Creativity, on the other hand, was highest in the high outcome-involvement condition, second highest in the low involvement condition, and lowest in the high value-involvement condition.

<u>Interpretation of Results</u>

<u>Information search behaviors.</u> Mumford et al. (1991) reported that during the early stages of creative problem solving, people identify, search, retrieve and encode the information they will need for the rest of the creative process. Thus, information search behaviors are fundamental to the entire creative problem-solving effort. Effective information search behaviors that provide quality information are essential in developing creative solutions to ill-defined, novel problems (Mumford, Baughman, Threlfall, et al., 1996).

Results provide support for the importance of information search behaviors in creative problem solving. Participants who searched for more information and spent more time on information search behaviors generated more creative solutions to ill-defined problems than those who did not engage in as vigorous information search activities. As discussed by Mumford, Baughman, Supinski, et al. (1996), participants in this study differed in their information search behaviors and these differences were predictive of creativity. In support of the Mumford et al. (1991) model, results indicated that people who engage in extensive information search behaviors prior to solution generation benefit by having this information available for generating creative solutions to ill-defined, novel problems. People may use this additional information to generate more alternative solutions, some of which may be creative, or to generate higher quality and more original alternatives, or both.

<u>Personal involvement.</u> Chaiken et al. (1996) and Petty et al. (1983) hypothesized

that personal involvement in an issue increases the amount of thinking a person engages

in concerning that issue. Empirically, Takemura (1994) and Atoum and Farah (1993)

found that personal involvement was positively related to information search behaviors.

Ruscio et al. (1998) showed that high involvement in a task can result in higher creativity.

Thus, indications were that involvement with an issue, task, or problem would have

positive effects on information search behaviors and creativity.

Johnson and Eagly (1989) warned that researchers need to be careful when

studying the effects of personal involvement. They reported that different types of

involvement would produce different effects. People who are involved by having their

values and morals engaged tend to be close-minded when dealing with an issue. They

tend to behave in a manner consistent with their values and morals and not consider

alternatives. People who are outcome-involved, on the other hand, are only concerned

with the outcome of their efforts and are motivated to engage in extra thought and effort

because these outcomes are personally relevant to them. Thus, Johnson and Eagly

suggested that value involvement and outcome involvement should be researched as

different constructs due to the different aspects of the self engaged by each.

The present study lends support to the assertion that value involvement and

outcome involvement are different constructs. Participants who believed that the outcome

of their problem solving efforts was personally relevant tended to engage in more

information search behaviors and were more creative than those who had their values and

morals engaged and those who were asked to solve a low involvement problem. This

finding lends support to the research of Petty and Cacioppo and their colleagues who consistently find that making the outcome of participants' efforts personally relevant will motivate them to exert more effort towards information processing.

Results of the present study reveal even stronger creative problem solving detriments due to value involvement than expected. In terms of information search behaviors, participants in the high value-involvement condition searched for more information than those in the low involvement condition but searched for less information than those in the high outcome-involvement condition, as expected. However, value-involved participants did not spend significantly more time engaging in information search behaviors than participants in the low involvement condition. Thus, statistically speaking, participants who had their values and morals engaged looked at significantly more information in the same amount of time as those in the low involvement condition. This seems to indicate that the value-involved participants did not exert much effort in processing the information they viewed. This may by due to the close-mindedness brought on by the value issue.

To a large extent, participants in the low involvement condition seem to have satisficed with the information presented in the problem and did not feel the motivation to engage in a large amount of information search. This is consistent with Mumford et al. (1994) who discussed that if people are not motivated to engage in all aspects of creative thought, such as problem construction and information search, they will likely terminate problem-solving processes prematurely. Participants in the low involvement condition

did not have the motivation to search through information regarding the uninteresting, irrelevant problem, even though they were told that this information would aid in the development of a solution.

When considering the effects of value and low involvement on creativity the results become even more interesting. As noted, participants in the high value-involvement condition engaged in more information search behaviors than those in the low involvement condition. However, this effect was reversed when the creativity of problem solutions was considered. Participants in the high value-involvement condition wrote solutions that were less original and appropriate, and thus, less creative than did participants in the low involvement condition.

It is interesting to note that participants in the high value-involvement condition engaged in more information search behaviors but were less creative when compared to participants in the low involvement condition. Also, as noted, participants in the high value-involvement condition looked at more information than those in the low involvement condition but spent about the same amount of time engaging in information search behaviors. One possible explanation of these results is that participants were more familiar with the issue presented in the value-related problem as compared to the other problems. Recall that this problem depicted a college student who was having trouble with her roommate using illegal drugs in their dorm room. Thus, the college-student participants in this study could have related to this problem. If so, they may have engaged in less information search and were less creative when compared to outcome-involved

participants. However, this familiarity interpretation does not explain why the value-involved participants searched for more information but were less creative when compared to participants who had a low level of involvement. They searched for more information, but for some reason, this extra information did not enhance the creativity of their solutions.

Close-mindedness may be the reason why a fair amount of information search behaviors did not help participants in the value condition. These participants may have activated a dominant schema on the value-laden issue after reading the problem and were convinced immediately as to how the problem should be solved. As a case in point, one participant reported in his/her solution that the information "looked at was stuff that didn't really change how I would have [Sally] solve this difficult problem." This is an indication that participants in the value condition activated a powerful schema on the value issue and had in their minds from the onset how that issue should be resolved. This may also be part of the reason why they looked at significantly more information in the same amount of time when compared to the participants in the low involvement condition. They just did not extend much cognitive effort towards processing the information presented to them.

If close-mindedness decreased the motivation of participants to think about the information they viewed and decreased the creativity of the solution, the question can be raised as to why they searched for more information than participants in the low involvement condition? The answer to this question may lie in the distinction between

biased processing versus amount of processing and whether or not value involvement and outcome involvement are different constructs. Petty and Cacioppo (1990) speculated that value involvement was just a high level of involvement that may inhibit persuasion due to biased processing brought on by a strong, value-laden attitude (as opposed to being a different involvement construct). However, Maio and Olson (1995) empirically found that value involvement motivated people to ignore message arguments, not bias them. They concluded that value involvement is a different construct than outcome involvement that causes a decrease in the amount of processing by engaging a different aspect of the self.

Results of the present study seem to show that both biased processing and decreased processing play a role. A decrease in processing was indicated by the fact that participants in the high value-involvement condition engaged in less information search behaviors than those in the high outcome-involvement condition, both in terms of amount searched and time spent searching. Value-involved participants were also less creative than their outcome-involved counterparts. These results are consistent with the interpretations of Maio and Olson (1995) that value involvement decreases the amount of processing.

However, a decrease in amount of processing does not explain why value-involved participants searched for more information but were less creative when compared to participants with low involvement. This effect may be due to biased processing in the value-involvement condition. Recall that manipulation check results

showed that value-involved participants where more involved than low involvement participants. This is probably why they engaged in more information search behaviors. However, due to biased processing, this increase in information search did not lead to an increase in creativity. All the information viewed was immediately assimilated into a biased attitude or schema. Participants in the value condition believed they knew how this issue should be solved and the information they viewed did not change this belief. Therefore, they did not spend as much time contemplating what they selected to view or spend as much time incorporating what they viewed into their solution.

High value-involvement may have also resulted in participants searching only for the information that they believed would confirm their biased opinion. Thus, not only might they have assimilated the searched information into their existing schema, they might even have attempted to search only for information that was consistent with that schema or biased opinion. If so, they would not have needed to spend as much time contemplating that information, which might explain why they did not spend significantly more time on information search when compared to participants with low involvement, despite looking at significantly more information. Also, because this information only served to confirm their opinion, it would not enhance the creativity of their solutions.

Petty and Cacioppo (1990) reported that value involvement is such a high level of involvement that it produces inhibiting effects due to biased processing caused by a strong value-laden attitude. Although biased processing was encountered in the present study, decreases in processing were also seen and manipulation check results indicated

that the high outcome-involvement problem was actually more involving than the high value-involvement problem. Additional analyses using only the few manipulation check items (five) that dealt specifically with level of general involvement (e.g., "The problem I worked on was involving") showed that mean involvement in the outcome condition was 3.30, in the value condition it was 2.78, and in the low involvement condition it was 2.68 (measured on a five-point scale with a high score indicating high involvement). Although not decisive, these results, along with those of Maio and Olson (1995), provide evidence indicating outcome and value involvement are different constructs affecting different aspects of the self and causing differences in cognitive processing.

