THE EFFECT OF RESPONSE INVOLVEMENT, MEANINGFULNESS, AND
NEED FOR INFORMATION ON COGNITIVE EFFORT AND RECALL

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

By
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* * * * *

The Ohio State University
1983

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TO MY PARENTS
PAMELA AND THOMAS PAGE
ACKNOWLEDGEMENTS

As is the case with any endeavor of this magnitude, many people make contributions to its success that must be recognized. My committee members, Professors Wesley Johnston, Alan Sawyer, and Harvey Shulman, have been an invaluable source of advice and guidance throughout the project. A special debt of gratitude is owed to Professor Shulman for making the equipment and laboratory available to conduct the experiment. In addition, the helpful advice of Professor James Ginter during the early stages of this research is acknowledged. Special recognition goes to my committee chairman, Professor Robert Burnkrant, whose influence throughout my work at Ohio State is largely responsible for whatever success I may eventually achieve.

Of course, special thanks go to my parents, Pamela and Thomas Page. Without their patience and help, completion of the program would have been impossible.
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Chapter I

INTRODUCTION

Over $33 billion a year is spent on advertising in the United States, "yet the amount of fundamental research on advertising effectiveness is appallingly small" (Kotler, 1980, p. 519). Most of the research has dealt with the effectiveness of specific advertisements or campaigns, and as such, is applied in nature. Theoretical understanding of what makes an advertisement or any other marketing communication effective or ineffective is important because marketers cannot take for granted that the audience will comprehend and interpret their messages in the desired manner. As Wright (1973) states, it is essential that marketers develop a conceptual understanding of the psychological processes that mediate acceptance of the information provided to the audience.

Much of the research on the effectiveness of marketing communications has dealt with ways of increasing attitude change and/or belief change and the subsequent effects of these constructs on behavior. Indeed, the most popular
approach to understanding how persuasive communications produce behavior change is based on the following hierarchy: exposure, attention, comprehension, acceptance, retention, and behavior change (McGuire, 1969). The probability of a persuasive message producing the desired behavior is equal to the product of the probabilities of occurrence of each stage in the model. Thus, if any stage fails to occur, later stages will not occur either. Therefore, for a persuasive message to produce an effect on behavior, the following sequence of events must occur. First, the message must be presented to the individual in such a manner as to gain and hold his or her attention. Once this has occurred, the effectiveness of the message is directly related to the ability of the individual to comprehend it. If the message is comprehended, the individual must then accept the message content and retain it long enough to behave in accordance with his or her new beliefs.

Most of the research using this information processing approach has tended to treat attitude or belief change as the dependent variable and some component of the communication as the independent variable (Day, 1973). A variety of components of the communication have served as the independent variable in such research. A detailed discussion of such research is beyond the scope of this disser-
tation, however a brief description of these variables is in order.

Source components have included such variables as source credibility and source attractiveness with the general finding that the more credible or attractive the source, the greater the attitude or belief change. Message characteristics that have been varied include the type of appeal (i.e. fear or reinforcement) and order of presentation (i.e. order of support or order of climax). The media used to present the message, either audio or visual, has been the primary channel component that has been varied. Personality and demographic factors are examples of receiver characteristics that have been used as independent variables.

Other models of the effects of persuasive communications are also based on a hierarchy of effects. For example, an alternative hierarchy of effects model postulates the following stages: awareness, knowledge, liking, preference, conviction, and behavior. The adoption process model stipulates five stages in its hierarchy: awareness, interest, evaluation, trial, and adoption. Since they all start at the same point, awareness or exposure, and end at the same point, behavior change, it seems likely that the intervening stages in the three models are different
largely in name only. In fact, the stages can be classified into three general types of responses: (1) those related to awareness and comprehension, (2) those related to attitude, such as interest, evaluation, and conviction, and (3) those related to behavior (Dunn and Barban, 1978).

While it is certainly necessary to understand the effects of these stages on the outcome of a persuasive communication, it can be argued that the research has overlooked the underlying psychological processes that mediate the occurrence of each stage. For example, why does an individual, once exposed to a message, devote any attention to it, and how does the amount of attention devoted to the message affect subsequent recall of the message? It has been established in the verbal learning literature that the comprehension of any message depends on three factors: (1) the reader's goals, (2) the contextual information in the message (i.e., the text of the message), and (3) the application of previous organized knowledge (Kozminsky, 1977). Each of these factors directly influences the outcome of a persuasive message.

The reader's goals are a determinant of what information the reader processes with information that is useful in achieving the goal being more likely to be processed than information that is not useful in achieving the goal.
For example, if the person's goal is to buy an automobile, he or she is likely to read messages that are useful in helping him or her make a purchase. Thus, the reader's goals directly influence the amount of attention an individual devotes to a particular message.

The contextual information in the message and the reader's existing knowledge both combine to influence message comprehension. If the information in the message is such that its main theme cannot be readily ascertained, comprehension will be severely reduced. Similarly, even if the main theme of the message is readily apparent, if the reader lacks the appropriate knowledge to make sense of the message, comprehension of the message will suffer. Therefore, it seems that a logical starting point for research into the psychological processes that mediate the effectiveness of a persuasive communication is to operationalize these variables. The organizing theme of the research to be presented here is to propose and test a set of relationships among constructs that operationalize these variables.

Information may be passively received or actively sought. When information is actively sought, the consumer is making a conscious decision about which pieces of information to examine. This is selective exposure, and it
increases as the individual's need increases. For example, an individual will tend to read more advertisements for automobiles as his or her present one becomes less reliable (Hughes, 1973). This voluntary attention to a piece of information is the result of the conscious allocation of processing effort to activities related to the consumer's goals and plans (Bettman, 1979). The greater the individual's desire to achieve the goal, the more processing effort will be devoted to information pertinent to the goal.

This allocation of effort based on the individual's goals has generally been studied under the heading of involvement. Product involvement is essentially a motivational concept related to perceived risk of the purchase decision (Chaffee and McLeod, 1973). If the cost of the product, either in terms of price or some other dimension such as prestige, is high, the perceived risk of making a suboptimal decision is high, and hence individuals should be highly involved and willing to process large amounts of information in order to make such decisions. On the other hand, for purchase decisions that do not have important consequences attached to them, the consumer should not be highly involved and therefore should not be motivated to process large amounts of information in order to make such decisions. For example, Chaffee and McLeod (1973) summar-
ize research that shows that subjects that are highly involved with a product are more likely to be persuaded by an informative appeal (i.e., a message describing product relevant attributes) than a less informative appeal. However, for subjects that are not highly involved with the product, the difference in effectiveness of informative and less informative messages in producing persuasion was not significant. Highly involving products were automobiles and stereos, and uninvolving products were cigarettes and flash cubes.

It appears, based on this research, that involvement in this case may be really based on the subject's desire to decrease his or her uncertainty regarding a purchase decision. If uncertainty is high, perhaps due to infrequent or no past purchase experiences as may be the case with cars or stereos, information that is useful in making the decision will be sought. If uncertainty is low, due perhaps to frequent past purchase experiences as may be the case with cigarettes or flash cubes, then additional information will not be sought. This desire to decrease one's uncertainty concerning a product decision will be manifested in the individual's goal of obtaining and understanding useful information about the product category. Thus, it appears that an individual's involvement with a product decision may be based on his or her uncertainty
regarding the outcome of the decision, and this uncertainty may be manifested in the individual's need for useful and understandable information affecting the decision. The concepts of uncertainty and involvement will be developed more fully in the following chapter.

Another aspect of the purchase decision that can contribute to the desire of the individual to decrease his or her uncertainty is the perceived performance risk of the product. Brody and Cunningham (1968) define perceived performance risk as the extent to which people think different brands perform differently in ways that are important. They found that when the perceived performance risk of the product was high, individuals that were low in specific self-confidence were likely to turn to risk reducing sources of information. In other words, when people were uncertain about their ability to make a purchase decision, they sought information that could help them reduce this uncertainty.

Variations in the content of the messages have taken many forms such as fear appeals or reinforcement as mentioned above. Other examples of manipulations of message text include argument quality (strong or weak) and discrepancy from the receiver's initial position. However, in order for these manipulations to be effective in producing
changes in behavior, they assume that the reader is able to grasp the meaning of, or comprehend, the message content. This is the second stage in the models of information processing discussed above and it precedes belief and attitude change. If this stage does not occur, subsequent stages cannot occur, and these manipulations will not be effective. It will be shown in the following chapter that in order for the comprehension stage to occur, two conditions must be met. First, the receiver must have the relevant knowledge in memory, and second, this relevant knowledge must be activated in order for the matching process to occur.

The ability of an individual to comprehend incoming information is determined in part by the meaningfulness of the message. Meaningfulness is determined by the number of associations the individual forms between the message and his or her existing knowledge. The greater the number of associations formed, the more meaningful the information is, and therefore the easier it is to comprehend. Thus, the ability of an individual to comprehend a message is a function of both the message content and the reader's existing knowledge.

The reader's goals are also believed to have an effect on the amount of comprehension that occurs when he or she
is processing a message. Specifically, goals determine what pieces of information get processed and how much effort the individual is willing to put forth to process a message. Information that is useful in achieving the individual's goals is more likely to be processed, and with more effort, than information that is not useful. The effort used to process a message is believed to be a determinant of the amount of the message that is subsequently recalled. Hence, the reader's goals affect the effort used to process the message which in turn affects message recall.

One of the goals of the research to be carried out here is to investigate the hypothesized effects of the reader's information processing goals and the meaningfulness of the message on the cognitive effort used to process the message, and investigate the relationship between effort and recall. Specifically, the questions of interest are: (1) how does a particular task, such as processing a message, affect the demands placed on an individual's processing capacity, (2) how is this capacity allocated among competing tasks, and (3) what are the effects when various tasks compete for processing capacity.

Support for the hypothesized relationships to be developed in the following chapters will have both theoretical
and practical implications for marketers that will be elaborated in the last chapter. From a theoretical standpoint, if the relationships are supported, the conceptualization of the processes that mediate the effectiveness of a persuasive message will be greatly increased. Specifically, the processes necessary for message comprehension to occur will be examined. That is, the degree to which the reader's goals and the meaningfulness of the message influence information processing will be determined. If the hypothesized relationships are supported, it will be shown that the effects of certain types of involvement are really due to the subject's need for information. This would suggest that information search and acquisition are not based on the individual's level of involvement but instead are driven by his or her need for information that is useful in achieving the desired goal.

From a practical viewpoint, support for the hypothesized relationships could have a significant impact on the design of marketing communications. For example, if the reader's goals do indeed affect the effort used to process a message, then messages that satisfy these goals will have a better chance of being retained than those that do not. Similarly, messages whose meaning is easily grasped will be more likely to be retained than those whose meaning is not easily grasped. Thus, if the hypotheses are
supported, anything marketers can do to incorporate these constructs into their messages is likely to increase their effectiveness in producing behavior change.

In summary, the research to be presented below is aimed at testing the hypothesis that the reader's need for information and the meaningfulness of the message being processed are mediators of the cognitive effort used to process a persuasive communication, and the effort used is a determinant of the subsequent retention of the message. Furthermore, it is hypothesized that need for information may actually be a mediator of the effects of involvement. To accomplish the objective of testing these proposed relationships, the following chapter will present a review of the literature and a model based on this review that specifies the relationships discussed above. Then the hypotheses necessary to test the proposed relationships will be presented followed by the experimental method used to test them. The results of the experiment will be presented and analyzed, and finally the implications of the findings will be discussed.
Chapter II
LITERATURE REVIEW

The review of the literature relevant to the proposed relationships and tests will be organized in the following manner. First, the concept of cognitive effort and the commonly accepted method of measuring it will be discussed. Next, the research on message content factors and their effects on cognitive effort and message recall will be reviewed. Then the literature on message involvement and need for information will be discussed.

2.1 COGNITIVE EFFORT

Cognitive effort, or information processing intensity, is defined "as the amount of a limited capacity central processor utilized in performing an information processing task" (Iyler et al., 1979, p. 608). Two assumptions underlie this definition. First, an individual has a limited processing capacity, and second, effort is voluntarily allocated by the individual. Each of these assumptions have considerable support in the cognitive psychology literature.
The notion that humans have limited processing capacity is supported by both subjective experience and experimental evidence. Kahneman (1973) describes several common-sense examples that demonstrate that man has a limited capacity for processing information which is voluntarily allocated among competing stimuli. For example, when a person driving a car interrupts a conversation to make a turn, or when a person stops talking to perform a math problem, it is an indication that the combination of task demands exceeds capacity limitations and the individual makes a conscious decision about which task to allocate effort to. (Kahneman uses the terms effort, attention, and capacity interchangeably, and considers involuntary attention to be an allocation of effort to a stimulus based on automatic mechanisms rather than current goals. Further research summarized in Ettman (1979) provides physiological evidence that attention is directly related to capacity.)

Experimental evidence of limited processing capacity is provided by numerous studies that demonstrate man's inability to perform two tasks at the same time. When performance of one task causes performance on another simultaneous task to deteriorate, it is evidence that the combination of processing demands of the two tasks exceeds the available capacity (Kerr, 1973). Additional support
for a limited capacity processing system is provided by studies that demonstrate that subjects can only process about seven chunks of information at one time. (A chunk is defined as an organized cognitive structure that summarizes a large amount of information such as a brand name. (Bettman, 1979).)

The allocation of this effort to the performance of a given task is determined by both internal and external factors such as arousal, motivation, and rules governing selective attention (Kahneman, 1973; Kerr, 1973). Arousal may be brought about by characteristics of the stimulus or the individual's involvement with it. Motivation to allocate effort to a particular task is based on whether or not the task is congruent with the individual's current goals. If the task is useful in achieving a goal, then effort will be allocated to performing it. Rules governing selective attention are exemplified by instructions in experiments in which the subject is told which of two simultaneous stimuli to attend to and which to ignore. Once the pool of effort has been allocated to performing a particular task, the amount of the pool used is determined by the nature of the task, with easy tasks requiring little effort and difficult tasks requiring more effort (Kahneman, 1973).
In short, cognitive effort may be viewed as having two dimensions. Selectivity is the allocation of effort to a task based on internal or external factors. Intensity is the amount of capacity used in performing the task (Bettman, 1979). Thus, task performance may fail either because its demands exceeded the available capacity or sufficient capacity was not allocated to it.

An important feature of the cognitive effort construct is that it has been shown to be an important determinant of subsequent recall performance. Tyler et al. (1979, experiment 1) showed that the greater the effort used to perform a task, the greater the recall following completion of the task. They designed a 2 (high and low effort) X 2 (shallow and deep processing task) experiment. The standard levels of processing paradigm was used to manipulate depth. In the shallow processing (nonsemantic) task, subjects unscrambled anagrams, and in the deep processing (semantic) task, subjects performed a sentence completion task. For each processing task, there were two degrees of effort believed to correlate with processing capacity demands. For the anagram task, in the high effort condition the words were extensively scrambled, but in the low effort condition the rearrangement was minimal. In the sentence completion task, a single word was strongly implied in the low effort condition, but in the high effort condi-
tion, the best fitting word was not obvious. Subjects were then surprised with a word recall test. The major hypothesis was that words encountered in the high effort condition would exhibit better recall than those in the low effort condition. Their results showed a main effect of effort with high effort producing greater recall, and no effect of depth-of-processing.