Need for cognition. The absence of an effect for need for cognition was unexpected. Cohen et al. (1955) and Cacioppo and Petty (1982) identified the need for cognition as a stable individual difference in the enjoyment of thinking and the need to understand everything that is happening. Thus, it seemed that people high in need for cognition would engage in more information search behaviors and be more creative than would people low in need for cognition. Similar results have been found in past research with regards to idea generation (Scudder et al., 1994) and information search behaviors (Verplanken et al., 1992; Verplanken, 1993).

A couple of different reasons may explain the lack of a need for cognition effect in the present study. The sample consisted of college students who may tend to be higher in need for cognition than the general population. This may have resulted in a lack of sufficient variability. The data show some support for this assertion. The median score on

the need for cognition scale was 3.57; the mean was 3.49 and the standard deviation was .66. The distribution of means on the five point scale was as follows: (a) 2.00% fell between 1.00 and 2.00, (b) 24.7% fell between 2.01 and 3.00, (c) 52.00% fell between 3.01 and 4.00, and (d) 21.30% fell between 4.01 and 5.00. Although not drastic, these results indicate that a large majority of participants responded as being high in the need for cognition. This restriction in range may have played a role in the absence of need for cognition effects.

A second reason why null effects were found with need for cognition may be due to a lack of power. Data from 150 participants may not have been sufficient to reveal individual differences in need for cognition. Although plausible, this explanation is unlikely because no trends were found in the data to indicate more power would yield significant results. All relevant correlations with need for cognition were .08 or smaller.

A third explanation as to why need for cognition was not related to information search behaviors and creativity may be that the effects of need for cognition were masked by other factors in the experiment. One of these factors may have been the nature of the experimental task. Working on a computer may have been the type of task that naturally engages most people. Many participants commented that they enjoyed the computer portion of the experiment. Others mentioned that the computer task was different and more "fun" than simply filling out questionnaires. Thus, the computer exercise may have been engaging enough to mask individual differences in need for cognition. However, this explanation seems unlikely because very few participants (under five) actually

looked at all the available information, leaving sufficient variability for a potential need for cognition effect.

The level of difficulty of the high value-involvement problem is a second factor that may have concealed a need for cognition effect. Past research has indicated that some participants considered it easy to provide solutions for the high value-involvement and low involvement problems used in this study (Goodman, 1999; Scherer et al., 1994). Thus, these problems may not have been difficult enough to challenge those participants who were high in the need for cognition, thereby not allowing that variable to have an effect.

A third factor that may have masked a need for cognition effect is the involvement manipulation. It is possible that each involvement manipulation (outcome and value) produced such strong reactions that participants' need for cognition no longer mattered. For example, participants in the outcome-involvement condition may have been so concerned with the outcome of the problem that participants both low and high in need for cognition were motivated to engage in extensive information search behaviors and write creative solutions.

Correlations among need for cognition scores, the information search indicators, and the creativity indicators within each involvement condition were calculated to explore this possibility further. These correlations did not reach statistical significance, probably due to the limited sample size within each condition ($\underline{n} = 50$). However, some trends were present that may partly explain the lack of a need for cognition effect. Within

the outcome-involvement condition, all correlations were negative and less than -.08, with the exception of time spent searching, which was -.13. However, within the low involvement condition, correlations were moderate when considering the information search behaviors (r = .21 with time spent, r = .12 with amount searched, and r = .18 with the composite), but were positive and less than .11 when looking at the creativity indicators. Within the value-involvement condition, correlations were positive and less than .08 with the information search indicators but were moderate when considering the creativity indicators (r = .14 with originality, r = .20 with appropriateness, and r = .22 with the creativity composite).

These correlations provide some indication that when the data for the three involvement conditions were aggregated, the effect of need for cognition was lost. The lack of correlations with any magnitude in the outcome-involvement condition may indicate that all participants in this condition were so highly involved that individual differences in need for cognition did not matter. This is consistent with the speculation by Cacioppo et al. (1996) that under conditions of high outcome-involvement a ceiling effect would be encountered making individual differences in need for cognition irrelevant. In the low involvement condition, it seems that in terms of information search behaviors, participants high in need for cognition were able to overcome the low involvement to some extent. However, this trend was not seen in the creativity indicators. Finally, the correlations seem to show that the value-involved participants were able to overcome their close-mindedness when providing a solution to the value problem; however, these

trends were not seen with the information search indicators. Thus, although none of the correlations were statistically significant, trends provide some evidence that the involvement manipulation may have played a role in the absence of a need for cognition effect.

One must also consider the possibility that the null results found for need for cognition are true results in this study. There are a number of reasons why this study may have differed from past research on need for cognition. Much of the research on need for cognition has been in the persuasion literature. People high in need for cognition have been found to engage in more information processing, carefully considering counter-attitudinal arguments and other information (Cacioppo et al., 1996). It may be possible that need for cognition has a stronger effect when looking at argument processing than in actually searching for information and solving problems. These types of tasks require more than just considering message content. Participants must actively engage the computer and develop a solution to an ill-defined problem.

Verplanken (1993) found results that are similar to those encountered here. Initially, Verplanken et al. (1992) found that people high in need for cognition desired more information and used more cognitive effort than those low in need for cognition. However, participants in this study did not actually search for information; they simply announced what information they would desire if in that situation. In a follow-up study, Verplanken (1993) allowed participants to actually search for information. Results revealed once again that participants high in need for cognition exerted more cognitive

effort. However, similar to what was found in this study, Verplanken's results revealed

that, when given the opportunity, participants high in need for cognition did not actually

search for more information than those low in need for cognition.

Verplanken (1993) discussed that one of two things may have explained the lack

of a need for cognition effect on amount of information searched. First, he speculated that

the information display board used to guide information search may have resulted in a

ceiling effect in amount of searchable information. A ceiling effect is not a plausible

explanation in the present study because a large amount of information was provided.

Less than five participants actually viewed every piece of information. Secondly,

Verplanken speculated that identifying the information one would desire to see may be

different than actually searching for that information. He hypothesized that in tasks where

one has to actively search through information, participants high in need for cognition

have alternative routes to satisfy their motivation to engage in thought other than actually

viewing information. They may spend more time on other cognitive activities, such as

processing information, rather then spending more time actually searching for

information.

Verplanken (1993) also discussed that participants in his study who were high in

need for cognition may have engaged in more "intensive" information processing. The

lack of a relation between need for cognition and time spent searching in the present

study seems to provide evidence against this hypothesis. If participants were engaging in

more "intensive" information processing (and not just searching for more information)

that effect should have presented itself in the amount of time spent on information search

behaviors. However, there may be other cognitive processes that are related to need for

cognition that did not show up in amount of information searched or amount of time

spent searching, such as speed of processing.

This same reasoning could also explain the absence of a need for cognition effect

on creative problem solving. Need for cognition may have an effect during an

unmeasured aspect of creative problem solving, such as problem construction, or

problem-solving confidence. For example, Heppner et al. (1983) found that people who

were more confident in problem solving were also higher in need for cognition. It seems

unlikely that need for cognition would be related to individual processes of creative

problem solving and not the final result (problem solution), but it is a possibility.

Information search behaviors as a mediator. It was predicted that information

search behaviors would mediate the relationship between need for cognition and

creativity and between involvement and creativity. Because no effects were found for

need for cognition, mediation analyses were not preformed with this variable. On the

other hand, type of involvement was related to information search behaviors and

creativity. Also, information search behaviors predicted creative problem solving.

However, information search behavior was not a mediating variable between involvement

and creativity.

This is an intriguing result. If, as expected, information search behavior is having

the biggest effect during the early stages of creative problem solving it may be that a

mediating effect would be found only when considering these early processes. Thus, information search behavior may show up as a mediator when looking at problem construction or information encoding. Although type of involvement was related to information search behaviors, it is also plausible that these two variables only affect creativity separately.

Need for cognition / type of involvement interaction. Exploratory hypotheses predicted that need for cognition would interact with type of involvement in affecting information search behavior and creativity. None of the interaction analyses resulted in statistical significance. Due to the exploratory nature of these predictions, the most obvious explanation is that these null results are true. However, participants within each involvement condition did differ in information search behaviors and increases in information search behaviors were related to increases in creativity across involvement conditions. Thus, it is worth speculating as to what motivates people to increase information search behaviors.