The concept of cognitive effort is of theoretical interest because of its advantages over other constructs such as depth-of-processing. Depth-of-processing has come under attack in psychology lately for several reasons that will be elaborated below. One of the framework's two major assertions has been empirically disproven, and the other has been shown to be non-falsifiable (Nelson, 1977; Tyler et al., 1979). The depth-of-processing framework states that memory should be unaffected by repetition, involvement, and message content, and that the depth at which material is processed should be the only determinant of the retention of the material. Nelson (1977) has shown that repetition of the same material at a constant depth does improve memory for the material. Jacoby, Bartz, and Evans (1978) have shown that the characteristics of the material being processed (e.g. scaled meaning of consonant-vowel-consonant trigrams), as opposed to task characteristics, also affect retention. Thus, the assertion that only depth determines retention is false.
The second assertion of the framework is that memory increases as depth increases. The problem with this assertion is that it is circular and therefore not testable (Nelson, 1977). It is not testable because there is no independent measure of depth. "Most studies have adopted the procedure of choosing types of processing that it seems intuitively plausible to assume differ in depth" (Baddeley, 1978, p. 141, emphasis added). However, this is not sufficient to support a theoretical framework that postulates a hierarchy of levels of processing. Furthermore, appeals to such notions as breadth or elaboration suffer from the same lack of independent measurement and only serve to make the theory more difficult to test. Thus, the scientific usefulness of such a framework in explaining memory appears to be severely limited.

The cognitive effort framework is superior to the depth-of-processing framework because it does not have these problems. As stated earlier, there is empirical support for the assumptions that man has a limited processing capacity and effort is voluntarily allocated by the individual. Equally important is the fact that it can be measured independently of recall, and therefore is testable. In short, "it is an identifiable factor in memory processing, the effects of which are directly reflected in recall performance, and which can be described as a con-
tinuum accessible to independent measure" (Tyler et al., 1979, p. 608). This independent measurement is achieved using the secondary task technique.

The secondary task technique is described in detail in Kerr (1973). The procedure requires subjects to perform two tasks at the same time. Since man's capacity to perform mental operations is limited, any mental operation that requires the central processing mechanism will interfere with a second mental operation that simultaneously requires the same mechanism. This assumes that the central processor can serve only one task in full at a time as discussed earlier. Performance on the secondary task can be used as an indicator of capacity allocated to the primary task. The secondary task is designed such that, while subjects are aware that they must respond to it, it must not affect performance on the primary task. In other words, it is assumed that a group performing both the primary and secondary task should demonstrate performance on the primary task equivalent to a control group performing only the primary task. However, the same group should show poorer performance on the secondary task compared to a control group performing only the secondary task. Alternatively, using within-subjects measures, an individual should show better performance on the secondary task when it is performed alone than when both a primary and secon-
dary task are performed together, and primary task per­
formance should not be affected by the secondary task. Thus,
performance on the primary task affects performance on the
secondary task but not vice-versa. Numerous studies have
demonstrated the effect of the primary task on the secon­
dary task. See Kerr (1973) for a detailed discussion of
these studies. The author is unaware of any studies that
report comparisons between the experimental group and a
primary task only control group.

This technique can be operationalized in several ways
and the usefulness and validity of the technique for mea­
suring cognitive effort are well established (Kahneman,
1973; Kerr, 1973; Tyler et al., 1979). Rather than review
studies that have used the technique at this point, they
will be discussed in conjunction with studies on message
cues and message content since several of these experi­
ments used the technique. However, it should be pointed
out that Tyler et al. (1979, experiment 2) have demons­
trated that this technique measures something separate
from levels-of-processing. In this experiment, which is
similar to experiment 1 described earlier, subjects made
yes-no decisions about whether or not a given word could
be used to complete a sentence (a semantic task), or a set
of scrambled letters could be used to form a given word (a
structural task). Effort was manipulated as in Experiment
This was the primary task. In addition, subjects also responded to a secondary tone detection task while performing the primary task. Their results showed that the effort effects were mirrored exactly in the recall effects, with greater effort resulting in longer reaction times and higher recall. No relationship between levels of processing and effort was found. Thus, they conclude that the secondary task technique measures "something separate and independent of depth-of-processing." (Tyler et al., 1979, p. 612).

2.2 **MESSAGE MEANINGFULNESS**

Meaningfulness is defined as the extent to which a message unit calls forth associations with past experiences (Johnson, 1974). As such, it is an empirical construct. The more associations between the stimulus and the subject's prior knowledge, the more meaningful the stimulus is. It can be measured by the number of responses produced by the stimulus. Thus, Noble (1952) proposed the average number of acceptable written responses to a given stimulus given by all subjects per unit time as an index of meaningfulness. A neutral stimulus is meaningless as evidenced by zero responses, and a stimulus that produces twenty responses is more meaningful than one that produces only ten. Unacceptable responses include repetitions of
earlier responses and those that are related to a prior response rather than the stimulus (i.e. chain responses). Examples of the latter include tangential associations (e.g. Lemur---Dorothy, Hope, faith, charity) and alliterative associations (e.g. Raysen---caisson, Casey, case-ment) (Noble, 1952, p. 425). Although Noble (1952) only tested the meaningfulness of real and artificial words, the definition extends directly to message level meaningfulness. Message meaningfulness has been manipulated in two ways. One way is through non-content factors that serve as message cues. The second way is by manipulating the actual content of the message itself.

2.2.1 Message Cues

The most commonly manipulated message cue is the title. Dooling and Lachman (1971) gave subjects a metaphorical passage that was not likely to be understood by itself. They found that when a message relevant title was provided (i.e. one that told what the message was about), subjects did significantly better on recall tests than subjects that did not receive the message title. Even though subjects had the knowledge that would have enabled them to comprehend the message (e.g. Columbus discovering America), they could not make use of this knowledge to understand and recall the passage unless they were given a mes-
sage cue by the experimenter. This is because the messages did not contain any explicit referents that could serve as cues as to what the messages were about. Without such cues, the messages appeared to be a series of unrelated sentences without a central theme, and subjects could not call up their existing knowledge to encode the messages. Thus, both comprehension and recall were diminished when a title was not present (Alba and Hasher, 1983).

Bransford and Johnson (1972) and Dooling and Mullet (1973) both replicated this result and carried it one step farther. Both experiments used a title-before and a no-title group, and they added a title-after group. Their results were similar and showed that the title-before group had significantly better comprehension and recall of the message than the other two groups, and the no-title control group and the title-after group did not differ significantly in comprehension (measured on a seven point scale with 1 representing very difficult to comprehend and 7 representing very easy to comprehend) and recall. Moreover, Britton et al. (1979) showed that when the title did not increase the meaning of the passage (i.e. the passage was already easy to understand or could not be understood even with the correct title), the presence or absence of a title had no reliable effect on recall. Thus, titles only
appear to affect recall when they enhance the meaning of a message.

Britton et al. (1979) used this experimental procedure and measured subjects' cognitive effort used to process the message. (In this context, processing a message means that the individual is consciously analyzing and interpreting the message, that is, actively reacting to it (Bettman, 1979).) They found that subjects in the title group used more cognitive effort, as measured by the secondary task technique, than subjects in the no-title group. This is a somewhat counterintuitive finding in that the easier a message is to understand, the more cognitive effort is used to process it. However, the finding has support in earlier research (to be discussed below) that manipulated message content and showed that easier passages used more cognitive effort than difficult passages (Britton, Westbrook, and Holdredge, 1978).

Furthermore, Britton et al. (1979) put forth a plausible cognitive explanation for the finding. The presence of a message relevant title activates relevant prior knowledge. The activated prior knowledge allows the individual to make more associations between the incoming information and his existing knowledge, thus making the message more meaningful (Johnson, 1974). The more associations
and elaborations made, the more cognitive capacity used. Thus, the more meaningful a message is due to the ability of the individual to match it with relevant prior knowledge, the more cognitive effort (capacity) will be used to process it (Britton et al., 1979). However, Britton et al. do not actually test this contention by measuring the number of associations. They merely offer it as a possible explanation as to why a meaningful message takes more effort than a less meaningful one.

These results indicate that prior knowledge of what a message is about does not automatically insure that such knowledge will be useful in comprehending the message. In order for this prior knowledge to be useful, not only must it become activated, but it must become activated before attempting to understand the message so that it will be present during the ongoing process of comprehension. Titles serve as cues that act as advance organizers and allow an individual to activate prior knowledge that will aid in comprehending new information (Kozminsky, 1977).

This organized prior knowledge constitutes a schema. A schema can be defined as a cognitive structure of organized prior knowledge, abstracted from experience with specific instances (Fiske and Linville, 1980). A schema can serve as a framework for comprehending incoming informa-
tion, and an individual will have the subjective sense that a message has been comprehended when there is a good match between the incoming information and the prior knowledge contained in the schema (Anderson and Pichert, 1978; Cohen and Ebbesen, 1979). If there is no available schema into which the incoming information can be integrated, it will be quickly lost (Alba and Hasher, 1983). In fact, message comprehension may fail because a relevant schema is either not available or not activated (Townsend, 1980). The latter point was demonstrated in the experiments discussed above in which subjects could not comprehend a message about Columbus discovering America unless they were given a title prior to reading the passage. Thus, titles serve as a method of activating schemata.

Once a schema has been activated, the processing of a message is under the control of that schema (Alba et al., 1981; Clary, Tesser, and Downing, 1978). People may activate different schemata for processing the same message, and the schema that is activated determines how the message is interpreted and what is recalled (Tesser, 1978). Therefore, if a message is to be comprehended as intended, it is important to activate the desired schema since only the information that is relevant to the currently activated schema will be encoded (Alba and Hasher, 1983). This point was demonstrated by Schallert (1976) and Kozminsky (1977).
Schallert (1976) gave subjects a passage that could be interpreted in two ways. She found that providing a biasing title at the beginning of the message significantly influenced what was recalled from the passage. For example, subjects were given a passage that could be interpreted as being about a manager of a baseball team or the manager of a glass factory. Subjects that were told the passage was about a baseball manager recalled significantly more items related to the baseball theme than did other subjects, and subjects who were told the passage was about a glass factory manager recalled significantly more items related to that theme. Rozinski (1977) used an almost identical procedure and obtained very similar results. Thus, for these subjects, the title activated a pre-existing cognitive structure, or schema, that significantly determined how the message was interpreted and what was recalled from it. It should be pointed out that this manipulation does not necessarily imply differences in the amount of effort used to process the message, but only that the effort can proceed along different lines of interpretation depending on the schema that is activated.

There are other methods of activating a message-relevant schema (i.e. prior knowledge that allows the subject to make associations with the message) besides using a title. Morris, Stein, and Bransford (1979) used an intro-
ductory paragraph to influence message comprehension. They found that when the introductory material was consistent with the subject's general knowledge of the world, recall was enhanced compared to a group that received introductory material that was not consistent with the subject's prior knowledge. For example, when subjects were told in the introductory paragraph that a strong man lifted a piano, the following paragraph that stated that he was the only one that could perform the deed made sense because it was consistent with subjects' knowledge of the world that a strong man would be able to lift a piano. When subjects were told that an old man lifted the piano, the subsequent statement that he was the only one that could do so was inconsistent with the subject's knowledge of "old man" and was not recalled as well as the consistent information. In other words, for recall of new information to be facilitated, it must be preceded by information that allows it to be effectively tied in with the existing information.

Bransford and Johnson (1972) used a picture to provide a context for an ambiguous passage. They used a picture that provided an appropriate context for the passage (i.e., all of the elements in the picture were in the correct locations) and a partial context picture (i.e., all of the elements were in the picture but not in the correct loca-
tions). They found the greatest comprehension and recall of the passage occurred for the appropriate context picture group, and the partial context and no context groups did not differ significantly from each other. Lutz and Lutz (1978) review similar research in marketing which shows that when a picture is unrelated to the product, such as the use of a sexy model in an advertisement, it does not facilitate recall of the product at all.

In summary, the research on message cues suggests certain constraints that must be observed if the cue is to be an effective aid in message comprehension. The message cue will increase comprehension and recall of the message only if it activates a message relevant schema that allows the subject to produce associations between his or her schema and the incoming information. The research reviewed above shows that this happens most effectively when (1) the cue is supplied at the beginning of the message, (2) the cue is consistent with the subject's knowledge of the world, and (3) the cue provides an appropriate context for the message. When these conditions are met, the research (Britton et al. 1978, 1979) has shown that subjects will use more cognitive effort to process the message perhaps because of the increased number of associations being formed between the activated schema and the incoming message. The more associations formed, the more cognitive
capacity used to process the message and the less left to respond to the secondary task.

The relevance of this type of research to marketing becomes apparent when a product name is viewed as a cue and product knowledge is viewed as a schema. Bettman (1979) and Jacoby, Speller, and Ferning (1974) point out that a product name serves as a cue around which consumers can lump various attributes associated with that product. Thus, the product name serves as a chunk that summarizes detailed information associated with the product. When the product name is supplied, it can serve as a cue to activate all of the individual's prior knowledge about the product and enable him or her to grasp the meaning of a message about the product.

While it is unlikely that an advertisement would never mention the product (i.e., no title), messages are frequently encountered that do not give the product (or brand) name until the end (i.e., title after) or that do not make it immediately clear what the message is about. This appears to be especially true regarding the sponsor's name. In a recent study (Wall Street Journal, 1983), eye-tracking cameras recorded what readers of 804 print advertisements actually looked at. The results showed that for 43% of the messages, the sponsor's name was over-
looked. The implication of the finding was that in order to avoid such "anonymous advertising," the product or company's name should be made more prominent. Furthermore, as Nylen (1980) states, "advertisements must clearly name and identify the product being advertised to combat the problem of consumers misidentifying the product." (p. 401) The experiment to be carried out here will have implications for these findings.

2.2.2 *Message Content Factors*

All of the research discussed above manipulated introductory material. However, message meaningfulness, defined as the number of associations formed between the incoming information and the subject's prior knowledge, may also be manipulated by varying the content of the message itself. This type of manipulation has usually taken two forms. Either the reading difficulty of the passage is varied, or the quality of the arguments presented in the passage is varied. This research is reviewed here because it supports the point made earlier that the more meaningful a passage is, the greater the recall of the message.

The effect of manipulating the content of a passage on subsequent recall has been investigated by several researchers, and their results are all consistent. Aulls
(1975) manipulated meaningfulness by scrambling the order of sentences in a paragraph so that each one appeared to be about a separate topic instead of all being about a central topic. He found a direct relationship between the meaningfulness of paragraph content and the recall of idea units contained in the paragraph. A similar finding was obtained by Marslen-Wilson and Tyler (1976). They found that recall of a message that had semantic meaning was significantly better than recall of a paragraph that was semantically anomalous.

Britton, Westbrook, and Holdredge (1978) constructed a series of one hundred and fifty word paragraphs that ranged from easy to difficult in both readability and comprehensibility. In the easy passages (from primary school readers), common words and simple sentences were used, and in the difficult passages (from college level text books), rare words and complex sentences were used. Comprehensibility was measured using a separate set of subjects and a "cloze" test in which words were deleted and subjects had to replace them. For the easy passages, 69% of the words were correctly replaced, whereas only 35% of the words were correctly replaced for the difficult passages. Not only did they find that significantly more items were recalled from the easier passages, they also found that the easier passages used more cognitive effort than the difficult passages.
This finding was found to be generalizable since the results were replicated in a second experiment using a second set of messages. In addition, explanations for the counterintuitive finding based on artifacts were ruled out based on additional data collected in the experiments. For example, the hypothesis that the subjects found the difficult passages less interesting and therefore paid less attention to them can be ruled out because the difficult passages took longer to read than the easy passages. This indicates that subjects did not give up on reading the difficult passages. Furthermore, the correlation between reading time and the rated interest was -.04. Also, they found no evidence that the difficult passages were more arousing than the easy ones based on ratings of semantic characteristics of the message thought to be related to arousal.

The explanation for this counterintuitive finding, which has already been discussed, is that easy passages permit the subject to form more associations with his or her prior knowledge. These associations occupy more capacity in short term memory and leave less capacity for responding to the secondary task. Meaningfulness has been operationalized as the number of associations between message content and prior knowledge. This research has shown that easy messages use more cognitive effort than diffi-
cult ones. If easy passages utilize more cognitive effort because they produce more associations, this implies that easy passages are more meaningful than difficult ones.

It should be pointed out however, that Britton et al. never actually measured the number of associations formed between the message and the subject's knowledge. They merely offer it as a plausible explanation for their findings. One of the main contributions of this research is to actually test this explanation by measuring the number of associations formed and also measuring cognitive effort. Based on the results of this line of research, it is expected that not only will more material be recalled from a more meaningful message, but also that more cognitive effort will be used to process a meaningful message compared to a less meaningful one because more associations will be formed with the meaningful message.

2.3 MESSAGE INVOLVEMENT

Krugman (1965) defines involvement as the number of connections or personal references that an individual makes between his or her own life and the message. The greater the number of associations, the greater the involvement. It should be recognized that this definition fits in nicely with the schema activation and message me-
ainingfulness research discussed above. Since involvement is one of the main constructs in the relationships to be tested, the research reviewed below will concentrate on manipulations of involvement and their effects on learning and attitude change.

Petty and Cacioppo (1979) discuss two types of involvement that can affect learning and attitude change. One type is referred to as response involvement. In this kind of involvement, the topic or issue addressed by the message is not of great interest to the individual. Instead, what is important is the position that one takes in response to the message. Specifically, the individual attempts to adopt the position that will lead to a situational reward. Thus, response involvement may be viewed as the individual's concern with the consequences of his or her response to the message.

The second type of involvement is called issue involvement, and concerns the extent to which the message topic, or issue, is of intrinsic importance to the individual. In other words, it is the extent to which the mere presentation of the topic of the message is sufficient to elicit interest (Zimbardo, 1960). This classification of involvement is very similar to that used by Rothschild (1979). Rothschild breaks issue involvement into two categories.
One category is called situational involvement, and accounts for the concern generated by an object at a particular point in time. The other category, called enduring involvement, accounts for the preexisting relationship of the individual to the object. Both of these categories account for the intrinsic interest generated by an object, and thus can be classified as issue involvement. Rothschild's (1979) definition of response involvement is similar to that of Zimbardo (1960) and Petty and Cacioppo (1979).

In a marketing context, an individual is likely to be persuaded by an advertisement to the extent that it is instrumental in helping him or her achieve a desired reward or outcome such as choosing the best product from a set of alternatives. In other words, the advertisement itself is not of interest; only the rewards that it can help obtain are important. The following summary from a current text on advertising (Nylen, 1980) shows that this contention is recognized and taken into account in designing advertisements. Nylen (1980) points out that in determining the content of an advertisement, one must first understand the need the consumer is trying to satisfy and design the message to communicate how the product can help satisfy that need. A consumer is more likely to read and act upon an advertisement if it satisfies his or her informational
needs. Products are not purchased simply for their own sake. Instead, consumers buy products because they provide benefits that satisfy some need. Hence, it would appear that involvement with the topic of an advertisement (i.e., product) is not likely to occur unless that product provides some benefit (i.e., outcome) that meets a need the consumer is trying to satisfy. Thus, response involvement rather than issue involvement appears to be the most relevant to marketing.

Furthermore, issue involvement often confounds a number of factors that cannot be analyzed separately such as initial differences in commitment, social support, and prior information (Zimbardo, 1960). Each of these are related to the individual's needs and values, and they vary with the individual which tends to make issue involvement an unreliable construct. For example, research reviewed in Petty and Cacioppo (1979) indicates that individuals highly involved with an issue showed greater resistance to a persuasive communication than did individuals low in issue involvement. Also, individuals publicly committed (high involvement) showed greater resistance to a counterattitudinal message and greater acceptance of a proattitudinal message than did privately committed (low involvement) subjects. On the other hand, response involvement can be imposed on a neutral individual and thereby control many
of these contaminating factors. For these reasons, response involvement is the construct of interest in this research.

2.3.1 Response Involvement

Research on response involvement has not been extensive. Zimbardo (1960) introduced the construct, and Wright (1971) and Mitchell and his colleagues (1980, 1981) have used it in a marketing setting.

Zimbardo (1960) manipulated response involvement by telling subjects in the high involvement condition that their responses to a juvenile delinquency case study would be good indicators of their social values and personalities. In the low involvement condition, subjects were led to believe that their responses would be unlikely to tell the experimenter anything about their values or personalities. As a manipulation check, Zimbardo (1960) showed that subjects in the high involvement condition were significantly more concerned about their opinions and judgments about the case than were subjects in the low involvement condition. The dependent variable in this study was attitude change, and it was found that high involvement subjects changed their attitudes significantly more than low involvement subjects. However, Freedman (1964)
manipulated response involvement and found just the opposite, so "it appears that the effects of response involvement on attitude change are indeterminate." (Burnkrant and Sawyer, 1981, p. 7)

Wright (1971) transferred the concept to a marketing context and noted that in a low response involvement condition, "the individual sees no outcome, reward, or problem solution as dependent on his feelings toward the topic; he is not therefore inclined to exert much cognitive effort in processing the incoming information. Under conditions of high response involvement, the person believes that reaching a 'correct' solution in a given situation is important." (p. 36) He then states that the individual will be more interested in evaluating information about the topic in the high involvement condition than in the low involvement condition, and the greater the pressure to reach a decision, the more interested he or she will be. Wright (1971) manipulated response involvement by telling subjects in the high involvement condition they would be making an evaluative decision about the product in the advertisement within a short period of time, and he emphasized the importance of this decision to the individual. Low involvement subjects were not told they would have to make an evaluative judgment. His results showed that subjects did not change their attitudes significantly in
either condition, but high involvement subjects "tended" to recall more of the message units than did low involvement subjects.

Mitchell (1981) and Mitchell, Russo, and Gardner (1981) used a brand versus nonbrand strategy which they regard as a manipulation of involvement. In the brand strategy, subjects were told to examine the advertisement in order to form an evaluation of the brand, but in the nonbrand strategy, subjects were told to evaluate the effectiveness of the advertisement along specified criteria. Results using this method have tended to show that high involvement subjects (i.e. brand processors) recalled more product related information than the low involvement (i.e. nonbrand processors) subjects. However, as Burnkrant and Sawyer (1981) point out, these results are essentially a confirmation of the manipulations. Furthermore, it is not at all clear that this technique manipulates involvement because both strategies require responses that may be regarded as important, and therefore response involvement may be high in both conditions.
2.4 **NEED FOR INFORMATION**

If indeed subjects do use more cognitive effort to process a message under conditions of high involvement as Wright (1971) suggests, it would be of value to know why this is so. Burnkrant and Sawyer (1981) state that the crucial aspect of involvement manipulations that leads to more intensive processing (i.e., more effort) of a message is not the personal importance of the issue or response, but the personal importance of understanding the content of the message. This personal importance to the individual of correctly grasping the meaning of a message can be regarded as a need for information (Burnkrant, 1976). Need for information is independent of issue or response involvement in that it is brought about by the individual's desire to decrease uncertainty regarding the message. It is possible to have a condition of high issue or response involvement and yet have no desire for increased understanding of the message if the subject is already certain about the message content. Conversely, it is possible to have a high need for the information in the message but yet not be highly involved.

There is not a lot of research demonstrating that need for information is the underlying construct that mediates the effects of involvement on cognitive effort and learn-
ing. In fact, Burnkrant and Sawyer (1981) appear to be the first to specify such a relationship. They theorize that an individual whose need for information about a product (or issue) is high is likely to expend more cognitive effort to process a message about the product (or issue) than an individual that does not have such a high need for information about the product (or issue). In general, when an individual is motivated or aroused to process a message, i.e., has a high need for the information, he or she will generate new associations with the message (Cacioppo and Petty, 1981).

The need for information construct has the advantage of explicitly treating the arousal that is likely to underlie effective manipulations of involvement, and therefore should help explain some of the contradictory findings in the response involvement literature discussed above. As discussed earlier, manipulations of involvement appear to manipulate the individual's desire to decrease his or her uncertainty about the incoming information. The greater the desire to decrease this uncertainty, the greater the need to grasp the meaning of the information. Thus, contradictory results may be due to the possibility that in one study, subjects in the low involvement condition have a high need for the incoming information and in a comparable study, subjects have a low need for the incoming in-
formation. In the first study, subjects would be motivated to process the information intensely, but in the second study they would not. This set of circumstances would lead to contradictory findings in studies of involvement. (The same set of circumstances could occur in the high involvement condition.)

Furthermore, "rather than suggesting that task manipulations have qualitative effects on the way information is processed, it suggests that processing intensity varies on a continuum and the subject's position on this continuum is a function of the degree of arousal of his need for information" (Burnkrant and Sawyer, 1981, p. 14). If the construct of need for information is to be of use as an explanatory variable as suggested above, methods of measuring it independently of recall, cognitive effort, and involvement are needed. More will be said about this in the method chapter.

2.5 THE MODEL

The literature reviewed to this point has dealt with three constructs: message meaningfulness, response involvement, and need for information. In addition, the concept of cognitive effort was also discussed. It was stated in the first chapter that the objective of this re-
search was to test the hypothesis that need for information and message meaningfulness are mediators of the cognitive effort used to process a message, and the effort used is a determinant of the subsequent recall of the message. Also, it was hypothesized that need for information may be a mediator of response involvement. In fact, the relationships between the variables to be tested have been proposed in a model developed by Burnkrant and Sawyer (1981) and shown in Figure 1.

The model starts by hypothesizing that need for information is a mediator of the effects of depth-of-processing and both issue and response involvement. It was argued by Burnkrant and Sawyer (1981) that issue involvement, depth of processing, and response involvement are only likely to affect processing intensity through their effect on need for information. In this research, response involvement is the construct of interest for reasons developed in preceding sections of this chapter. It remains for future research to investigate the role of issue involvement and depth-of-processing. The rationale for the contention that need for information mediates the effects of response involvement is as follows. As stated earlier, an examination of the research on response involvement reveals that the effects of this construct are really due to the individual's desire to decrease his or her uncertainty regard-
ANTECEDENTS

(Issue Involvement) → (Need for Information) x (Meaningfulness) → Information → Recall
(Processing Depth) → Information → Recall
(Response Involvement)

CONSEQUENCES

Processing
Recognition
Intensity
Thoughts

FIGURE J: Burnkrant and Sawyer Model
ing the outcome of a particular decision. This desire to decrease one's uncertainty will affect the subject's need for useful and understandable information regarding the decision. If the person is certain about the decision, then his or her need for additional information will be low even if the outcome is very important (i.e., response involvement is high). Conversely, one may have a high need to decrease his or her uncertainty about a decision even when the outcome is not very important.

Next, the model hypothesizes an interaction between need for information and message meaningfulness. There is a small amount of research that indirectly suggests that there may be an interaction between meaningfulness and need for information. Most of this research deals with task manipulations in depth-of-processing experiments. Jacoby, Bartz, and Evans (1978) manipulated depth-of-processing, repetition, and meaningfulness of consonant-vowel-consonant trigrams (cvc's) and found that both depth-of-processing and meaningfulness were directly related to recall. They also found an interaction between the two terms that showed that the advantage in recall of high meaning cvc's over low meaning cvc's was greater under conditions of deep processing than under shallow processing. Thus, ability to recall material depends on both the meaningfulness of the material and the task demands. Tasks
demands have little effect on recall when the material being presented cannot support a meaningful analysis. However, manipulations of meaningfulness have their greatest effect when task demands require processing the meaning of the material.

Seamon and Murray (1976) used words instead of cvc's and found that a semantic task produced better recall than a structural task, and the semantic task subjects exhibited greater recall for high meaning words than low meaning words. This difference in recall was greater in the semantic task than in the structural task.

Burnkrant and Sawyer (1981) theorize that the same relationship should be obtained at the message level as well as the trigram and word level. In other words, message meaningfulness should have a greater impact on learning under conditions of deep processing compared to shallow processing. Depth-of-processing experiments manipulate the individual's desire to grasp the meaning of the information being processed. Another way to say this is that they are manipulating the subject's need to grasp the meaning of the information. Therefore, the level of need for information should have little effect when the meaning of the information is low, but should produce a large difference in recall when the meaning is high with high need producing greater recall.
A substantial amount of literature was reviewed above which showed how message level meaningfulness affects both cognitive effort (called information processing intensity in Figure 1) and recall. Specifically, the research reviewed showed that the more meaningful a message was, as manipulated by the presence or absence of a title, the greater the recall of the message. The research also showed that messages that were high in meaningfulness required more cognitive effort to process than messages low in meaningfulness. The explanation offered for both of these findings was that messages high in meaningfulness produced more associations between the message content and the individual's existing knowledge than did low meaningfulness messages. This increased number of associations occupies more capacity and produces greater recall.

The hypotheses and method that follow are designed to test these proposed relationships. This will be followed by an analysis of the results of the experiment. Finally, the implications of the findings will be discussed.
Chapter III
HYPOTHESES

The experiment is a $2 \times 2 \times 2$ design in which response involvement, need for information, and meaningfulness are the independent variables. The hypotheses will be stated in terms of main effects and interactions. The rationale for each hypothesis will be developed based on the preceding review of the literature.

3.1 HYPOTHESIS 1

$H_1$: Recall in the high response involvement condition will not differ from recall in the low response involvement condition. That is, there will be no main effect for response involvement on recall.

The rationale for this hypothesis is based on Burnkrant and Sawyer's (1981) theory that the effects of most types of involvement on recall are due to the subject's need for information about the topic. Therefore, if need for in-
formation is orthogonally varied with response involvement in a factorial design, the level of recall should be affected by the level of need for information and not by the level of response involvement. The basis for hypothesizing that the effects of response involvement on recall are really due to the individual's need for information was developed in the preceding chapter.

3.2 HYPOTHESIS 2

H2: Recall in the high need condition will be greater than in the low need condition. That is, there will be a main effect of need for information on recall such that under conditions of high need, more message units will be recalled than under conditions of low need.

If a person has a high need to increase his certainty of understanding about a given topic, he or she should show greater learning of information about the topic than a person that has a low need for information about the topic. The increased arousal caused by the high need for information should cause more cognitive effort to be used to process the message than would be used under conditions of low need, and the more cognitive effort used to process a message, the greater the recall of the message.
3.3 **HYPOTHESIS 3**

H3: Recall will be greater in the high meaning condition than in the low meaning condition. That is, there will be a main effect of meaningfulness on recall such that under conditions of high meaning, more message units will be recalled than under low meaning conditions.

This is not a novel hypothesis. Several pieces of research reviewed above (Bransford and Johnson, 1972; Britton et al., 1979; Dooling and Lachman, 1971; and Dooling and Mullet, 1973) have demonstrated this effect. Also, Britton et al. (1979) have shown that the more meaningful a passage is, the more cognitive effort is used to process it. One of the main contributions of the experiment proposed here is to show that the reason a more meaningful message uses more cognitive effort (and therefore is recalled better) is that subjects form more associations with a more meaningful message, and therefore more capacity in short term memory is occupied by processing the message and less is left over to respond to the secondary task. This is Britton et al.'s explanation for their counterintuitive finding, but they never actually demonstrate its validity by measuring the number of associations
found in each condition. The number of associations formed within each level of meaningfulness will be measured in pretests in order to test this explanation.