Although not significant, it remains possible that need for cognition is that motivating variable. Graphs of the involvement / need for cognition interaction revealed that participants in the low involvement and high value-involvement conditions who were also high in need for cognition did show increases in their information search behaviors and creativity. This was especially evident for the value-involved participants when considering the creativity composite scores. Therefore, it is possible that people high in need for cognition are able to overcome the close-mindedness brought on by the value

issue and are able to overcome the low motivation brought on by the low involvement

issue. These trends seem to reveal a possible benefit for people high in need for

cognition. It should be reiterated, however, that these predictions were exploratory and

the null findings remain the most plausible interpretation of the results.

Implications of Results

   Applied implications. Increasing the creativity of employees is becoming very

important to employers in today's rapidly changing, information technology-based work

environment. Many times these changes require creative solutions to ill-defined, novel

problems. One option for organizations who desire these creative solutions is to hire

employees with creative potential. However, this is not usually a practical solution. A

second and more immediate option is to maximize or capitalize on the creative potential

of current employees. This has recently become a very viable option as researchers have

begun to demonstrate that all people have the potential to be creative (Houtz, 1994;

Runco & Chand, 1994; Treffinger et al., 1994). Research has also indicated that leaders

or managers can tap that potential and increase the creativity of their employees

(Redmond et al. 1993). Given that all people have a certain degree of creative potential, it

becomes evident that the ability to tap into that potential is competitively advantageous

for organizations.

   The present study provides empirical support for the assertion that increases in

information search behaviors will be accompanied by increases in creativity. Participants

who searched and viewed more information and spent more time on information search

behaviors were more creative. This finding alone has applied implications. First, employers need to make relevant information available to employees who are working to solve a problem. All employees, and especially managers will encounter novel problems, issues, and crises while on the job. If these employees are unable to attain the information they need to solve these problems, the creativity of their solutions will suffer and the problems, issues, or crises will not be solved optimally. The more information available to employees the greater the possibility that they will have the information they need to creatively solve a problem.

The second implication of this information search finding is that people need time to engage in information search behaviors and solve a problem creatively. Participants who spent more time engaging in information search behaviors were more creative. The first step in helping to ensure employees spend the time needed to engage in information search behaviors is to make that time available. Although this is not always an option for organizations, the results of this study indicate that managers and employees are more likely to be creative if they dedicate time towards information search behaviors. In order to dedicate that time, these employees must feel that they have this time available to them above and beyond their other duties. This explanation is consistent with Mumford, Whetzel, and Reiter-Palmon (1997) who discussed the importance of information gathering to organizational problems and how time pressure, limited access to important information, etc., will hinder the creativity of employees.

Opportunity to search for more information and extra time to engage in

information search behaviors alone are probably not sufficient to consistently enhance creativity. Most people need motivation to engage in the extended information search needed to see creative results. The present study reveals that personal involvement may be a way in which organizations can provide this motivation. However, a general increase in task or problem involvement alone is not sufficient. Advantages and disadvantages are found depending on the type of personal involvement felt by employees. Outcome involvement provides motivation above and beyond regular levels of involvement. Value involvement, on the other, is detrimental in that people are even less creative than normal.

The most important applied implication of the involvement results is that organizations will benefit by making the outcomes of employees' problem solving efforts highly relevant to them while avoiding engaging their values and morals. Participants in this study engaged in extended information search behaviors and were more creative if they had a stake in the outcome of the problem. In other words, if they believed that the outcome of their problem-solving efforts would or could affect them in some manner, they were motivated to engage in information search behaviors and develop a creative solution to the problem. This finding has the potential to be very influential in terms of increasing employee creativity. If managers can discover how to increase the personal relevance of organizational outcomes so that employees become highly involved while working towards those outcomes, it may provide employees with the increased motivated needed for creative results to be realized.

A second important finding concerns the detrimental effects of high value

involvement in terms of creativity. Participants in the high value-involvement condition engaged in more information search behaviors than participants in the low involvement condition but were less creative. Implications of this finding are fairly obvious. Executives and managers must be careful not to engage employees' values and morals in a problem-solving effort. The difficulty with this will be to identify before hand which issues or problems have the potential to affect employees' values. These issues could include pay raises, promotions, or other areas that may tap into organizational justice issues. This also could include any issues that are related to company politics, which always have the potential to affect employee values (Ferris & King, 1991). Generally, there is a potential that employees will become value-involved any time they get too emotionally attached to a problem or solution.

Theoretical implications. The research findings of the present study provide indirect empirical support for the creativity model developed by Mumford et al. (1991). Increases in information search behaviors engaged in before providing a solution to a problem were accompanied by increases in the creativity of problem solutions. Mumford et al. (1991) emphasized with their model the importance of the early stages of creative problem solving when a person develops a plan for solving a problem and collects the information they will need to complete this plan successfully. Although this study did not directly measure the specific processes involved in the early stages of creative problem solving, one can infer that participants who searched for more information and spent more time on information search behaviors also spent more time on problem construction

and information encoding because these early stages are where information search behaviors are most required. In any case, the results provide additional empirical support for the importance of information search behaviors to creative problem solving.

A second theoretical implication is that this research is one of the first studies to look at type of personal involvement in an area other than persuasion. Extending this research into information search behaviors and creative problem solving helps to strengthen the results found in the persuasion literature. Although research exists that explores the effects of general involvement on information search behaviors and problem solving, none of these studies considered the different effects of value versus outcome involvement. This study indicates that it may be critical to account for the differences between these two types of involvement, as first indicated by Johnson and Eagly (1989). Outcome involvement not only increases message processing but also increases information search behaviors and creativity. On the other hand, although value involvement has positive effects on information search behaviors (though not to the extent of outcome involvement) it proves to be detrimental to creative problem solving. The close-mindedness and inhibiting effects of value involvement discussed by Johnson and Eagly in terms of persuasion also seems to be true in creative problem solving. These results provide an indication that the effects of motivation due to personal involvement may present themselves in many different arenas

Limitations and Future Research.

Methodological limitations. This research study contains several methodological

limitations that should be improved upon or corrected by future research. One such limitation is that the data did not provide information on the thought process of those searching for information. Recall that participants worked alone in a small room. Thus, it is unknown, for example, whether or not some participants wasted time on peripheral behaviors unrelated to information search behaviors. Future research might be able to use verbal protocols or a related method to examine more closely the actual thought processes of participants engaging in information search behaviors. Along the same lines, future research should also attempt to use more sensitive measures of time spent on information search. For example, obtaining a measure of time spent on each item searched might prove informative. Certain people may spend more time contemplating each item searched whereas others may scroll through many items just to get an overview of the issues, and then spend time contemplating this information while they are developing their solutions. The measures used in this study were not sensitive enough to capture either of these possibilities.

A second limitation that should be improved upon concerns the problems participants in this study were asked to solve. Separate problems depicting different issues were used for each involvement condition. This presents a possible confounding variable. Observed involvement difference could have been due to the problem itself, rather than the type of involvement it produced. For example, a problem, by its nature alone, may immediately present more possible solutions, regardless of the level of involvement it induces (Scherer, 1989; Scherer et al., 1994). Although the assertion that

value involvement and outcome involvement are different theoretical constructs necessitates that they be addressed by different problems, it is conceivable that an issue could be developed where minor changes in the problem could make it an outcome- or value-involvement problem. This would greatly reduce the possibility that any observed differences are due to aspects of the problem other than personal involvement.

Another limitation of this study was the order in which data were collected. Because of unforeseen and unavoidable circumstances, a large portion of the data for the low involvement condition were collected with students enrolled in summer classes whereas the data for the outcome- and value-involvement conditions were collected from students enrolled in fall classes. However, there does not seem to be a reason to believe students who take classes during the summer are in any way different than students who take classes during the regular semesters. The only conceivable difference may be that students who take classes during the summer are more conscientious and motivated than students who take the summer off and only enroll in the fall and spring semesters. In that case, results would only be strengthened because the summer students received the low involvement problem.

Theoretical limitations and future directions. This study provides further explanations about the importance of information search behaviors in the creative process. However, this study did not explore where in the creative process these variables have their effects. For example, it was speculated that information search behaviors would have their greatest impact during the early stages of creative problem solving,

specifically between the problem construction and information encoding stages. Future research should specifically test this proposition. Mumford et al. (1994) reported that during problem construction people develop an execution plan for solving a problem. This plan lays the foundation for information search behaviors. Thus, effective problem construction should lead to productive information search behaviors, which in turn should lead to more information being encoded, etc. Future research should attempt to empirically support this assertion.

Future research should also explore further the effects of type of involvement. More research is needed to determine if value involvement and outcome involvement should be considered different constructs. This research should continue in the persuasion arena along with other areas such as creativity and decision making. If results continue to be found within and outside the persuasion literature, more confidence can be applied to the proposed theoretical assertions.

Future research also needs to examine the specific differences in information search behaviors between the different types of involvement. For example, are there differences in the content of the information people search for depending on the type of involvement? Do people who have their values and morals engaged look only for information that supports their opinion? People seem to be close-minded on value-related issues and it is plausible that this close-mindedness would motivate them to look at only the information they feel would support this close-minded opinion or attitude. In the same manner, studies need to address whether people who are outcome-involved simply

engage in more information search or if they also search for higher quality information and/or think more deeply about the information they retrieve. There are a wealth of available research questions that could be addressed by looking more in-depth at the type of information people search for in each of the involvement conditions.

Future research also needs to explore whether the inhibiting effects of value involvement are due to decreases in information processing, biased processing or both. Also, if the answer is both, as this study seems to indicate, is one more influential? Along the same lines, research needs to explore what can reduce or overcome the detrimental effects of value involvement. If possible, studies should determine how to reliably reduce the close-mindedness that seems to occur when people have their values and morals engaged. This will also have important applied implications. If managers can determine how to reduce value-involvement effects they should be able to increase the creativity of solutions to value-laden problems.

Along similar lines, research should look more closely at values themselves. This study found that value-relevant issues are detrimental to creative problems solving. However, to make a general prescription to avoid value-laden topics is probably not desired or practical. It is very likely that the detrimental affects found in this study will depend on the problem being solved and which values the issue depicted in that problem violates or makes salient. An individual's value system, including both its content and structure, probably also play a role in determining which issues have the potential to hinder creative problem solving. Thus, a more complete understand of how and why high

value involvement hinders creativity could be obtained by looking more directly at the value component itself.

Another possibility for future research is to ascertain what makes people search for more information regardless of type of involvement. Although people differed in terms of information search behaviors between each involvement condition, they also differed greatly within each condition. Because of this, and because information search behaviors are positively related to creativity, determining why certain people engage in extended information search behaviors, regardless of personal involvement, will have obvious beneficial implications. The present study found that need for cognition does not seem to be this variable. Future research should consider other individual difference variables as possibilities, such as need for closure or intrinsic motivation.

However, future research should not ignore the need for cognition as an important variable in predicting information search behaviors and creativity. The theoretical reasoning and empirical evidence in support of this variable being positively related to information search and creativity are still stronger than those against. Also, future research should again consider a need for cognition / involvement interaction. Although not statistically significant, trends in the present data indicated that people in the low and high value-involvement conditions who were high need for cognition were motivated to search for more information and were more creative than those low in need for cognition. Future research should explore this further.

Future applied research directions. Several promising applied research avenues

are also born out of the present study. First, this study's findings need to be replicated in an applied setting to determine if the effects of type of involvement generalize to problems encountered by organizations. Secondly, studies should examine the type of involvement brought on by different types of organizational problems. For example, researchers should investigate what issues have the potential to engage employee values and morals and if there are ways to avoid this from happening. Similarly, research should determine what managers and executives can do to make organizational problems personally relevant to individual employees so that these employees will have a high level of outcome involvement.

One of the more difficult tasks in an organizational setting may turn out to be getting employees outcome-involved without engaging their values. Values comprise part of an individual's stable characteristics (Meglino, Ravlin, & Adkins, 1989; Rokeach, 1973) and will invariably play a role in most activities that person engages in. These activities include those performed on a job. Values play a role in employee behavior, satisfaction, and commitment (Meglino et al., 1989). Therefore, most organizational problems will be value-related to some extent. Future research should investigate this value versus outcome dilemma in organizational problems to determine how to achieve outcome involvement while repressing value involvement.

Conclusions

The results of this study indicate that organizations may have the potential to enhance the creativity of their employees through two main avenues. First, it was shown

that increases in amount of information searched and amount of time spent searching lead

to increases in creativity. Thus, organizations should ensure that the information desired

by employees is available to them and ensure that these employees have time to search

for and consider this information. Second, results revealed that creativity is enhanced

through high participant involvement due to the personal relevancy of a problem's

outcome. Thus, organizations can enhance employee creativity by increasing the personal

relevance and importance of organizational outcomes. However, organizations must also

ensure that organizational problems do not engage employees' values and morals in order

to avoid the detrimental effects high value involvement has on creative problem solving.

Clearly the involvement results found in this study have important implications for

organizational problem solving. Personal involvement has both the potential to benefit

and hinder organizations and further research directed at understanding these effects in

work settings has the potential to be very influential in determining the optimal

circumstances for employee participation in organizational problem solving.

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Appendix A

The Need for Cognition Scale

For each of the statements below, please indicate whether or not the statement is characteristic of you. If the statement is extremely uncharacteristic of you (not at all like you) please place a "1" on the line to the left of the statement; if the statement is extremely characteristic of you (very much like you) please place a "5" on the line to the left of the statement. You should use the following scale as you rate each of the statements below.

1	Extremely Uncharacteristic
2	Somewhat Uncharacteristic
3	Uncertain
4	Somewhat Characteristic
5	Extremely Characteristic

_____ 1.   I prefer complex to simple problems.

_____ 2.   I like to have the responsibility of handling a situation that requires a lot of thinking.

_____ 3.   Thinking is not my idea of fun.

_____ 4.   I would rather do something that requires little thought than something that is sure to challenge my thinking abilities.

_____ 5.   I try to anticipate and avoid situations where there is a likely chance I will have to think in depth about something.

_____ 6.   I find satisfaction in deliberating hard for long hours.

_____ 7.   I only think as hard as I have to.

_____ 8.   I prefer to think about small daily projects to long-term ones.

_____ 9.   I like tasks that require little thought once I've learned them.

_____ 10.   The idea of relying on thought to make my way to the top appeals to me.

_____ 11.   I really enjoy tasks that involve coming up with new solutions to

            problems.

_____ 12.   Learning new ways to think doesn't excite me much.

_____ 13.   I prefer my life to be filled with puzzles that I must solve.

_____ 14.   The notion of thinking abstractly is appealing to me.

_____ 15.   I would prefer a task that is intellectual, difficult, and important to one that

            is somewhat important but does not require much thought.

_____ 16.   I feel relief rather than satisfaction after completing a task that required a

            lot of mental effort.

_____ 17.   It's enough for me that something gets the job done; I don't care how or

            why it works.

_____ 18.   I usually end up deliberating about issues even when they do not affect me

            personally.

Appendix B

Sally's Problem

Sally is a new student at a small liberal arts college. She moved into a dormitory at the beginning of the school year and was assigned to a roommate, Jackie. Jackie is very popular with the other students. Sally also likes Jackie, but she does not like sharing a room with her. The problem is that Jackie smokes marijuana in the room a couple of times a week. Sally strongly disapproves of drugs of any kind because she has had a close family member pass away due to a drug overdose. She feels very uncomfortable when Jackie is smoking in the room, and is concerned that her parents would be upset if they found out what was happening. Furthermore, she does not like Jackie's behavior when she gets high; at these times, Jackie tends to be obnoxious and inconsiderate. This is Sally's first experience with drug use since coming to college and she does not know what to do. She is rather timid, and prefers to avoid trouble whenever possible. Also, Jackie doesn't seem to notice that Sally is concerned about the situation (even though she knows about Sally's family history with drugs). Sally also realizes that Jackie is very popular with the other students in her dorm, and, being that she is a new college student, she (Sally) is worried about their reactions to any action she may take. However, she is afraid that things with Jackie will get worse as the term proceeds. What should Sally do?