3.4 Hypothesis 4

H4: There will be a two way interaction between need for information and meaningfulness such that under conditions of high need, the difference in recall across meaningfulness conditions will be greater than the corresponding difference under low need conditions.

This is the multiplicative interaction hypothesized by Burnkrant and Sawyer (1981). No research has directly investigated this interaction. The research discussed earlier has treated need for information and meaningfulness separately. Only Burnkrant (1974) has manipulated need for information directly, but the effect on recall was not statistically significant.

The rationale for this hypothesis is as follows. The interaction will occur because a subject's need for information affects the amount of knowledge activated which, in combination with the meaningfulness of the message, deter-
mines the number of associations formed. Under conditions of high need for information and high message meaningfulness, the subject has greater desire to grasp the meaning of the message. This increased arousal results in more knowledge being activated which interacts with the high meaning message to produce a large number of associations. Conversely, in the low need condition, not as much knowledge is activated to interact with the high meaning message, so fewer associations are formed and recall should be lower. If the message is essentially neutral in the low meaning condition (i.e., no associations regardless of the need condition), then the level of recall should be relatively low regardless of the need for information condition. (In both need conditions, the high meaning condition should have the higher recall score.)

3.5 **Hypothesis 5**

H5: No other two way interactions, nor the three way interaction, will be present.
3.6 COGNITIVE EFFORT

The hypotheses presented above were all developed for recall measures. However, the same set of effects are expected to be found for the cognitive effort measure. That is, in each of the four hypotheses discussed above, cognitive effort could be substituted for recall. The reason the effects of the independent variables are expected to be the same for both recall and cognitive effort is as follows.

Research (Tyler, et al., 1979) has shown that there is a direct relationship between the effort used to process a message and the amount recalled from the message. Cognitive effort is a measure of the amount of processing capacity utilized in performing an information processing task. This processing capacity is utilized by forming associations between the message and the subject's knowledge, and the more associations formed, the greater the recall. Consequently, the greater the effort used to process a message, the greater the subsequent recall of the message. As stated earlier, the major advantage of the cognitive effort concept is that it can be measured independently of recall by the secondary task technique, and the effects of the manipulations of the independent variables on this measure should be the same as those for recall.
The major distinction between recall and cognitive effort is that cognitive effort is a measure of the number of associations formed while they are being formed, and recall is a measure of the number of associations after they have been formed. Thus, it may appear that the discussion of cognitive effort should have preceded that of recall. The hypotheses were developed for recall first because there is much more research to draw on for support than there is for cognitive effort. It was easier to support the rationale for the expected effects on recall, and then show that they should be the same for effort, than it would have been to support the expected effects on effort first. Therefore, the following hypothesis is stated.

**H6:** The effects of the independent variables expected in Hypotheses 1 through 5 for recall will be the same for cognitive effort.

### 3.7 Recall and Cognitive Effort

The entire set of hypotheses can be summarized on a performance-resource graph as shown in Figure 2 (Norman and Bobrow, 1975). In this experiment, recall is the performance variable (X-axis) and cognitive effort is the resource variable (Y-axis). "In general, the function that
Figure 2: Performance Resource Graph

\[
\text{RECALL} \quad \frac{RI_L \& RI_H}{NI_L \over M_L} \quad \frac{RI_L \& RI_H}{NI_H \over M_L} \quad \frac{RI_L \& RI_H}{NI_L \over M_H} \quad \frac{RI_L \& RI_H}{NI_H \over M_H}
\]

COGNITIVE EFFORT

RI = Response Involvement
NI = Need for Information
M = Meaningfulness
relates performance to resource allocation should be monotonically nondecreasing." (Norman and Bobrow, 1975, p. 47) In this experiment, the function is expected to be monotonically increasing, and is assumed to be linear although other nondecreasing functions are possible. Figure 2 shows where each combination of the independent variables is expected to fall on the graph.

From this graph several things are apparent. First, response involvement is expected to have no effect on the cognitive effort used to process the message, and therefore no effect on recall (H1). Second, moving from low to high need for information will cause more cognitive effort to be used to process the message and, therefore, high need leads to greater recall within a meaningfulness condition (H2). Third, moving from low to high meaningfulness produces more cognitive effort and therefore greater recall (H3). The data obtained in the experiment will result in a set of recall-reaction time combinations. These can be used to develop a performance operating characteristic graph in which performance in the primary task, recall, is plotted against performance on the secondary task, reaction time. From this graph a performance-resource function can be developed by examining tradeoffs in performance on both tasks.
Chapter IV

METHOD

The major objective of this research is to test the relationships proposed in Chapter II. Hypotheses were presented in Chapter III that will provide tests of these relationships. The purpose of this chapter is to describe the research design and procedure that were used to test these hypotheses.

In order to test the relationships expressed in the model, a laboratory experiment will be used. A laboratory experiment will permit the manipulation of the model's constructs and allow causal inferences to be made about the effects of one construct on another. Furthermore, a laboratory experiment permits greater control over extraneous sources of variation than would be possible in a field experiment.

In the sections that follow, the methods of manipulating the independent variables and methods of measuring the dependent variables will be described along with the various pretests and manipulation checks necessary to support
the validity of the manipulations. First, the manipulation of message meaningfulness will be described, followed by the manipulations of response involvement and need for information.

4.1 Manipulation of Message Meaningfulness

The meaning conveyed by the integrated sentences of a text as a unit is referred to as discourse level meaning (Britton et al., 1979). In a marketing framework, discourse level meaning would refer to the meaning conveyed by an advertising message as a whole. One of the most effective manipulations of discourse level meaning is accomplished by the presence or absence of a title that tells what the message is about. Research was presented in Chapter II that showed the effectiveness of this manipulation (Bransford and Johnson, 1972; Dooling and Lachman, 1971; and Dooling and Mullet, 1973). Furthermore, Britton et al. (1979) have demonstrated the effectiveness of this manipulation on cognitive effort. They showed that titles increased the cognitive effort used to process a message but only when they increased the meaningfulness of the message.

It should be pointed out however, that the passages used in these experiments were metaphorical in nature.
They were abstract and lacked concrete referents which would provide a cue as to the meaning of the message. It could be argued that such a message would be unlikely to occur as an advertisement. However, in order to establish the internal validity of the experiment, a message whose discourse level meaning cannot be obtained without a title was developed. Once the relationships have been tested with this type of message, the manipulations can be diluted with more realistic advertisements in order to establish the external validity of the proposed relationships. In theoretical investigations, initial manipulations should produce wide variations in the dependent variables, and only after significant effects have been obtained should attempts be made to assess differences due to more subtle manipulations (Sawyer and Fall, 1981). Thus, the meaningfulness manipulation was conducted in the final experiment as follows. One group received a message without a title, and one group received the identical message with a message relevant title (i.e. product category).

4.1.1 Pretest of the Meaningfulness Manipulation

To reiterate, the meaningfulness of a stimulus is indicated by the number of associations the stimulus elicits. These thoughts served as indicators of the number of associations formed. Each thought represents either an asso-
ication of message content with the subject's knowledge, or a piece of knowledge that is brought into active memory as the result of another association. Thus, all thoughts, either contained in the message or generated by the subject, are of interest because they occupy processing capacity. As Cacioppo, Harkins, and Petty (1981) state, it appears that an unexpected request to list everything about which the subject thought during the presentation of the message provides a useful indication of the associations naturally elicited by the message. Extensive research was discussed in Chapter II that showed that titles were effective manipulations of the number of associations formed with the message.

In order to insure that the messages used in the experiment differed in meaningfulness when a title was or was not present, a pretest was conducted. A total of five messages were developed from articles in recent issues of Consumer Reports. Consumer Reports was chosen as the source to enhance the credibility of the messages. All messages were approximately the same length, and took about the same amount of time, fifty seconds, to read. No attempt was made to match the messages in terms of word count or reading difficulty because in the final experiment, only one message was tested for recall.
The pretest was conducted using undergraduate marketing students since they were also used as subjects in the final experiment. One hundred and twenty-seven subjects were run in groups of four to six, and groups were assigned to a meaningfulness condition the opposite of the previous group with the only restriction being an attempt to keep cell sizes relatively equal. In other words, if the first group was assigned to the low meaning condition, the second group was assigned to the high meaning condition. However, if it appeared that cell sizes would be highly unbalanced, then groups were assigned to the small cell regardless of the previous group's condition. Each group saw only one message. Subjects in the title condition were first shown the title for five seconds, and then the message for one minute. Subjects in the no-title condition did not see the title. After the one minute period, subjects were asked to separate their thoughts into individual ideas to be written down separately, with the definition of an individual thought being one that, to the best of their judgment, expresses only a single fact, value, good or bad feature, or thought. This is the same as the thought listing task used by Furpkrant (1974). Since all thoughts that occurred to a subject were of interest, subjects were given four minutes to list their thoughts (Cacioppo, Harkins, and Petty, 1981).
Table 1 shows the means, standard deviations, and t-values for the five messages. Three of the five messages showed significant differences in total thoughts, and in each case, the high meaningfulness condition had the greater number of thoughts. Message 1, the portable fire extinguisher, was chosen as the critical message for the recall measure since it showed the most significant difference (p=.05) in thoughts that were categorized by the subjects as reactions. A thought was defined as a reaction to the message if it was a paraphrase of a statement from the message with additional content provided by the subject. In other words, a reaction was a paraphrase with the subject's own ideas added. It was felt that this was the most important category since it more closely resembles an association between the message and the subject's knowledge than either contained thoughts (i.e., a direct statement from the message) or own thoughts (i.e., a thought with no direct relation to the message) (Cacioppo, Harkins, and Petty, 1981). Messages 4 and 5 were selected to serve as practice messages in the final experiment. (See Appendix A for the text of these messages.)
TABLE 1
Pretest of Messages

<table>
<thead>
<tr>
<th>MESSAGE</th>
<th>CONDITION</th>
<th>MEAN NO. OF THOUGHTS</th>
<th>STANDARD DEVIATION</th>
<th>T-VALUE</th>
<th>P-VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NO TITLE</td>
<td>3.75</td>
<td>1.66</td>
<td>-4.40</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>TITLE</td>
<td>6.93</td>
<td>2.02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>NO TITLE</td>
<td>4.55</td>
<td>1.13</td>
<td>-1.09</td>
<td>0.27</td>
</tr>
<tr>
<td></td>
<td>TITLE</td>
<td>5.14</td>
<td>1.51</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>NO TITLE</td>
<td>4.67</td>
<td>1.07</td>
<td>-1.31</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td>TITLE</td>
<td>5.54</td>
<td>2.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>NO TITLE</td>
<td>4.92</td>
<td>1.31</td>
<td>-2.11</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td>TITLE</td>
<td>6.73</td>
<td>2.65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>NO TITLE</td>
<td>4.57</td>
<td>1.83</td>
<td>-2.15</td>
<td>0.041</td>
</tr>
<tr>
<td></td>
<td>TITLE</td>
<td>6.15</td>
<td>1.99</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.2 MANIPULATION OF INVOLVEMENT

Manipulations of response involvement have already been discussed (Zimbardo, 1960; Wright, 1971; Mitchell, Gardner, and Russo, 1981). The manipulation used here was similar to that employed by Zimbardo (1960) and Wright (1971). Subjects in both conditions were told that they would be required to make an evaluative judgment about the
products in the messages. In the high involvement group, subjects were told that their compensation (2% of their final grade) for participating in the experiment will be tied directly to the quality of their evaluations with a better evaluation resulting in more extra credit. The low involvement group was not told anything about the importance of their evaluations. That is, they were only told that they would receive 2% of their final grade. (In reality, all subjects received the same amount of extra credit regardless of the experimental condition.) It was necessary to tell both groups that they will make an evaluation (response) in order to implement the need for information manipulation described below. Moreover, this is very similar to the technique Zimbardo (1960) used. He told both groups they would have to make a response, but only the high involvement group saw the response as important in obtaining a reward. Rather than discuss the results of a pretest of this manipulation at this time, they will be discussed in conjunction with the pretest results of the need for information manipulation because any interaction between the two is of interest.
4.3 MANIPULATION OF NEED FOR INFORMATION

Need for information was manipulated by telling subjects that the evaluative judgment they will have to make will be either difficult or easy. In the low need condition, subjects were told that the evaluation of the products will be very easy because most people, like themselves, already know the information contained in the message, and the evaluation can be performed satisfactorily without it. In other words, the usefulness of the information in performing the evaluations will be negligible, so the need for understanding the information should be low. Subjects in the high need for information condition were told that the evaluation will be difficult and cannot be made without relying heavily on information contained in the message. In this condition, the information in the message will be very useful in performing the evaluations, and subjects' need for it should be high.

4.3.1 Measurement of Need for Information

Need for information was measured in a manner similar to that used by Burnkrant (1974). He used two different types of questions to assess subjects' need for information. In one type of question, subjects were asked to indicate their own level of need for information on various
topics, one of which they had just received a need manipulation on. The specific questions used in this research are shown in Appendix B, questions 5 through 9. They were designed to determine whether or not the subject feels that the information contained in the messages is needed to perform well on the product evaluations. If the manipulation of need for information is effective, then subjects in the low need condition should have scores close to the right hand side of each scale, and conversely, subjects in the high need condition should have scores close to the left side of the scale. The validity of self-report measures as indicators of need for information is discussed in Burnkrant (1974).

4.4 MANIPULATION CHECK OF INVOLVEMENT AND NEED

In order to insure that the manipulations of involvement and need for information are effective and are not manipulating the same thing, a pretest manipulation check was conducted. The tests were designed to test the hypotheses that there would be a main effect of response involvement on the questions designed to measure involvement, and there would be a main effect of need for information on the questions designed to measure need. Furthermore, it was hypothesized that the involvement manipulation would have no effect on the subject's need for
information, and the subject's need for information would have no effect on his or her involvement. Also, it was hypothesized that there would be no two-way interactions between need and involvement. This would show that the two constructs can be manipulated independently. In order to show that the need for information manipulation was not manipulating source credibility, four questions were included to measure source credibility in the pretests.

The actual manipulations are shown in Appendix E. It should be pointed out that the manipulations of the constructs and the questions designed to measure their effects are in accordance with the descriptions given in the literature review chapter. That is, the response involvement manipulation manipulates the personal importance of the response by tying it to a reward (extra credit), and the need for information manipulation manipulates how much the subjects need the information contained in the messages in order to perform the evaluation.

Subjects for both pretests described below were drawn from undergraduate marketing classes. They were run in groups of not more than six. After arriving at the testing room, subjects were instructed to carefully read the instructions, answer all questions, and not to talk while filling out the questionnaire. After all subjects were
finished, the test booklets were collected, and the subjects were debriefed and instructed not to talk to anyone about the experiment. The actual test booklet consisted of a cover sheet, the instructions containing the manipulations, a series of demographic questions that served as fillers or distractors, and the scales to measure the effects of the manipulations.