Appendix C

Exam Problem

For the past five years, UNO has been concerned about the quality of education

students possess when they leave the University. Many professors have expressed a

concern that the students may not be prepared when leaving the University and starting a

new job. UNO realizes that how former students perform on their jobs reflects the quality

of education they received while at UNO. UNO administrators do not know if these

concerns are warranted or are people's opinions. However, they would like to assess the

situation. In order to do this they need a way of assessing the education students have

when leaving UNO. It has recently come to the attention of UNO that many colleges and

universities are starting to require students to pass comprehensive examinations before

graduating. Although these comprehensive exams are quite long and challenging,

administrators believe that they will be a good way of assessing any deficiencies

graduates have when they leave. This information will then be utilized to improve on

required courses. It will also be used to require students who do not pass this exam to

take additional classes before graduating to better prepare them for the "real-world".

UNO is not sure how students will react to this solution, but are having difficulty thinking

of any alternative solutions. Therefore, they are opening up the issue to the students in an

effort to help generate other solutions to this problem. Can you help UNO with their

problem of assessing the quality of education obtained by graduates? Please write your

solution below.

Appendix D

Sam's Problem

Sam is a technician in a large pest control company. Each week, Sam provides

pest control assessments and treatments for several dozen regular accounts in his territory

and handles any "spot jobs" that come up if he has enough time. Sam enjoys his work

because the hours are flexible and he is his own boss. In addition, the pay is commission-

based and because Sam is an excellent technician, he makes good money. On the other

hand, Sam believes that the work can be dangerous because it calls for lifting and

carrying heavy equipment without assistance. Many technicians in the company have had

shoulder and back injuries as a result of such strenuous job demands. In the past few

months, Sam's family has had additional expenses that Sam's regular workload cannot

cover. Sam is working harder and faster, but the depressed economy has made "spot jobs"

scarce and has removed any hope of finding a higher paying job elsewhere. Recently,

Sam was offered a "spot job" that would pay enough to cover several overdue bills, but

would involve a great deal of highly strenuous lifting, carrying and maneuvering of

equipment and supplies. Sam needs the money that this job would provide; however, he

is afraid of the considerable personal risk. Sam does not know what to do; can you offer a

solution to his problem?

Appendix E

Mark's Problem

Mark is a senior in college and captain of the swim team. The team is at the state swim meet, which is being held at another college. This is Mark's first overnight trip as captain of the team. The team consists of ten other swimmers and the coach. The coach has made it clear that as the captain, Mark is responsible for the behavior of the whole team. Mark found out that several team members are planning to sneak out of the dorm after curfew and meet with members of some of the other teams to go out to the bars. Mark's best friend seems to be the one organizing this night out, and he is generally a reliable person and does not get into trouble. Mark knows that the rules of the swim meet, as well as the rules of the team, prohibit leaving the dorm after curfew. The team could be disqualified from the meet if the officials find out. Mark has been excited to have the people at the meet see how good their team is this year. However, he is worried about how well the team will perform in the meet tomorrow if they go out drinking tonight. If the coach finds out about this, the organizer of the outing, Mark's best friend and one of the best swimmers on the team, will be suspended from the team for this meet. Mark, as captain of the team, would also be suspended from the meet and would lose his position as captain for the remainder of the season. Mark wants to keep his best friend and the rest of the team members happy as well as the coach and the swim meet officers. What should Mark do?

Appendix F

Night Classes Problem

The issue of whether or not UNO should hold night classes has been debated on campus for a couple of years now. Enrollment in night classes is very small (sometimes only five people per class). The University has disclosed that it is losing money on these night classes. It costs more to light and power the classrooms and buildings and to staff the needed University personnel (including professors, support staff, security, etc.) than what the University makes in tuition from the students enrolled in these classes. UNO has also received several letters from distinguished faculty members who are not fond of teaching after 6:00 p.m. On the other side of the issue, UNO would like to be an "equal opportunity" university. This means that night classes are needed to accommodate the non-traditional students who work during the day. Secondly, most of the classrooms are already scheduled during the day leaving little space to add the classes that would be moving from the night schedule. UNO does not know what to do. Please help with this issue by offering any possible solutions to this problem. Your responses will be compiled with those of other participants and then will be given to UNO officials for consideration, therefore, all participants will remain anonymous.

Appendix G

Barb's Problem

Barb is a nurse at a hospital and was elected by other nurses to represent them on the hospital's governing board. At a recent board meeting, some hospital administrators discussed closing the children's intensive care unit. Although the hospital has not lost a lot of money operating the unit, administrators forecast that the unit could use up more of the hospital's financial resources in the future. Administrators also feel that the money freed up from closing this unit could be used for future improvements so that the hospital can continue to offer excellent adult care. The hospital has been operating the unit as a service to the community and Barb realizes that many nurses would lose their jobs if the hospital eliminates the children's intensive care unit. Barb believes that if enough people objected to the plan, the board might respond favorably and try to accommodate their needs. Barb would like to speak with some other nurses about this, but she is expected to keep the information confidential. In addition, she does not want to jeopardize her position on the board. Barb does not know what to do.

Appendix H

Involvement Manipulation Check Questions

Items used to check for low involvement:

1.   The problem made me feel angry.

2.   The issue that the problem presented was related to my values and morals.

3.   The outcome of the problem is very relevant to me.

4.   I am not concerned with this problem.

5.   The problem presented a major social issue.

6.   I was personally involved while working on this problem.

7.   The problem did not produce an emotional reaction for me.

8.   The outcome of the problem is very important to me.

9.   This problem has no immediate effect on me.

10.   The issue depicted in this problem is very important to me.

11.   The issue presented in the problem is related to my values and morals.

12.   The issue in the problem violated established social values.

13.   The issue presented in this problem activated a well-established attitude in me.

14.   The outcome of the problem will personally affect me.

15.   The problem I worked on was involving.

16.   The problem strongly affected me personally.

17.   The problem matters a lot to me.

18.   The problem provoked strong feelings in me.

19.   The consequences of this problem may affect me in some manner.

Items used to check high outcome involvement:

1.   The problem made me feel angry.

2.   The outcome of the problem is very relevant to me.

3.   I am not concerned with this problem.

4.   I was personally involved while working on this problem.

5.   The outcome of the problem is very important to me.

6.   This problem has no immediate effect on me.

7.   The issue depicted in this problem is very important to me.

8.   The outcome of the problem will personally affect me.

9.   The problem I worked on was involving.

10.   The problem matters a lot to me.

11.   The consequences of this problem may affect me in some manner.

Items used to check high value involvement:

1.   The problem made me feel angry.

2.   The issue that the problem presented was related to my values and morals.

3.   I am not concerned with this problem.

4.   The problem presented a major social issue.

5.   I was personally involved while working on this problem.

6.   The problem did not produce an emotional reaction for me.

7.   The issue presented in the problem is related to my values and morals.

8.   The issue in the problem violated established social values.

9.   The issue presented in this problem activated a well-established attitude in me.

10.   The problem I worked on was involving.

11.   The problem strongly affected me personally.

12.   The problem matters a lot to me.

13.   The problem provoked strong feelings in me.

Items used to check for differentiation between high value involvement and high outcome involvement:

1.   The issue that the problem presented was related to my values and morals.

2.   The outcome of the problem is very relevant to me.

3.   The problem presented a major social issue.

4.   The issue described in the problem presented is not acceptable in today's society.

5.   The outcome of the problem is very important to me.

6.   This problem has no immediate effect on me.

7.   The issue presented in the problem is related to my values and morals.

8.   The issue in the problem violated established social values.

9.   The outcome of the problem will personally affect me.

10.   The consequences of this problem may affect me in some manner.

Appendix I

Instructions to Pilot Study Participants

Imagine you were presented with this problem and were asked to offer a solution. In order to generate a well thought out, complete solution you would probably desire more information than that given in the problem. We are interested in what additional information would be beneficial to you if you were asked to solve this problem. We are not asking you to give a solution to the problem. Please answer the questions below.

1.   Assuming you have an opinion about how the problem should be solved, what additional information would you need to confirm your opinion, or what information would help you present the solution you think is correct?

2.   What additional information could be requested that would not support or confirm your opinion about how the problem should be solved?

3.   Please list any additional information that would help solve the problem, or if you don't have an opinion about how the problem should be solved, list below any information that you feel would be beneficial in solving the problem.