4.4.1 Pretest 1

The first pretest consisted of 44 subjects. These subjects were promised 8 points extra credit (2% of their final grade) on the next exam for participation in the experiment. Subjects in the high involvement condition were told that the actual amount of extra credit they would receive depended on how well they performed the product evaluations. There were 11 subjects per cell. Results of this pretest were as follows. For each of the first three questions, all of which were designed to measure the effects of the response involvement manipulation, a statistically significant main effect of the response involvement manipulation was obtained (p<.001). In each case, the subjects in the high involvement condition indicated a higher level of involvement on the questions. No effects of need for information or any two-way interactions were obtained.
For the four questions designed to measure the effects of the manipulations on source credibility, some unexpected and unwanted effects were obtained. A statistically significant (p<.05) effect of need for information was obtained for the questions that measured how factual and how believable the messages were. Subjects in the high need condition saw the messages as more factual and more believable than did subjects in the low need condition. This is undesirable in that it indicates that the need for information manipulation is also affecting source credibility, and source credibility should be a constant in this experiment. No effects of response involvement or any two-way interactions were obtained.

Of the six questions designed to measure the effects of the need for information manipulation, only two showed statistically significant effects (p<.05). These were the questions asking how much the subjects felt they needed the information contained in the messages, and how helpful they thought it would be. In both cases, the subjects in the high need condition had higher means than subjects in the low need condition. No effects of response involvement or any two-way interactions were obtained.

Based on these results, it was decided to conduct a second pretest in order to accomplish two things. First,
the effects of need for information on source credibility had to be eliminated, and second, the need for information had to be made stronger so that it would be reflected in more questions. Therefore, the instructions were revised and another pretest was conducted. Specifically, the credibility of the messages was emphasized by stressing that they were also unbiased, and the need manipulation was changed to emphasize the fact that in the high need condition the evaluations to be performed were quite different from the typical product choice task. (See Appendix B for the revised messages.)

4.4.2 Pretest 2

Subjects for this pretest were drawn from a different undergraduate marketing class, and any subjects that participated in the first pretest were not allowed to participate in this one. Unfortunately, it was necessary to change the response involvement manipulation since the instructor was only willing to give participants 10 points on the next exam. This is a higher number of raw points, but amounts to a smaller percentage (1%) of their final grade. The exact manipulations are shown in Appendix B. A total of 36 subjects were run which resulted in 9 per cell.
The results of this pretest show that the initial objectives were accomplished, however some other results also changed. For the response involvement questions, the first one no longer showed a main effect but did show an interaction that approached significance ($p = .06$). The second and third questions both showed significant main effects ($p < .05$), in the expected direction, for involvement, and the two way interaction for the second question approached significance ($p = .094$). No main effects for need for information were obtained.

No main effects or interactions were obtained for any of the four questions measuring source credibility. Four of the five questions measuring need for information (the last question from Pretest 1 was dropped) showed a significant ($p < .05$) main effect in the expected direction for need for information. No question showed a main effect for response involvement. Only the question that asked how much the subjects want the information failed to show a main effect of need, however it did show a significant ($p = .044$) two-way interaction. This interaction is not easily interpretable since it indicates that subjects in the high involvement - high need condition want the information less than subjects in the high involvement - low need condition or the low involvement - high need condition, which is not what would be expected. In talking with sub-
jects during the debriefing, they indicated that they saw a clear distinction between wanting the information and needing it. They did not really want to read it, but they still felt they needed it to perform the evaluations.

This suggests that the question is not measuring the construct of need for information. Performing a reliability analysis on the scale consisting of the five items indicated that this question had the lowest squared multiple correlation of the five items, and that dropping the item from the scale would actually increase the coefficient alpha from .829 to .847.

Another indication that the item is not measuring the same construct as the other four items can be obtained using confirmatory factor analysis. The hypothesis that all measures load on the same factor is rejected (chi-square of 5 d.f. = 15.40, p=0.009). Dropping the question about wanting the information (which again had the lowest reliability) produced a chi-square of 2 d.f. = 3.01, p=0.222, which indicates that the four indicator model is not rejected. It should be pointed out, however, that due to the small sample size (n=36), the results of the confirmatory factor analysis should only be regarded as supplemental evidence to the reliability analysis reported earlier, both of which indicate that the measure is not reliable.
and should not be regarded as indicative of the effects of the manipulations.

Based on the results of the two pretests, 2% of the final grade was used as the response involvement manipulation in the final experiment since it worked well in the first pretest. For the need for information manipulation, the instructions used in the second pretest were used in the final experiment since they also worked well. (See Appendix C for the manipulations used in the final experiment.)

4.5 MEASUREMENT OF COGNITIVE EFFORT

The level of cognitive responding to a persuasive message can vary from complete inattention to intensive examination and elaboration. The self-report measure of cognitive response (number of support and counter arguments) has the major problem of placing post-hoc demands on subjects to recall their thoughts. What is needed is a concomitant measure of cognitive activity that provides direct evidence that people covertly and simultaneously process a persuasive message (Bettman, 1979; Cacioppo and Petty, 1981). Such a measure is provided by the secondary task technique. This technique has been thoroughly discussed in Chapter II. There are several methods of opera-
tionalizing the measure. Britton et al. (1978, 1979, 1979) used response time to audio clicks. Other methods include response times to lights, signal detection tasks, or even continuous tasks such as tracking (Kerr, 1973). As mentioned, earlier, Tyler et al. (1979) have demonstrated the feasibility and validity of using this technique as a measure of effort used in processing a message. Therefore, the secondary task technique was used in this experiment to measure cognitive effort. For specific details, see the Experimental Method section below.

4.6 MEASUREMENT OF RECALL

Recall of the message is the primary dependent variable in this experiment. The method of measuring recall used in this experiment is free recall of message units. In this method, units are designated a priori and correspond to either individual sentences or phrases that represent a single thought or idea. The subject's recall of these units, including paraphrasing, is then scored against the pre-designated list of message units by independent judges blind to the experimental condition. Any recall protocol that cannot be agreed upon is settled by a third judge (Bransford and Johnson, 1972). There are several advantages to using this type of recall measure over others such as fill-in-the-blank or serial recall. First, the
order in which the units are recalled is not important, only the total number of units is of interest. Second, and most important, free recall permits classification of each unit into either direct recall, paraphrase recall, or intrusions. This would not be possible with the fill-in-the-blank measure. As will be shown below, the ability to make this classification is useful in understanding the nature of the information processing engaged in.

4.7 EXPERIMENTAL METHOD

The actual experiment was carried out in the following manner. Subjects were undergraduate marketing students excluding those who had participated in any earlier phase of the experiment. Subjects were run individually and were scheduled every twenty minutes. Each subject was brought into the testing cubicle and seated in front of the television monitor. They were then instructed verbally about the secondary task. The verbal instructions were as follows: "You are going to see a series of messages on the television screen in front of you. During the period of time that the messages are on the screen and also during the period between the messages when the screen is blank, you will hear a series of irregularly spaced tones over the earphones. Each time you hear a tone, you are to press a button on the panel in front of you. You may use
any button and either hand; which ever is most comfortable for you. Reading the messages is of primary importance, and responding to the tones is of secondary importance. In other words, do not let responding to the tones interfere with your reading. However, it should be possible for you to both read the messages and respond to the tones without any problems. Do you have any questions? If subjects indicated they were not clear about the task, the instructions were repeated, and any specific questions were answered as they arose.

After these instructions were given, each subject was given a sheet of paper containing the response involvement and need for information manipulations. Subjects were assigned randomly to one of eight cells with the only restriction being that no cell have n subjects until all other cells had n-1 subjects. The response involvement and need for information manipulations are shown in Appendix C. After the subject read the manipulation, he or she was again asked if there were any questions. The experimenter then left the room and began the experiment.

Subjects were first given thirty seconds of practice responding to the tones. Then a message was flashed on the screen and remained there for sixty seconds. Then the screen went blank for sixty seconds. This pattern was re-
peated two more times. Subjects in the title condition were exposed to the message title for five seconds before each message. During each sixty second period (both when the message was present and when the screen was blank), twenty-five tones, each seventy milliseconds long, were presented over the earphones. The tones were randomly spaced with a minimum of one and a half seconds and a maximum of three seconds between each tone. Each reaction time was recorded, in milliseconds, by the computer. Messages were always presented in the same order: (1) a luggage carrier, (2) drive on car ramps, and (3) a portable fire extinguisher.

After the last sixty second period, subjects were given the recall instructions and were given five minutes to write down as much of the last message as they could remember. The recall instructions were as follows: "Now we would like you to recall as much as possible of the last message you read. If you cannot remember it word for word, write down as many ideas as you can remember in your own words." Subjects were provided with two sheets of lined paper for their responses. After the recall measure, the subjects completed some other scales, were debriefed, thanked, and dismissed.
Chapter V
RESULTS AND DISCUSSION

This chapter will be broken into three major sections. The first section will examine the results dealing with the recall measures and whether or not they support the hypotheses set forth in Chapter III. The second section will look at the cognitive effort results and the hypotheses dealing with this construct. The third section will then look at the relationship between recall and effort.

A total of one hundred and thirty-one undergraduate marketing students participated in the experiment excluding any who had participated in an earlier phase of the research. However, five subjects had to be dropped from the final analysis. Two were dropped because of equipment malfunctions, and three were dropped because they did not understand the secondary task and therefore responded to the tones only when there was no message on the screen. Thus, one hundred and twenty-six subjects provided recall and effort measures for use in the final analysis.

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5.1 RECALL

This section will start by describing how subjects' message recall protocols were scored. Then the results describing the effects of the independent variables on recall will be discussed in terms of the hypotheses presented in Chapter III.

5.1.1 Determining Recall Scores

Individual recall scores were determined in a manner similar to that used by Bransford and Johnson (1972). The procedure is as follows. The message is broken down into individual idea units that correspond to individual sentences or phrases. For the message used in this experiment, twenty idea units were designated a-priori. Subjects in the title-before condition had one additional unit representing the title. The title was counted as an extra unit for the title-before group because it was an actual message unit that they had the opportunity to recall. While this may appear to create a slight bias in favor of this group having greater recall, an examination of the data revealed that even if one unit were subtracted from every subject's total recall in the title-before condition, the significance of the effects does not change. Each idea unit corresponds to a product attribute or a de-
After idea units were designated, subject protocols were given to two judges who scored them against the list of idea units. The judges worked independently, and were blind as to the experimental conditions of the protocols. Bransford and Johnson (1972) scored their protocols so that only one score representing recall of idea units, including paraphrasing, was arrived at by each judge for each protocol. The scoring procedure used in this experiment resulted in three scores for each protocol from each judge. The first score represents the number of idea units directly recalled. Judges were told that in order for a response to be classified as direct recall, it had to be, in their opinion, an exact replication of the original idea unit. The second score represents paraphrase recall. For this category, any meaning preserving approximation of an idea unit was accepted (Schallert, 1976). The third category is intrusions in the protocol. Judges were instructed to classify any response that, in their opinion, did not fall into the other two categories as intrusions. Intrusions could be items from the previous two messages, items related to the content of the third message but not directly contained in it, or items totally unrelated to the message (Docling and Mullet, 1973). When
the two judges disagreed on the classification of a response, a third judge was consulted. The two judges agreed on 87% of the total response units.

5.1.2 Analysis of the Recall Measures

Two of the three recall scores, direct recall and intrusions, generated for each subject from the above judging procedure served as dependent variables in a 2x2x2 analysis of variance. The third dependent variable was formed by adding the direct recall score and the paraphrase recall scores together to form a total recall score. Paraphrase recall was not analyzed as a separate category since, in most cases, it represented a subset of a subject's total recall that if analyzed separately could produce misleading results. For example, if subject A recalled only three idea units all as paraphrases, his total recall score would be three units. If subject B recalled five units classified as direct and one unit classified as paraphrase, his total recall score would be six units. However, if paraphrased recall were analyzed separately, subject A would appear to have recalled the message better than subject B when in fact he or she did not. Therefore, the dependent variables were direct recall, direct plus paraphrase recall, and intrusions. The independent variables were the three between subjects factors of response
involvement (high and low), need for information (high and low) and title (no-title and title).

No distinction between direct and total recall was made in the hypotheses of Chapter III. The hypotheses are stated only in terms of recall, and therefore should apply equally well to both measures since there is no reason to hypothesize that the independent variables would affect the two measures differently. Therefore, the results for direct recall and total recall will both be examined when each hypothesis is discussed. No specific hypotheses were stated with respect to intrusions because the existing literature is vague as to what should be expected in this area, and they are not the primary concern of the research presently being discussed. Nevertheless, the results are of interest and will be discussed after the hypotheses concerning recall. Analysis of variance summary tables for direct and total recall, and intrusions are shown in Tables 2, 3, and 4 respectively, and the corresponding tables of means are shown in Tables 5, 6, and 7.

5.1.2.1 Hypothesis 1

Hypothesis 1 states that there will be no main effect of response involvement on recall. The rationale for this hypothesis, as stated in Chapter III, was that the effects
### TABLE 2

**Anova Table For Direct Recall**

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>D.F.</th>
<th>F</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response Involvement (R)</td>
<td>8.50</td>
<td>1</td>
<td>3.81</td>
<td>0.053</td>
</tr>
<tr>
<td>Need for Information (N)</td>
<td>2.54</td>
<td>1</td>
<td>1.41</td>
<td>0.289</td>
</tr>
<tr>
<td>Title (T)</td>
<td>72.55</td>
<td>1</td>
<td>32.51</td>
<td>0.000</td>
</tr>
<tr>
<td>R x N</td>
<td>1.26</td>
<td>1</td>
<td>0.57</td>
<td>0.453</td>
</tr>
<tr>
<td>R x T</td>
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<td>1</td>
<td>0.28</td>
<td>0.613</td>
</tr>
<tr>
<td>N x T</td>
<td>3.36</td>
<td>1</td>
<td>1.50</td>
<td>0.223</td>
</tr>
<tr>
<td>R x N x T</td>
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<td>1</td>
<td>0.09</td>
<td>0.758</td>
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<td>Residual</td>
<td>263.37</td>
<td>118</td>
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<td></td>
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</tbody>
</table>
### TABLE 3

Anova Table For Total Recall

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<thead>
<tr>
<th>Source</th>
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<th>D.F.</th>
<th>F</th>
<th>P-VALUE</th>
</tr>
</thead>
<tbody>
<tr>
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<td>17.21</td>
<td>1</td>
<td>3.54</td>
<td>0.062</td>
</tr>
<tr>
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<td>1</td>
<td>0.07</td>
<td>0.799</td>
</tr>
<tr>
<td>Title (T)</td>
<td>331.85</td>
<td>1</td>
<td>68.26</td>
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</tr>
<tr>
<td>R x N</td>
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<td>1</td>
<td>2.15</td>
<td>0.145</td>
</tr>
<tr>
<td>R x T</td>
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<td>1</td>
<td>0.03</td>
<td>0.872</td>
</tr>
<tr>
<td>N x T</td>
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<td>1</td>
<td>2.56</td>
<td>0.112</td>
</tr>
<tr>
<td>R x N x T</td>
<td>0.98</td>
<td>1</td>
<td>0.201</td>
<td>0.654</td>
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<tr>
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<td>F</td>
<td>P-VALUE</td>
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<td>----------------</td>
<td>------</td>
<td>------</td>
<td>---------</td>
</tr>
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<td>Title (T)</td>
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<td>1</td>
<td>0.15</td>
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</tr>
<tr>
<td>$R \times T$</td>
<td>0.02</td>
<td>1</td>
<td>0.02</td>
<td>0.898</td>
</tr>
<tr>
<td>$N \times T$</td>
<td>0.75</td>
<td>1</td>
<td>0.654</td>
<td>0.420</td>
</tr>
<tr>
<td>$R \times N \times T$</td>
<td>0.00</td>
<td>1</td>
<td>0.00</td>
<td>0.954</td>
</tr>
<tr>
<td>Residual</td>
<td>135.89</td>
<td>118</td>
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</tbody>
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**TABLE 5**

Table of Means For Direct Recall

<table>
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<tr>
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<th></th>
<th>Title</th>
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<td>N(Low)</td>
<td>N(High)</td>
<td>N(Low)</td>
<td>N(High)</td>
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<tr>
<td><strong>R (Low)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.44</td>
<td>0.75</td>
<td>2.50</td>
<td>2.00</td>
</tr>
<tr>
<td></td>
<td>(16)</td>
<td>(16)</td>
<td>(16)</td>
<td>(17)</td>
</tr>
<tr>
<td><strong>R (High)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.38</td>
<td>1.13</td>
<td>3.00</td>
<td>2.27</td>
</tr>
<tr>
<td></td>
<td>(16)</td>
<td>(16)</td>
<td>(14)</td>
<td>(15)</td>
</tr>
</tbody>
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TABLE 6
Table of Means For Total Recall

<table>
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<tr>
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<th>N(High)</th>
<th></th>
<th>N(Low)</th>
<th>N(High)</th>
</tr>
</thead>
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<td></td>
<td>Title</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R (Low)</td>
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</tr>
<tr>
<td></td>
<td>(16)</td>
<td>(16)</td>
<td></td>
<td>(16)</td>
<td>(17)</td>
</tr>
<tr>
<td>R (High)</td>
<td>4.38</td>
<td>4.13</td>
<td></td>
<td>8.14</td>
<td>7.00</td>
</tr>
<tr>
<td></td>
<td>(16)</td>
<td>(16)</td>
<td></td>
<td>(14)</td>
<td>(15)</td>
</tr>
</tbody>
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TABLE 7
Table of Means For Intrusions

<table>
<thead>
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<th>No-Title</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N(Low)</td>
<td>N(High)</td>
</tr>
<tr>
<td>R(Low)</td>
<td>1.38</td>
<td>1.38</td>
</tr>
<tr>
<td></td>
<td>(16)</td>
<td>(16)</td>
</tr>
<tr>
<td>R(High)</td>
<td>1.25</td>
<td>1.38</td>
</tr>
<tr>
<td></td>
<td>(16)</td>
<td>(16)</td>
</tr>
</tbody>
</table>
of response involvement on recall were due to the subject's need for information about the topic, and when this need is controlled for, response involvement should have no effect.

Whether or not this hypothesis is supported depends on the alpha level chosen. If the .05 level is chosen, then the hypothesis is supported. However, for direct recall, the main effect was significant at the $p=.053$ level, and for total recall, it was significant at the $p=.062$ level (see Tables 2 and 3). Therefore, while technically the hypothesis is supported, the discussion must be tempered by the fact that the effect was very nearly statistically significant at the .05 level, and in each case, subjects in the high involvement condition had higher mean recall scores. Using the direct recall scores, the response involvement treatment accounts for 1.11 of the variance, but this cannot be compared with Zimbardo (1960) or Wright (1971) since neither provides enough information to calculate effect size for their manipulations of response involvement.

5.1.2.2 Hypothesis 2

Hypothesis 2 stated that there would be a main effect of need for information with subjects in the high need
condition having higher recall scores than subjects in the low need condition. This hypothesis is not supported. For direct recall and total recall, the main effects do not approach statistical significance (p>-.25). (See Tables 2 and 3.)

The pretest check of the manipulation of need for information showed that it was effective in producing significant differences in the stated amount of need the subjects had for the information contained in the messages. However, a possible explanation for the failure of the effect to reach significance may be in information obtained from debriefing subjects after the experiment. Subjects in the low need for information condition frequently said that while they believed that the information contained in the message was not necessary to perform the evaluation, they still wanted to read it as long as it was available. They felt that as long as they were going to perform a product evaluation, they might as well gather all the information possible, and judge for themselves what was needed to perform the task. It must be kept in mind that the exact nature of the evaluation task to be performed was not described to the subjects. In other words, subjects in the low need condition would have felt comfortable performing the evaluation without the message if they had to, but since it was available, they would judge for
themselves how much they needed it to perform the evaluation.

In effect, the manipulation of need for information may not have been effective in producing a statistically significant reduction in processing in the low need condition. This could have produced a floor effect in which subjects in the low need condition felt that regardless of the nature of the evaluation to be performed and regardless of how well others performed the evaluation without the message, as long as the information was available, they wanted to read it. Thus, under these circumstances, the low need condition may not differ significantly from the high need condition.

5.1.2.3 Hypothesis 3

The third hypothesis stated that there would be a main effect of the meaningfulness manipulation (i.e., title versus no-title) with higher recall scores in the high meaning (title) condition. This hypothesis is clearly supported by both recall measures. In both cases, subjects in the title condition had higher recall scores, and the effect is significant at \( p < .001 \) for both direct and total recall (see Tables 2 and 3). For direct recall, the meaningfulness treatment accounted for 19.6% of the variance.
This cannot be directly compared to Britton et al.'s treatment effect since they used a fill-in-the-blank measure of recall and free recall of message units was used here.

This indicates that when a meaning enhancing title is present, recall of a message is significantly enhanced. As stated in Chapter III, several researchers (Fransford and Johnson, 1972; Britton et al., 1979; and Dooling and Lachman, 1971) have demonstrated this effect. Thus, the effect was expected here, and its presence serves to verify that the meaningfulness manipulation was effective in this experiment.

5.1.2.4 Hypothesis 4

Hypothesis 4 stated that there would be a two-way interaction between need for information and meaningfulness. This hypothesis was not supported for either recall measure. As can be seen in Tables 2 and 3, the interaction is not significant ($p>0.10$) for either measure. Therefore, the hypothesized simple main effects were not examined.

The rationale for this hypothesis, as stated in Chapter III, was that subjects in the high need condition would be more aroused than subjects in the low need condition, and therefore activate more knowledge to form associations.
with the message. Since more associations can be formed with a message high in meaningfulness than one low in meaningfulness, there should be a significant interaction between need and meaningfulness.

One possible explanation for the failure of this interaction to attain statistical significance may be similar to that for the failure of the main effect of need for information to reach significance. That is, subjects in both the high and low need conditions processed the message with equal intensity. As stated earlier, subjects in the low need condition were willing to take advantage of the fact that the information was available and process it whether or not they needed it to perform the evaluation task. Thus, they may have formed just as many associations with the message as subjects in the high need condition did within each meaningfulness condition. This would eliminate the possibility of any interaction since the mean recall scores for low and high need would be essentially the same within a meaningfulness condition, which was what was found.

5.1.2.5 Hypothesis 5

No other two-way interactions, nor the three-way interaction were significant, and as can be seen in Tables 2 and 3, none were significant at the .10 level.
5.1.3 Intrusions

As stated earlier, no hypotheses were developed with respect to intrusions in the recall protocols. The only effect on intrusions to reach statistical significance (p<.001) was the main effect for title (see Table 4). Subjects in the no-title (i.e., low meaningfulness) condition had more intrusions than subjects in the title (i.e., high meaningfulness) condition.

This effect seems quite logical. Subjects in the high meaning condition should activate more knowledge relevant to the message because of the presence of the title. In turn, they should form more associations with the message, and therefore they should be able to comprehend the message better than subjects in the low meaning condition. Furthermore, if the main theme provided by the title serves as the retrieval guide, associations irrelevant to the theme (i.e., intrusions) are not likely to be recalled (Alba and Hasher, 1983). Conversely, in the low meaning condition, subjects may activate knowledge that does not pertain to the message at all. They may activate as much, or even more, knowledge than subjects in the high meaning condition. However, this knowledge may be largely irrelevant and not allow them to make sense of the message. Thus, subjects in the high meaning condition activate
knowledge that helps them process the message and reduce the amount of irrelevant information activated. Subjects in the low meaning condition would not be able to process the message as well, and would retain more irrelevant information when asked to recall the message. In other words, the title provides a theme for the message which guides one's processing and increases the amount of the message recalled but decreases the amount of irrelevant information recalled. Therefore, it seems logical that subjects in the high meaning condition should have significantly fewer intrusions than subjects in the low meaning condition.

It should be pointed out that when total thoughts (i.e., direct plus paraphrase plus intrusions) are analyzed, the inclusion of intrusions does not eliminate the effect of the meaningfulness manipulation on recall. Even though subjects in the low meaning condition had significantly more intrusions than the high meaning condition, they were not enough to reverse the overall effect of the title manipulation (p<.001).
5.2 COGNITIVE EFFORT

Chapter III states that the independent variables were expected to have the same effect on cognitive effort used to process the message as they did on message recall (see Hypothesis 6). This was expected because a direct, or at least a monotonically nondecreasing, relationship between effort and recall should exist (Norman and Bobrow, 1975). Therefore, each hypothesis will again be examined with respect to the cognitive effort measure.

5.2.1 Determining Cognitive Effort Scores

Before discussing the hypotheses, it is necessary to discuss how the cognitive effort scores were determined. As described in the method chapter, cognitive effort was measured using the secondary task technique. Subjects were exposed to a message for one minute and then a blank screen for one minute, and the sequence was repeated two more times with a different message each time. During each one minute period while there was a message on the screen, and while it was blank, twenty-five reaction time measurements were obtained. The messages were always presented in the same order, with the message of interest always being third (i.e., the one for which recall was measured). Thus, analyzing the reaction times for only the
third message results in a three between-subjects and one within-subjects factor design. The within-subjects factor results from the fact that all subjects, regardless of the levels of the between-subjects factors, saw the message followed by a blank screen, and during both periods reaction times were measured.

The first three reaction times from both periods were dropped from the analysis for all subjects. This was because in going from a blank screen to a message, which occurred almost instantaneously, subjects would frequently disregard the secondary task and either respond abnormally slowly or fail to respond altogether to the tones. This is because subjects were refocusing their attention on the screen, and therefore their reaction times during this brief period are not indicative of the effort being used to process the message but instead reflect the reorientation of attention that occurred during the transition. Table 8 contains a summary of a t-test on the mean of the first three reaction times versus the mean of the remaining twenty-two. As can be seen from this table, the means of the first three are significantly \((p<.05)\) higher than the other twenty-two.

In going from a message to a blank screen, which did occur instantaneously, subjects would still respond to the
first few probes at the same rate as they were when they were processing the message. An explanation for this is the likelihood that even though they were no longer reading the message, they may still have been processing it. That is, they were still forming, or attempting to form, associations between the message content and their own knowledge. Therefore, the first few probes would again not be indicative of the reaction times that would occur when no processing was going on. Table 8 shows that the mean of the first three reaction times is significantly (p<.001) higher than the remaining twenty-two. Thus, the mean of the last twenty-two reaction times in each screen condition was used as an indicator of cognitive effort.
TABLE 8

Reaction Time Means

<table>
<thead>
<tr>
<th>Condition</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Diff.</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
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<td><strong>Message on Screen</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First 3 RT's</td>
<td>0.493</td>
<td>0.191</td>
<td>0.0249</td>
<td>0.03</td>
</tr>
<tr>
<td>Last 22 RT's</td>
<td>0.468</td>
<td>0.171</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Blank Screen</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First 3 RT's</td>
<td>0.435</td>
<td>0.162</td>
<td>0.0647</td>
<td>0.00</td>
</tr>
<tr>
<td>Last 22 RT's</td>
<td>0.370</td>
<td>0.108</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5.2.2 Hypothesis 1

In accordance with Hypothesis 1, response involvement was not expected to have any effect on the reaction time measure. As can be seen in Table 9, this hypothesis is supported. The main effect of involvement is not significant (p=0.49), nor is there any interaction (p=0.36) with the within-subjects variable (i.e., blank screen versus message on the screen). Therefore, as predicted, response involvement has no effect on effort.

5.2.3 Hypothesis 2

The second hypothesis states that need for information should have a main effect on reaction time with greater need producing slower reaction times. From Table 9, it is readily apparent that this hypothesis is not supported. Neither the main effect (p=0.49) nor the interaction with the within-subjects factor (p=0.34) is significant.

The explanation for this lack of an effect would be the same as that for the lack of an effect on the recall measure. If subjects were motivated to form the same number of associations with the message regardless of the need condition, then there would be no difference in the utili-
<table>
<thead>
<tr>
<th>SOURCE</th>
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<th>D.F.</th>
<th>F</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
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<td>0.46</td>
<td>0.497</td>
</tr>
<tr>
<td>Need for Information (N)</td>
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<td>0.47</td>
<td>0.493</td>
</tr>
<tr>
<td>Title (T)</td>
<td>0.025</td>
<td>1</td>
<td>0.77</td>
<td>0.383</td>
</tr>
<tr>
<td>R x N</td>
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<td>0.75</td>
<td>0.387</td>
</tr>
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<td>R x T</td>
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<td>1</td>
<td>0.35</td>
<td>0.554</td>
</tr>
<tr>
<td>N x T</td>
<td>0.011</td>
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<td>0.34</td>
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<tr>
<td>R x N x T</td>
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<td>0.246</td>
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<td>0.343</td>
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<td>0.39</td>
<td>0.565</td>
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<tr>
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<td>0.033</td>
</tr>
<tr>
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<td>0.221</td>
</tr>
<tr>
<td>Residual</td>
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</table>
zation of processing capacity between the two conditions, and hence no difference in reaction times. The motivation for subjects in the low need condition to form large numbers of associations with the message was discussed in the recall section.

5.2.4 Hypothesis 3

Hypothesis 3 states that there should be a main effect of the meaningfulness manipulation on cognitive effort with the high meaningful condition requiring more effort than the low meaningful condition. The hypothesis is not supported based on the results shown in Table 9. The main effect is not significant (F=0.38), nor is the interaction with the within-subjects factor (F=0.53). This hypothesis was supported for the recall measure.

The rationale for this hypothesis was set forth in Chapter III. There it was shown that the presence or absence of a meaning enhancing title had a significant effect on reaction times. Furthermore, the reaction times were slower when the title was present than when it was not present (Britton et al., 1979). A similar effect was expected here. Specifically, more associations should have been formed in the title condition than in the no-title condition, which in turn would lead to both slower
reaction times and greater recall than would occur in the no-title condition.

No such effect was obtained for the reaction time measure even though one was obtained for the recall measure. The failure to find a reaction time effect could be due to low statistical power. However, in this experiment, the power is reasonably high. Based on the effect size reported by Britton et al. (1979), there was approximately a 70% chance of detecting an effect the size of theirs at the .05 level, and approximately an 80% chance at the .10 level in this experiment (Cohen, 1977).

Pretest results showed that the number of thoughts subjects had differed significantly (p<.001) with more thoughts being generated in the title condition than the no-title condition. Therefore, it is unlikely that the number of associations were the same in both conditions, especially since the effect was as predicted for the recall measures. Furthermore, as stated earlier, even when all associations (i.e., total recall plus intrusions) are analyzed, the effect is still significant with the high meaning condition producing more associations.

One possible explanation for the lack of an effect on reaction times is as follows. Subjects in the low meaning condition may indeed have had relatively fast reaction
times because they were not forming many associations with the message and therefore had plenty of spare capacity to respond to the secondary task. However, subjects in the high meaning condition may have found the message so easy to comprehend that their spare processing capacity was sufficient to permit them to respond at an equivalent speed, and their reaction times therefore remained at the level of subjects in the low meaning condition.