Appendix J

Searchable Information for Sally's Problem

1. Personal information about Sally and Jackie

   A. Information about Sally's life

      1. Does Sally have a good social support system?

         - Sally has some really close friends from high school but she does

         not see them much now that she has gone away to college. She has

         not made any close friends at college.

      2. How old is Sally?

         - Sally is 19 years old.

      3. What kind of grades does Sally obtain?

         - Sally's GPA was 3.45 in high school.

      4. What is Sally's current education level?

         - Sally is a first year college student.

      5. Has Sally ever tried any type of illegal drug?

         - No, Sally has never tried an illegal drug.

   B. Information about Sally's views and personality.

      1. Is Sally the type of person to put herself on the line if Jackie gets

         caught?

         - Sally would probably tell them what she needs to in order to clear

         herself but would be hesitant to make accusations about Jackie.

2.   Is Sally the type of person to talk openly to others about this issue?

        - Sally would only feel comfortable talking to close family members and close friends.

3.   Does Sally care what others think of her?

        - Sally likes having a lot of friends. Therefore, she is concerned about the image she portrays. This is especially the case now that she is a first-year college student around many new people.

4.   Why does Sally not do drugs?

        - Sally feels that drugs will only serve to mess-up her life. Due to the past experience of having a family member addicted, she knows about the negative consequences of using drugs.

C. Information about Jackie's life

1.   Has Jackie ever done other drugs?

        - She tried cocaine once at a party a few weeks ago.

2.   How long has Jackie smoked marijuana?

        - Jackie has smoked marijuana for about two years.

3.   How old is Jackie?

        - Jackie is 20 years old.

4.   What kind of grades does Jackie obtain?

        - Jackie's high school GPA was 3.50.

5.   What is Jackie's current education level?

- Jackie is a first year college student.

D. Information about Jackie's views and personality

    1.   How does Jackie feel about how others view her?

         - Jackie has always been her own person and is not very concerned about what others think of her.

    2.   Why does Jackie smoke marijuana?

         - Jackie smokes marijuana because she likes the way she feels when she is high.

    3.   How is Jackie's self-image?

         - Jackie has a positive self-image and is very comfortable with her life.

    4.   Is Jackie open to the views of others?

         - Jackie is very open and respectful to the views of others. However, she does not let the views of others change her own personal views.

2. Information about Sally and Jackie's relationship with each other.

A. Information about their regular, everyday relationship

    1.   How often do Sally and Jackie talk with each other one on one?

         - Other than the daily "hello" and "how are you doing" conversations, Sally and Jackie do not talk very often. When they do, the conversations usually do not involve personal issues.

2.   Do Sally and Jackie spend a lot of time together?

- Sally and Jackie do many things with other students in their

dorm. They do not often do things that involve just the two of

them.

3.   Does Jackie know about Sally's family member who died of a drug

overdose?

- Yes, Jackie knows about Sally's family member who died of a

drug overdose.

B. Information about their relationship when Jackie is high.

1.   Does Jackie realize how she behaves when high?

- Jackie believes she is more fun when she is high because she

feels more relaxed and outgoing.

2.   Does Jackie usually smoke when Sally is around?

- Because Jackie smokes at night and on weekends, Sally is usually

present in the room.

3.   Is Jackie ever violent with Sally when she is high?

- Up to this point, Jackie has not been physically violent with

Sally. However, she is verbally inconsiderate and at times, very

insulting.

3. Relationships

A. Information about Sally's family

1.   What drug did Sally's family member overdose on?

- Sally's family member overdosed on cocaine.

2.   How long ago did Sally's family member die of an overdose?

- Sally's family member overdosed 2 years ago.

3.   How would Sally's parents react if they knew about Jackie?

- Sally's parents would be very angry and would go directly to school officials if they found out Jackie smokes marijuana.

4.   What do Sally's parents think of Jackie?

- Sally's parents have only met Jackie twice. However, both times they were very impressed with how outgoing and friendly Jackie was.

5.   Where do Sally's parents live?

- Sally parents live in Minneapolis, MN.

B. Information about Jackie's family

1.   Where do Jackie's parents live?

- Jackie's parents live in New York City.

2.   Does Jackie's family have a history with drugs?

- Jackie's family does not have a "history" of drugs. However, both her mother and father smoked marijuana when they were younger.

3.   What do Jackie's parents think about Sally?

- Jackie's parent think Sally is very nice and friendly.

4.   How do Jackie's parents feel about illegal drugs?

- Jackie's parents disapprove of all illegal drugs.

5.   Do Jackie's parents know she smokes marijuana?

- Jackie's parents do not know she smokes marijuana.

C. Information about their friends

1.   Do Jackie and Sally have any common friends?

- Both Jackie and Sally are friends with most of the people on their dorm floor. They do not have common friends outside of college.

2.   What do Jackie's friends think about Sally?

- Jackie's friends outside of college think Sally is very friendly, however, they also feel she is too conservative.

3.   What do Sally's friends think about Jackie?

- Sally's friends who do not know Jackie smokes marijuana like her a lot. Those who do know she smokes marijuana do not care for her because they know Sally is having a rough time with it.

4.   Do Jackie's friends smoke marijuana also?

- Only a few a Jackie's friends smoke marijuana.

5.   Do any of Sally's friends use drugs?

- As far as Sally knows, none of her friends use illegal drugs.

4. Information about their university.

A. Information about the university drug policy

1.   What are the required actions that should be taken if a student has knowledge of drug use?

- Students who have knowledge of drug activity on campus are asked to report it to campus security.

2.   Does the school have a no smoking and anti-drug policy in dorms? Students are prohibited from using illegal drug anywhere on campus. 60% of dorm rooms are no smoking rooms.

3.   What is the policy of the school for possession of drugs on campus?

- According to school policy, those found in possession of illegal drugs will be turned over to the state police for prosecution and will be expelled from school pending the outcome of the investigation.

4.   When were the drug policies last revised?

- The university drug policies were reviewed two years ago.

B. Information about the university policy regarding altering campus living arrangements.

1.   Can first-year students live in an apartment off-campus?

- First-year students are required to live on-campus.

2.   Are there other rooms available?

- Dorm rooms are always filled each semester, but students do quit

school or move off-campus every now and then opening up a room

during the semester.

3.   How does the university feel about altering living arrangements?

- The College discourages students from changing rooms. They

prefer students attempt to work out differences rather than having

students change rooms throughout the year.

4.   How difficult would it be to find a new roommate?

- Students usually get along with their roommates and are not

interested in changing rooms. Therefore, it is usually difficult to

find someone willing to move and change roommates.

C. University demographics

1.   Where in the U.S. is the school located?

- Sally and Jackie attend a university in the Southeastern United

States.

2.   How large is the school Sally and Jackie attend?

- There are 8000 enrolled students at this university.

3.   How large is the city where the school is located?

- The college is located in a city of about 400,000 people.

4.   Is the university public or private?

The university Sally and Jackie attend is a public institution.

Appendix K

Searchable Information for the Exam Problem

1. Information on the actual exam.

    A. Information on the content of the exam

        1.   How many questions are on the exam?

            - 500 questions

        2.   What format will the exam questions be in?

            - The exam questions will be multiple choice.

        3.   Will the exam concentrate on the individual's area of study?

            - 1/4 of the exam will be in area of concentration.

        4.   How long will it take to complete the exam?

            - The exam will take approximately four hours.

        5.   What content areas will the exam cover?

            - The test has four parts - Math, Verbal, Analytical, and content

            specific (major area).

    B. Information on the preparation and administration of the exam.

        1.   Will there be classes or other materials to help the student prepare

            for this exam?

            - Approximately one month before the test there will be a two-hour

            preparation class.

        2.   Who would administer the exam?

- Each college would administer the exam to their students.

3.   During what part of the academic year will the test be given?

- The test will be given in October of every year.

4.   What is the first semester in which the exam can be taken?

- The test may be taken as soon as the student has senior status.

C. Information on other schools using comprehensive exams

1.   Are most students at other schools well prepared for the exam?

- Surveys have shown that 80% of students feel they are prepared

for the exam.

2.   Does the exam have an affect on the number of students who

graduated?

- 15% do not graduate due to not passing the exam. However, 95%

of these students pass the test on subsequent tries.

3.   How are the UNO graduates doing compared to other schools

graduates?

- Average GPA is pretty much the same across schools.

4.   How did these exams affect the enrollment of those schools who

use them?