An equally plausible alternative explanation is that the reaction times of the subjects in the low meaning condition may have been as slow as those in the high meaning condition. Specifically, subjects in the high meaning condition may indeed have been using all of their processing capacity to read the message and thus have had very little left over to respond to the secondary task. This would be reflected in slow (i.e. longer) reaction times. However, subjects in the low meaning condition may also have been utilizing all of their processing capacity trying to form associations with numerous pieces of knowledge so that their reaction times were as long as those in the high meaning condition.

In other words, breakdowns in comprehension may not continually empty the central processor as Brinton et al. (1979) speculate, but instead may cause it to be full of
numerous schemata to which the subject is trying to match the message. The fact that the activated schemata do not necessarily allow increased comprehension does not mean they are discarded. Presumably, they were activated by some cue in the message, and, as discussed in Chapter II, until another cue is encountered that activates different schemata, no change will occur. Such an explanation would be consistent with the fact that a main effect for title on intrusions was found in the recall protocols with subjects in the low meaning condition having more intrusions. This could be because no-title subjects activated several different schemata to process the message which would show up in the results of this experiment as: (1) longer reaction times because the processing capacity is full, (2) poorer recall because of the fewer associations made with the message, and (3) more intrusions because of the different schemata that were activated.

5.2.5 Hypothesis 4

Hypothesis 4 states that there should be an interaction between the need for information and title condition. It goes on to state that the difference in reaction times between title and no-title should be larger in the high need condition than in the low need condition. This hypothesis is partially supported in that the interaction is
statistically significant, but the simple main effects are not as predicted. The three-way interaction between need, title, and the within-subjects factor was statistically significant ($p=0.033$) (see Table 9). Figure 3 shows a graph of this interaction with need for information on the x-axis and reaction time on the y-axis. The left hand graph in Figure 3A is when the screen is blank, and the right hand side is when the message is on the screen. Since the effect of the independent variables is only of interest when there is a message on the screen, the graph on the right hand side of Figure 3A is the one of interest. This graph shows that in the no-title condition, the reaction times were slow regardless of the need for information condition ($0.488$ ms. in low need and $0.476$ ms. in high need). However, in the title condition, the average reaction time in the low need condition was faster ($0.421$ ms.) than in the high need condition ($0.488$ ms.). The right hand side of Figure 3B shows this graph replotted with the title condition on the x-axis. This graph shows that in the high need condition, the mean reaction time remains high regardless of the title condition ($0.476$ ms. in the no-title condition and $0.488$ ms. in the title condition). However, in the low need condition, the reaction time drops when a title is present ($0.488$ ms. in the no-title condition and $0.421$ ms. in the title condition).
Figure 3: Interaction Between Need and Meaningfulness

Figure 3A - Three way interaction with need for information on the X-axis

Figure 3B - Three way interaction with title on the X-axis
An analysis of variance using the differences in reaction times between the message and blank screen condition as the dependent variable was performed. This analysis eliminates the within subjects factor, and it tests whether or not the just discussed interaction remains statistically significant based only on the between-subjects factors. The results of this analysis are shown in Table 10.

The interaction between need for information and title is again significant \((p=0.036)\) and accounts for 2.7% of the variance. A graph of this interaction is shown in Figure 4A with need for information plotted on the x-axis and the difference in mean reaction time plotted on the y-axis. Figure 4B shows the interaction replotted with the title condition on the x-axis.

In order to more fully analyze the nature of this interaction, simple main effects were examined. In Figure 4A, within the low need condition, the mean square for the title effect is 0.069 and the F ratio for the simple main effect of title is \(0.069/0.018=3.83\), \(p<.10\). In the high need condition, the mean square for the title effect is 0.019, and the F ratio is \(0.019/0.018=1.055\), which is not significant. In Figure 4B, in the no-title condition, the mean square for the need effect is 0.013 and the F ratio is \(0.013/0.018=0.722\), which is not significant. In the title condition, the mean square is 0.082, and the F ratio is \(0.082/0.018=4.555\), \(p<.05\).
<table>
<thead>
<tr>
<th>SOURCE</th>
<th>SUM OF SQUARES</th>
<th>D.F.</th>
<th>F</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response Involvement (R)</td>
<td>0.02</td>
<td>1</td>
<td>0.84</td>
<td>0.361</td>
</tr>
<tr>
<td>Need for Information (N)</td>
<td>0.01</td>
<td>1</td>
<td>0.77</td>
<td>0.383</td>
</tr>
<tr>
<td>Title (T)</td>
<td>0.01</td>
<td>1</td>
<td>0.37</td>
<td>0.543</td>
</tr>
<tr>
<td>R x N</td>
<td>0.00</td>
<td>1</td>
<td>0.04</td>
<td>0.851</td>
</tr>
<tr>
<td>R x T</td>
<td>0.01</td>
<td>1</td>
<td>0.31</td>
<td>0.581</td>
</tr>
<tr>
<td>N x T</td>
<td>0.08</td>
<td>1</td>
<td>4.49</td>
<td>0.036</td>
</tr>
<tr>
<td>R x N x T</td>
<td>0.03</td>
<td>1</td>
<td>1.52</td>
<td>0.220</td>
</tr>
<tr>
<td>Residual</td>
<td>2.146</td>
<td>118</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 4: Interaction Using Differences

Figure 4A - Two way interaction with need for information on the X-axis

Figure 4B - Two way interaction with title on the X-axis
The simple main effect of title was expected to be larger in the high need condition than in the low need condition. The results turned out to show exactly the opposite effects. The simple main effect of title in the high need condition was not significant, but it approached significance (p<.10) in the low need condition. A speculative explanation for this finding has already been discussed in dealing with the lack of a main effect of title on reaction time. Specifically, if subjects in the low meaning condition kept their processing capacity full by activating several schemata instead of just the one suggested by the title (which they did not see), then their reaction times could be expected to be slow (i.e., a large difference between blank screen and message on the screen conditions). These various schemata were presumably activated because the subjects felt a need to make some minimum amount of sense out of the message by matching it with an activated schemata. Furthermore, this need to match the message with some activated schema may override the fact that the information is not needed, in the low need condition, to perform the evaluation. The need to make sense of the message may keep effort high regardless of the need for information manipulation.

If the interaction is replotted as in Figure 4B, the effects of the independent variables on reaction times ob-
tained in this research become clearer. Within the no-title condition, the reaction time differences in the two need conditions do not differ significantly. In the title condition, however, the simple main effect is significant with high need producing greater differences than low need. This says that subjects' effort is kept high in the high need condition regardless of the title condition, but in the low need condition their effort drops in going from low to high meaning. Thus, it appears that a high need for information keeps effort at a high level whether or not the message is meaningful. In the low need, low meaning condition, subjects are using effort to make sense of the message (i.e., find a schema that it fits into) so that effort is high, but when the meaning is high, their effort drops way down because: (1) they no longer have to expend effort to grasp the meaning of the message, and (2) the information to perform the evaluation task.

In summary, regardless of the relative need for information, subjects attempted to find some meaning in the low meaning condition. This could be because of an innate need to make some minimum amount of sense out of any stimuli encountered. On the other hand, it could have resulted from some demand artifact created by the experimental setting. For example, the fact that subjects knew
they were in an experiment may have been sufficient to induce them to try to make some sense out of a low meaning message which they otherwise may not have devoted much effort to processing. In the high meaning condition, subjects could easily get at least some minimum level of understanding, and unless motivated to thoroughly understand the message (as in the high need for information condition), they would not expend much effort processing the message.

5.2.6 Hypothesis 5

Hypothesis 5 stated that no other interactions would be significant. As can be seen in Table 9, this hypothesis is supported since no other interactions were significant.

5.3 The Relationship Between Recall and Effort

One of the basic assumptions of using the secondary task technique as a measure of effort is that processing capacity is limited. Furthermore, it is assumed that the primary task takes up enough capacity so that there is not enough spare capacity to perform a secondary task without downgrading performance on the secondary task. Algebraically, let L be the limit on the processing capacity, let Cp be the capacity required to perform the primary task,
then $L - C_p < Cs$ where $Cs$ is the capacity required to perform the secondary task. Thus, performance on the secondary task can be used to make inferences about the amount of processing capacity allocated to the primary task. Of course, this also assumes that the secondary task is of such a nature that it cannot be performed at a high level while also maintaining a high level of performance on the primary task (i.e., $Cs + C_p > L$). Based on the work of Brinton et al. (1979) and others reviewed earlier, the tone detection task appears to be a suitable secondary task to measure the effort required by the primary task.

A performance-resource graph (Norman and Echrow, 1975) can be drawn to show the relationship of recall and effort obtained in this research. Since only the interaction between seed and title had a significant effect on reaction times, the data will be collapsed across involvement conditions. This is compatible with the hypothesis that response involvement would have no effect on resource allocation (see Figure 2). The resulting four recall-reaction time combinations are shown in Table 11. As stated earlier, to develop the performance-resource graph, it is first necessary to graph the performance-operating characteristics of the two tasks. Recall performance is measured by the number of units recalled, and performance on the secondary task is measured as speed of responding to
the click (i.e. 1/reaction time). This graph appears in the top of Figure 5. An interpretation of this graph is as follows. The greater the speed of responding to the secondary task (i.e. the shorter the reaction time), the more effort is available to respond to the secondary task and the less is devoted to the primary task.

In order to examine the relationship between effort and recall, the performance-resource graph in the bottom of Figure 5 is developed by plotting recall scores against effort based on the relationships shown in the performance-operating graph. This graph shows that the title present conditions have the highest recall and also require the least amount of effort. Within the title present condition, low need uses less effort but has greater recall than high need. In the no-title condition, recall is low but effort is high. Within this condition, high need has greater recall and uses less effort than low need.

This graph is exactly the opposite of that shown in Figure 2. There it was hypothesized that messages low in meaningfulness would use less effort than messages that were high in meaningfulness. This hypothesis was based on Britton et al.'s. counterintuitive finding discussed in preceding chapters. The results obtained in this research
do not support those obtained by Britton. However, the results obtained here are in line with Kahneman's (1973) statement that easier tasks require less effort than difficult ones. In this research, the passages that were high in meaningfulness and therefore easy to understand used less effort than passages that were low in meaningfulness.

There is a relatively straightforward explanation for this finding that has already been discussed briefly elsewhere. Messages that are high in meaningfulness have the central theme provided by the title. The title activates a schema to which subjects can match the incoming material. This allows subjects to easily grasp the meaning of the message, and therefore the effort used to process such messages should be low and recall should be high. When the subjects do not have the title to allow them to understand the message, they will activate various schemata based on cues in the message to try to make sense of it. Attempts to match the incoming message with various schemata will occupy a large amount of processing capacity and therefore effort will be high. However, since none of the activated schemata necessarily allow increased understanding of the message, recall will be low. Additional support for this explanation is provided by the fact that subjects in the no-title condition had significantly more
intrusions than subjects in the title condition. This increased number of intrusions could have been caused by the numerous schemata that were activated in attempts to make sense of the message.

As an explanation for their counterintuitive findings, Britton et al. proposed the possibility that subjects in the title condition had more associations which occupied more capacity and therefore they had slower reaction times than subjects in the no-title condition. They did not test this explanation. In this research, the message was pretested and found to elicit significantly more thoughts in the title condition than the no-title condition. Therefore, it seems reasonable to expect that subjects in the title condition of the experiment also had more thoughts. The reason for their faster reaction times and better recall is that their thoughts were all about one theme provided by the title rather than the several possible themes provided by the various schemata, none of which necessarily allow comprehension of the message. Thus, processing a message that is high in meaningfulness and therefore easier to understand takes less effort than one that is low in meaningfulness when people are actively trying to comprehend a message based on the results obtained here. This is intuitively more appealing and more
TABLE II
Recall-Reaction Time Combinations

<table>
<thead>
<tr>
<th>NEED FOR INFORMATION</th>
<th>TITLE</th>
<th>TOTAL RECALL</th>
<th>REACTION TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>No Title</td>
<td>3.66</td>
<td>.48 ms</td>
</tr>
<tr>
<td>Low</td>
<td>Title</td>
<td>7.50</td>
<td>.43 ms</td>
</tr>
<tr>
<td>High</td>
<td>No Title</td>
<td>4.16</td>
<td>.48 ms</td>
</tr>
<tr>
<td>High</td>
<td>Title</td>
<td>6.78</td>
<td>.48 ms</td>
</tr>
</tbody>
</table>
Figure 5: Performance Resource Results

PERFORMANCE-OPERATING GRAPH

PERFORMANCE-RESOURCE GRAPH

COGNITIVE EFFORT
in line with the conceptualization of cognitive effort than the results of Britton et al.

An anomaly regarding the effects of need for information is present in the no-title condition. In this condition, low need requires more effort than high need. However, an inspection of Table 11 will reveal that the reaction times for both conditions are the same which means the secondary task is operating in a data limited region. Therefore, the ordering of the conditions is based on the recall scores and the performance-operating graph.
Chapter VI
SUMMARY AND CONCLUSIONS

The objective of this research was to test the relationships among need for information, response involvement, meaningfulness, cognitive effort, and recall proposed Chapter III. To this end, an experiment was conducted in which these constructs were manipulated and the required measures obtained. What follows is a summary of the results and their implications, and directions for future research.

6.1 SUMMARY OF RESULTS

Overall, the support for the proposed relationships is mixed. For the recall hypotheses, two of the four hypotheses were supported. The hypothesis of no effect of response involvement on recall was supported, as was the hypothesis of a main effect of meaningfulness on recall. The hypotheses of an effect of need for information and a significant interaction between need and meaningfulness were not supported. Possible explanations for the lack of hypothesized effects were discussed in Chapter V.

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For the cognitive effort measure, none of the four hypotheses were supported. A statistically significant interaction between need and meaningfulness was obtained, but the simple main effects were not as predicted. The predictions about the simple main effects were based largely on the counterintuitive findings of Britton et al. (1979) in which they found that messages low in meaningfulness required less effort to process than did messages high in meaningfulness. This finding was not replicated in this research in that (1) there was no significant difference between high and low meaningfulness conditions with regard to the amount of effort used to process the messages (i.e., no main effect for title), and (2) in the significant interaction between need and meaningfulness, the low meaningful condition used more effort.

In retrospect, the results obtained here are more intuitively appealing and as supportable as those of Britton et al. (1979). The fact that a significant effect of meaningfulness was obtained for recall but not for effort can be explained as follows. Subjects in the high meaningful condition were given a title to the message around which they could organize their thoughts and make sense of the message. Thus, they would demonstrate better recall of the message than subjects in the low meaningful condition. However, subjects in the low meaningful condition may have
activated several schemata to try to make sense of the message, and these schemata kept their processing capacity as full as those in the high meaning condition. Thus, there would be no difference in spare capacity between the conditions, and therefore no difference in reaction times. As stated earlier, further support for this explanation was obtained in this research in the fact that the low meaning subjects had significantly more intrusions than the high meaning subjects. This may be taken as evidence of several schemata being activated instead of just the one provided by the title.