- On average, enrollment dropped 5%, but this does not seem to be

specific to those schools using the comprehensive exam.

5.   How many other schools are using this exam?

- Approximately 10% of state institutions are using a comprehensive exam.

D. Information on implications of the exam.

    1.   Is UNO willing to give out more financial aid to those students who fail the exam and have to take more classes?

        - The financial aid process will not change.

    2.   Who would pay for the extra classes that UNO has to offer to those who don't pass the exam?

        - Classes other than those already offered are not needed to pass the exam.

    3.   What if the part of the test failed has no relevance to the individual's major?

        - The parts of the exam not passed, regardless of what they are, will need to be retaken the following year.

    4.   What exactly happens if a student does not pass the exam?

        - The student will have to retake the parts failed the following year.

2. Relevant UNO statistics

A. Pre-graduation information

    1.   What percentage of UNO students is not passing courses?

        - Around 5% of students do not pass in an introductory course. This number is reduced for higher level courses.

2. How many UNO students withdraw from classes?

- Around 10% - 15% of students withdraw from introductory

courses. This number is reduced for higher level courses.

3. Are most students expected to be well prepared for the exam?

- Students should have obtained sufficient knowledge to pass.

B. Post-graduation information

1. Where do the majority of students work once they have graduated?

- The highest percentage of students is entering business or

governmental jobs.

2. What are the average grades of those who graduate?

- The average GPA of graduates is 2.95

3. What percent of students enter the work force right after

graduation?

- 75% of students look to enter the work force after graduation.

3. Information on the problem

A. Information on UNO's problem-solving process

1. What exactly does UNO hope to achieve by these tests?

- To ensure students are well educated in the fundamentals.

2. Could a trial period be used to see if the test works?

- The test is identical to those used and validated by other schools

so a trial period is not necessary.

3. Is the problem finding out whether or not graduates are deficient or correcting these proficiencies?

- At this point, the main concern is assessing the extent of the deficiency.

4. Whose idea was this test?

- The idea originated with top UNO administrators.

5. Was there ever a vote on the issue?

- The Regents and College Deans voted to consider the issue.

B. Information on how the problem was diagnosed

1. What evidence are the professors using in regards to the preparedness of former students?

- Professors have reported hearing comments about this issue from friends and colleagues in the real world. They also feel that students seem to be lacking fundamental mathematical and verbal skills.

2. Are students knowledgeable in their major fields?

- From what can be determined, students are knowledgeable in their area of concentration. The exam will shed additional light on this matter.

3. Is UNO receiving feedback from employers or students regarding this issue?

- The input from both employers and students is being considered.

4.   What caused the administrators to wonder about the quality of education that students had when graduating from the UNO?

- There has been an increasing pressure from faculty concerning this issue over the past 5-7 years. Also, employers report that a major training cost is teaching verbal and mathematical skills.

5.   What do employers think graduates should possess in "real-world" skills?

- Employers report that fundamental verbal and mathematical skills are as important as specific area knowledge in today's economy.

C. Information on surrounding issues.

1.   Could classes be changed to see if the problem could be solved that way?

- This would not assess the magnitude of the education deficiency.

2.   Are internships integrated into the curriculum?

- An internship is an option that all students can pursue if interested.

3.   Could there be a GPA cutoff for the comprehensive exam so those with a high GPA would not have to take the exam?

- Students can perform well in their major area of emphasis and still not know some education fundamentals. Also, an objective way of selecting this cutoff cannot be determined.

4. Will this problem go away if students are allowed to take only classes in their major because that is what their work will be in?

- This does not address the problem of students not mastering their verbal or mathematical skills.

5. Could the quality of the professor be the cause of the problem?

- This would need to be assessed after the magnitude of the educational deficiency is determined.

4. Information on reactions to the exam idea.

A. Information on student's reactions

1. How do UNO students feel about their education?

- UNO students who were interviewed feel they are receiving a quality education.

2. What are the emotions or feelings of the UNO students about the exam?

- Most UNO students interviewed are not thrilled about the possibility of not graduating due to the result of a comprehensive exam.

3.   Do UNO students feel they are not qualified for the workforce when they graduate?

- Students feel they are qualified in their area of concentration.

4.   What is the reaction of students at the schools who are currently using the exam?

- These students do not look forward to taking the exam, but feel they are more concerned with learning because of it.

B. Information on professor's and administrator's reactions

1.   What do UNO professors think about this idea?

- The reactions of UNO professors to the comprehensive exam idea have been largely positive.

2.   What do UNO administrators think about this idea?

- All administrators spoken to strongly endorse the idea of requiring an exam.

3.   Do professors feel this issue is an indication of their teaching effectiveness?

- Most professors feel that they do not have the opportunity in a specialized class to assess all areas of a students education, and therefore feel a comprehensive exam should be used to make this assessment.

4.   Are the administrators concerned about the cost of administering the exam?

- Administrators expect that in the long run, the test will increase the quality of education obtained by the average UNO graduate. This will result in graduates achieving better jobs, which will help UNO recruit high quality students in the future.

C. Information on employer's reactions

1.   How have employers been reacting to the exam idea?

- The employers interviewed had either positive or neutral reactions, with the majority being positive.

2.   Do employers feel the exam will address the issue?

- Employers are unsure if the exam will address the deficiency issue but applaud UNO for attempting to do something.

3.   Do employers who have hired students from universities that require the exam feel it is beneficial?

- Most employers do not know whether their employees have taken the exam. However, those who do tend to hire the applicants from the university requiring the exam.

4.   Are employers willing to help fund the exam if it may result in more qualified job applicants?

- A small percentage of employers contacted mentioned that if the exam improves the quality of education obtained by graduates they would consider assisting UNO in funding the exam.

Appendix L

Searchable Information for Sam's Problem

1. Occupation information

    A. Information specific to Sam's company?

        1.   What are the injury data of the company?

            - Sam's company has approximately 7-10 back injury reports and 5

            shoulder injury reports per year. Most of these incidents are not

            serious injuries.

        2.   How many employees work for Sam's company?

            - Sam's company employs 75 pest control technicians.

        3.   How many complaints does the company receive about safety?

            - The company processes approximately 30 safety complaints per

            year.

        4.   Does Sam's company have a safety policy?

            - The company's safety policy states that they will train new

            employees on how to safely use the equipment. This releases the

            company from responsibility for injuries resulting from misuse of

            equipment. The policy will pay for injuries resulting from the

            correct use of the equipment.

        5.   Is Sam's company competitive with others?

- Sam's company is one of the leading pest control organizations in their area.

B. General occupational information

1. How does Sam's company compare to other pest control companies in terms of injury statistics?

- Sam's company is right around the occupational average in terms of number of injuries.

2. How does Sam's company relate to other pest control companies in terms of salary?

- On average, the employees in Sam's company make more than the occupational average because their pay is based on commission.

3. Have any ergonomic studies been done in this area?

- No ergonomic studies have been done that specifically involved pest-control equipment.

4. What is the status of the local economy?

- The local economy has been depressed for the past year and no relief is seen for the near future.

C. Information about spot jobs.

1. How soon would he start the spot job?

- The spot job would begin in a week.

2.   How long would the spot job last?

- The spot job would last for three days.

3.   What is the occurrence of spot jobs?

- Spot jobs are usually quite common. However, due the depressed economy, they have been very scarce over the past year. Most people are attempting to do their own pest control rather than paying a technician.

4.   What exactly is a spot job?

- A spot job is a job that results from a call for a pest technician from someone who is not a regular customer of Sam's company. They are usually "one time" jobs that a company or individual needs completed.

5.   Why would the spot job be more dangerous than other jobs?

- This spot job is to fumigate a large, old, four-story warehouse building. This will involve lugging the equipment up stairs and ladders, etc., to get at all parts of the building (it is too old to be equipped with elevators and has very high ceilings).

D. Information about similar jobs.

1.   Are there other jobs available in a similar area?

- Sam cannot think of any jobs that are similar to pest control.

2.   Are there part-time jobs available in other fields?

- Due to the depressed economy, part-time jobs are very scarce.

3.   Are there full-time jobs available in other fields?

- Due to the depressed economy, full-time jobs are very scarce.

4.   What is Sam qualified to do?

- Pest control is the only job Sam has ever had and the only thing he feels he is qualified to do because he only has a high school education.

2. Financial information

A. Money information

1.   What are Sam's additional expenses?

- Sam's family has incurred many unforeseen family related expenses over the past few months (funerals, legal bills, medical bills, etc).

2.   When will Sam get paid if he does the spot job?

- Sam gets paid half of the money up-front and the other half when the job is finished.

3.   Does Sam have any savings or way of borrowing money to make payments?

- Sam has used his savings and has been unable to get a loan because he has no collateral.

B. Compensation/insurance information

1. Does Sam's company offer workman's compensation?

    - Sam's company provides workman's compensation if an employee gets hurts while correctly performing his/her job.

2. Does Sam have medical insurance?

    - Sam has medical insurance, but to keep monthly payments low, he chose an option with a very high deductible, which he has not yet met.

3. Does Sam have disability insurance?

    - Sam's company offers disability insurance as a part of a flexible benefits plan. Sam did not choose to receive it.

3. Specific job information

   A. Can Sam get help with the job?

   1. Will Sam's company pay to get him help with the extra equipment?

       - Sam's company will not pay for extra help because they would then need to pay two people to do a job which they hired only one person to do.

   2. Could Sam hire extra help?

       - It would be too expensive for Sam to hire someone to help him.

   3. Would wearing a back brace help?

- Sam does not feel that spending money on a back brace is practical or cost effective because he has so many other bills and his back is currently fine.

4. Can Sam get help from a friend?

- Sam does not have any friends who have the time to assist him on his job with no pay, and Sam does not have money to pay them.

5. Can Sam get an apprentice?

- Getting an apprentice would require either money from him or his company, neither of which is possible.

B. What has the company done to help prevent injuries?

1. Does the company have a safety coordinator?

- The company does not have a safety coordinator on staff.

2. Specifically, what has the company done to prevent injuries?

- The company trains all new employees on the proper ways to lift and maneuver the equipment.

3. Can salary pay be used instead of commission without supervision if the injury rate is high so employees do not feel they have to work as fast?

- Employees feel that they make more under a commission pay system because they have more control over how much work they perform.

4.   Has Sam investigated unions involving his trade to try and improve safety on the job?

- Sam is a union member. However, Sam does not feel the union can help because he is very satisfied with the pay, and the equipment they use is the top of the line. It just happens to be very heavy to lift and move around.

5.   Can Sam's company attempt to develop new, lighter equipment?

- Sam's company does not have a research and development department.

C. Information on equipment and ways of doing the job

1.   Is there lighter equipment that his employer could be convinced to use?

- There is no lighter equipment available on the market that the company can purchase.

2.   Are there different, less strenuous ways to use the present equipment?

- Employees are trained on the best and lest strenuous ways to use the equipment.

3.   Can he wheel the equipment around in a cart?

- Carts are not practical for pest control technicians because most areas they need to get to are not accessible with a cart.

      4.   Is there any way he could break or divide some of the equipment

up to make lighter loads?

- The equipment cannot be divided because it all needs to be

together to function.

      5.   What would he actually be maneuvering around?

- Sam would be carrying and maneuvering a large pest control unit

that can fumigate and spray different types of pest control

substances.

4. Information about Sam

    A. Personal information regarding Sam

      1.   How diligently did Sam search for another job?

- Sam watches the classified ads in the paper, but is not diligently

looking for another job because pest control is all he feels qualified

to do.

      2.   How many hours a day does Sam work?

- Sam usually works around 8 hours a day for his regular

customers. Any spot jobs he does are either above and beyond this

time or on weekends.

      3.   Is Sam ignoring safety rules to increase income?

- Sam will occasionally lift incorrectly in order to move the equipment more quickly, but for the most part he follows the safety guidelines.

4.   What is Sam's age?

- Sam is 42 years old.

B. Information about Sam's family

1.   Is Sam married?

- Sam is married.

2.   How many kids does Sam have?

- Sam has three kids.

3.   Can his children help with financial constraints?

- Sam's kids are too young to work.

4.   Could Sam's family cut down on living expenses?

- Sam cannot see how they can cut living expenses any more than they already have.

C. Information about Sam's health

1.   Does Sam try to stay in good physical condition?

- Sam is very healthy and physically fit. He works out each morning before going to work.

2.   Does Sam have a drug history?

- Sam does not have a drug history.

3.   Has Sam ever been off of work from pain resulting from work?

       - Sam has never missed work because of a work-related injury.

4.   Does Sam have any work-related physical problems presently?

       - Sam occasionally has backaches after work, but other than that he

is in good health.

Appendix M

Appropriateness Rating Scale

An appropriate solution is one that is (a) pragmatic, (b) socially responsible, and (c) ethical.

1. Solution does not meet any of the three criteria <u>OR</u> seriously violates one or more of the three criteria

2. Solution meets only one of the three criteria

3. Solution meets only two of the three criteria

4. Solution meets all three of the criteria

Appendix N

Originality Rating Scale

The degree to which the solution is not structured by the problem presented and goes

beyond it. The degree of novelty and uniqueness of the solution.

A solution is structured by the problem if

 1. It is implied by the problem

 2. No new elements are introduced in it

A solution is not structured by the problem if

 1. Shows thinking outside of the box

 2. Not being pulled into the frame of the problem

 3. Something new is added to the solution

 4. Solution shows that person is questioning the premise or assumption of

  the problem

Give a rating of 1-3 if solution is structured by the problem and a rating of 4-6 if solution

is not structured by the problem.

1. Solution structured by the problem. Very common response.

2. Solution structured by the problem. Somewhat common response.

3. Solution structured by the problem. Uncommon response.

4. Solution not structured by the problem. Common response.

5. Solution not structured by the problem. Uncommon response.

6. Solution not structured by the problem. Very uncommon response.

Appendix O

Arousal Scale

Using the following words, please indicate how you felt when working on the problem

presented on the computer. Using the five point scale given below and starting with

number 30 on the computer answer sheet, indicate how accurately each word describes

how you felt.

Does not describe   Accurately describes

how I felt   how I felt

1   2   3   4   5

_____30. Active   _____31. Energetic   _____32. Lively

_____33. Sharp   _____34. Drowsy   _____35. Sluggish

_____36. Jumpy   _____37. Exhilarated   _____38. Tired

_____39. Alert   _____40. Anxious   _____41. Aroused

_____42. Peppy   _____43. Jittery   _____44. Inactive

_____45. Relaxed   _____46. Calm   _____47. Agitated

_____48. Bored

Appendix P

Description of Study Read to Participants

(UNO has recently asked us to assist them in collecting information on a problem

or dilemma currently being discussed by campus administrators). This study is being

conducted as a way to collect possible solutions to a problem. You will read a problem,

have the chance to look at additional information about the problem, provide a solution to

the problem, and answer a few questionnaires. (Your solution to this problem will be

combined with others and will be considered by UNO administrators when they attempt

to develop a resolution to the problem).

Before providing a solution to the problem you will be presented with, you will

have the option to look at additional information that has been collected on the problem

but is not provided by the problem itself. The information is provided so that you can

produce an informed solution to the problem based on the information you feel is

important.

By using this computer, you will only have to look at the information you feel you

need to provide an educated solution to the problem. You will be given command buttons

with numbers and letters similar to this one (point to the screen). Just follow the

commands to the information you want to see. If you forget parts of the problem, click on

"view problem" button and the computer will show you the problem again. Once you

have looked at all the information you desire, click on the "solve problem" button. You

will be asked to type your solution directly into the computer. Remember, you only need

to look at the information you feel will benefit you in providing a solution to the problem.

If you have any questions about the computer or anything else while you are working,

please ask me, I will be outside the room. Thank you for your participation in this effort.

Note. Words in parentheses were read only to the participants in the outcome-

involvement condition.

Appendix Q

Debriefing Statement

The experiment you just finished was a study on the effects of involvement on problem solving. You were told of the academic problem in an effort to increase your involvement in the problem. We are predicted that people who are more involved in a problem will be more effective in solving the problem. UNO does NOT have an academic problem. The issue was construed by the experimenter. If you would like more information about the experiment, or about the results once obtained, please contact Jody Illies (phone number). Thank you for your participation in this research. Remember on your way out to obtain a research exposure points card from the experimenter to get credit for your participation. In an effort to obtain unbiased results, please do not discuss this experiments with other people who might be possible future participants.

Thank you again for your participation.