The nature of the interaction between need and meaningfulness on effort obtained here is also more appealing than what would be expected based on Britton's work. In effect, it says that subjects have an innate need to make sense of a message, and until this need is satisfied, their effort will remain at a high level regardless of whether or not the information is required to perform a task. However, when the need to make sense of the message is satisfied, such as when the message is high in meaningfulness, the effort used to process the message is determined by their need for the information, with low need resulting in less effort.
The need for subjects to make sense of the message regardless of their need for information condition may have been heightened by the experimental setting. Several aspects of the experiment could have caused this. First, subjects in both need conditions knew they were going to have to perform an evaluation. Furthermore, they were going to be exposed to the messages whether they were needed or not. As stated earlier, these two features of the procedure could have combined to produce relatively high need for the information in both conditions, and thus eliminate the possibility of an effect of the need for information manipulation. Evidence of this was provided earlier when it was stated that subjects often said that they wanted to read, and presumably comprehend, the message regardless of the need manipulation.

In addition, the laboratory setting itself may have induced a heightened need for information in the subjects. It is undoubtedly unusual for an individual to read excerpts from Consumer Reports on a television screen while pushing a button in response to tones over the earphones. Thus, when they encounter a message that does not immediately make sense to them, they may feel compelled to try to make sense of the message regardless of their need condition. This compulsion may result from the unusual circumstances and/or the subject's general skepticism re-
garding the experiment. Outside of the laboratory setting, if subjects encounter a message they cannot comprehend, the effort they use to process the message may be governed by how much they need the information in the message. If they do not need it, they will use little effort, and if they do need it, they will use more effort. It seems unlikely that in natural settings, subjects would strive to comprehend every message they encounter if they do not have a high need for the information in the message.

6.2 THEORETICAL IMPLICATIONS

Two aspects of the experiment carried out above have interesting theoretical implications. First, the pretest results showed that an individual's need for information could be manipulated independently of his level of response involvement. Second, the results obtained here do not support those of Britton et al. in which they found that high meaning messages required more effort than low meaning messages.

The results of the pretests of the need for information and response involvement manipulations showed that the two are separate constructs. Both pretests showed that the levels of the two constructs could be varied orthogonally.
Thus, an individual can have high need for information about a topic even when the response to be made is not important to him. Similarly, the individual may have low need for information about the topic even when the response involving the topic is quite important to him. This implies that one cannot assume that an individual that is highly involved with a given topic because it will help him achieve some reward will automatically have a high need for information about the topic and vice versa. Thus, information search and/or information acquisition are not necessarily implied by high levels of response involvement. The contention that need for information is a mediator of the effects of response involvement on processing capacity and recall could not be tested in this research since in the actual experiment, neither manipulation produced a statistically significant main effect.

The fact that the results obtained here do not agree with those of Britton et al. is also important from a theoretical standpoint. Britton et al.’s. major finding was that high meaning messages (title present) required more cognitive effort to process than low meaning messages (no title present). The results obtained here showed no effect of meaningfulness on effort, although one was obtained for recall. This could imply that the two experi-
ments were carried out at different levels of the cognitive effort continuum due to differences in the messages.

Britton et al.'s. messages may have been such that in the low meaning condition, subjects may not have been able to activate any schema to even attempt a match with the message. In other words, the messages may have been so impoverished that any attempt to grasp their meaning would not be supported. This would imply that virtually no associations would be formed (Alba and Hasher, 1983). Britton et al. speculate that this is the case, but they did not measure the number of associations formed. In the experiment carried out here, the number of associations was measured and found to be significantly higher in the high meaning condition than in the low meaning condition. However, the average number of associations formed in the low meaning condition was significantly greater than zero for each of the three messages. This could indicate that the subjects were activating various schemata to try to match with the message. These differences in the messages may account for the fact that Britton et al. found an effect of meaningfulness on effort and none was found in this research. In other words, when the number of associations being formed is virtually zero, as may have been the case in Britton et al.'s. study, the cognitive effort is indeed low, but when the number of associations is significantly different from zero, effort may not be low.
This would not only account for the differences between the two experiments, but might also account for the lack of an effect on effort in this research. Specifically, when the messages allow some schemata to be activated (i.e. they are not totally metaphorical in nature and do provide some concrete referents), effort is being used to form associations in both the high and low meaning conditions, so effort will not differ between the two. That is, effort will be high in the title condition because of the large numbers of associations being formed, and it will be high in the no-title condition because of the numerous schemata that are activated in an attempt to understand the message. However, in the low meaning condition, the number of associations formed is not sufficient to enhance recall, so an effect of meaningfulness would still be obtained for recall even though there was no effect on effort, as was the case in this research.

6.3 IMPLICATIONS FOR MARKETING

The results obtained here have several practical implications for marketers. First, they clearly show that recall of a message is significantly enhanced if a relevant title is presented at the beginning of the message. This says that if the goal of a communication is to have the audience retain the information presented in the message,
then the communication should be designed so that it tells what it is about immediately. This can be done by placing the product category or brand name at the beginning of the message to attract attention followed by a lead in sentence telling what the message is about. Messages that do not state what they are about at the beginning, either through the use of a title, picture, or introductory material, run the risk of either having subjects activate irrelevant knowledge in an attempt to process the message and perhaps misidentify the product, or having subjects disregard the message altogether.

Of course, two other factors must be considered. First, repetition of messages may eventually allow subjects to comprehend a message that was not clear the first time. Jacoby, Bartz, and Evans (1978) found a significant interaction between repetition and meaningfulness. They found that recall increased with repetition, but the rate of increase was greater in the high meaning condition. This indicates that even though repetition can increase recall, messages that are meaningful will be recalled with fewer repetitions than messages that are not meaningful. Second, messages, especially advertisements, may not be read from top to bottom. Subjects may start to read a message and if they cannot figure out what it is about, may look to the bottom of the page for a familiar brand
name or trademark that tells what the message is about. In fact, they may even notice the brand name or trademark at the bottom first since it may be the most prominent part of the message. However, research discussed earlier (Wall Street Journal, 1983) suggests that people very often do not notice the brand that is being advertised at all. Nevertheless, if the brand name or trademark were at the beginning of the message, the effects of repetition may be enhanced, and subjects would not have to search for something to allow them to comprehend the message. It may be useful to test this with advertisements.

The results of the need for information manipulation also have implications for marketers. The effort used to process a message was found to be significantly higher in the high need condition than in the low need condition when the message was meaningful. Although recall did not follow this pattern, the findings are still useful since other research (Tyler et al., 1979; Britton et al., 1979) has demonstrated that effort is directly related to recall. Marketers have two options available to them based on these results. The first is to gear all their messages to people that are already high in need for information about the topic. These messages should be informative about the product attributes rather than, for example, entertaining. Since subjects with a high need for informa-
tion want to decrease their uncertainty about a topic, the more relevant information they can be supplied with, the more effort they will use to process it and the more associations they will form with the message content. Thus, if an advertiser of a product can identify those attributes or pieces of information that subjects have a high need to know about, then those are the ones that should be stressed in the message.

The second option available to marketers is to stimulate the audience’s need for information about a topic. In other words, rather than concentrate only on those individuals that are already high in need for information, marketers can try to increase the need for information about a topic in the entire audience. One way of accomplishing this would be to make subjects aware of their lack of information about a product (Burnkrant, 1974). This may be accomplished telling them they may not know all of the information they should know before making a decision or by suggesting that additional information could lead to such benefits as financial savings or increased product satisfaction.
Support for the model of information processing proposed by Burnkrant and Sawyer (1981) is equivocal based on the results of this experiment. Given that some of the hypothesized relationships were supported and others were not, it is unclear whether the model is incorrectly specified or the procedures used in this research were inadequate to properly test the model. Before the model is altered or discarded, further research should be carried out to attempt a better test. There are several directions this research can take.

One direction would be to make the secondary task require more effort. This would serve to reduce the possibility that the simple tone detection task is not sensitive enough to the effects of the independent variables (i.e., $C_f + C_s < L$) which is a strong possibility in this research. This possibility is based on the fact that even though the secondary task detected significant differences between the periods when the subjects were processing a message and when subjects were responding only to the tone detection task, (see Screen Condition in Table 9), it did not show any difference due to the meaningfulness manipulation even though an effect of meaningfulness was obtained for recall. Since the secondary task has been used...
by others (Britton et al., 1979) to demonstrate a reliable
effect of meaningfulness on effort, similar results were
expected here especially since the hypothesized results
were obtained for recall. Making the secondary task re-
quire more effort could help to insure that the secondary
task is operating in the resource limited region rather
than in the data limited region of the performance-re-
source function. In the resource limited region, perform-
ance on the task is determined by the amount of effort
available to perform the task, but in the data limited re-
gion, devoting more resource to the task does not affect
performance. Making the secondary task require more ef-
fort could be accomplished by playing two tones and re-
quiring the subject to determine which tone is louder or
higher in pitch, for example. This not only would require
more effort, but also would supply the researcher with a
measure of the correct and incorrect responses which would
also be useful in inferring effort. An alternative would
be to make the messages require more effort, but this de-
feats the purpose of the secondary task as a useful mea-
sure of effort.

In any future research in this area, it would appear
that an additional pretest is necessary. It should be re-
called that one of the major contributions of this re-
search was to actually pretest the messages to determine
the number of associations formed with each one. Britton et al. did not do this, and thus they could not validate their explanation for their findings. While this pretest was carried out here, and the messages were found to differ significantly in the number of associations produced with and without a title, a pretest of the cognitive effort used to process the messages was not conducted. Therefore, the possibility exists that although significant effects were obtained for the number of associations and recall, none may be obtained for cognitive effort. This was discussed above in that the nature of the messages may produce this combination of results and is further expanded on immediately below.

Another question that may be answered by future research is why the results obtained here and those of Britton et al. (1979) are contradictory as discussed above. Clearly the messages used in this research are different from Britton et al's., and this may account for the discrepancy. To test this, cognitive effort should be measured over a wide range of messages varying in degree of meaningfulness so that the relationship between effort and meaningfulness may be more clearly specified. For example, as described in the section on theoretical implications above, messages that are so vague that they do not permit the subject to activate any schema to match with
the message may require no effort to process because no associations are being formed. As the messages become less vague, the subjects may activate several schemata in response to cues in the message and attempt to match the message with one of the activated schemata. This will require some capacity and therefore effort will increase. However, since none of the activated schemata necessarily allow the subject to comprehend the message because there are not enough associations formed, recall will still be low.

When the messages become meaningful, as when a meaningful enhancing title is provided, but are still abstract and metaphorical, as were Britton et al.'s., both effort and recall will be high because large numbers of associations are formed. However, when a meaningful message is not abstractly written, effort may drop. This is because, while large numbers of associations are still being formed, and recall is still high, the extra capacity required to form associations with the abstract message is no longer needed. Thus, the relationship between meaningfulness and effort may not even be monotonic. Hence, Britton et al. may be operating on one part of the curve and the research conducted here may be operating on another part of the curve, and this may account for the discrepant results.
One area that needs to be investigated further is the apparent need of subjects to attempt to make sense of a low meaning message. It was stated earlier that the cognitive effort results indicated a high amount of effort used to process a low meaning message, and the explanation provided was that subjects wanted to make sense of the message regardless of their need for information. This effect needs to be explored further to determine if it is a demand artifact caused by the fact that the subjects were in an experiment or if it generalizes to other settings. The possibility of the experimental setting causing the effect was addressed earlier.

The need to comprehend incoming information may be an individual difference variable in which some people have a very low tolerance for processing abstract information. If such a variable can be measured, then an experiment in which subjects that have a high or low tolerance for processing abstract information are crossed with high and low need for information should indicate whether or not the need to comprehend a messages overrides the induced need for information. The hypothesized results would be that the need to comprehend abstract information would override the need for information manipulation based on the results obtained in this research. Cacioppo and Petty (1982) review research in which previous researchers have described
“a need to understand” the world, and individuals that are high on this dimension engage in active efforts to structure and increase their understanding of any situation they encounter. (Cacioppo and Petty (1982) have developed a scale that purports to identify people that tend to engage in and enjoy thinking.) It should be pointed out that if indeed the need to comprehend abstract information is an individual difference variable, then random assignment of subjects to conditions should have negated its effects. However, the experimental setting may have artificially induced a high need to comprehend the message in all subjects.

An area of future research that is of practical relevance to marketers is an investigation of whether or not a title at the end of the message is meaning enhancing. Advertisers frequently put the product category or brand name at the end of the message. Whether or not this is helpful in increasing comprehension and recall should be investigated. Research reviewed earlier would suggest that a title at the end of the message does not increase comprehension or recall above that of the no-title group. Thus, advertisers who put their brand name at the end of a message may be severely and unnecessarily hampering the comprehension of the message. Research is needed to determine if this is the case with advertisements because the
stimuli employed in earlier research addressing this issue departed considerably from typical advertisements.

Also of interest to marketers is the question of whether or not pictures or symbols such as trademarks are as effective as verbal titles in enhancing the meaning of a message. For example, companies with well known trademarks may be able to substitute the trademark at the beginning of a message and thus enhance the meaning of the message to the audience. Research reviewed earlier would suggest that this would be the case provided the picture or symbol is relevant to the message and placed in a position where it will be the first piece of information processed.

The usefulness of the Burnkrant and Sawyer (1981) model of information processing cannot be judged from the results of one experiment. The proposed relationships are based on sound theoretical reasoning and the results of a large amount of past research. Therefore, the model certainly merits further investigation. Perhaps if the modifications to the experimental procedure suggested from the results of this experiment are incorporated into future experiments, more of the hypothesized relationships in the model will be supported or the necessary modifications discovered.
The purpose of this section is to outline the procedure that will be followed in a future attempt to test the relationships of the constructs proposed in Chapters II and III. The first step will be to carry out the necessary pretests. Several of these were discussed briefly above. One pretest will test the effectiveness of the need for information manipulation. The same procedure will be carried out as was used before however, instead of just measuring subject's expressed level of need, subjects would actually be given the messages and then a surprise recall test. The hypothesis would be that high need subjects should demonstrate better recall of the message. Since this is the manipulation that possibly caused problems in this research by not being strong enough to reduce processing in the low need condition, the manipulation will have to be made substantially stronger. One possible way of accomplishing this would be to tell the subjects in the low need condition that since they will be able to perform a satisfactory evaluation based on their own knowledge, the messages they will receive will be about a product other than the one they will be evaluating. They will then be told the only reason they are receiving a message is so that the researchers can determine the time required to read the message. In addition, the treatment in the
high need condition may be bolstered by emphasizing even more strongly that they will be unable to perform a satisfactory evaluation without almost total reliance on the information contained in the messages. These changes should widen the difference in the amount of processing enough to insure a significant effect on recall.

The title manipulation worked as expected in this research in that subjects in the no-title condition had significantly poorer recall of the message than did subjects in the title condition. However, the manipulation had no effect on effort. The two possible reasons for this lack of an effect, the nature of the messages and the operationalization of the secondary task, were discussed at length in preceding sections. To increase the possibility of obtaining an effect of title on effort, one or both of the following changes could be implemented. The message could be made more abstract by taking out concrete referents that could serve as cues to activate various schemata. This should reduce the effort used in the low need condition. The other option would be to make the secondary task more sensitive by making it require more effort as described in an earlier section. Either or both of these changes should help increase the probability of obtaining an effect of meaningfulness on effort.
Once these pretests have been conducted and found to produce the desired effects, the relationship between response involvement and need for information will be investigated. The procedure will be the same as that used in the pretest of this relationship discussed above (see Section 4.4), but this time instead of measuring only the expressed levels of need for the information and personal importance of the evaluation, subjects will actually be given a message followed by a surprise recall test. The hypothesis would be that when need for information and response involvement are varied in a 2x2 factorial design, recall will follow need for information and not response involvement.

The final step will be to actually conduct the 2x2x2 experiment varying meaningfulness, need for information, and response involvement. Since only one message is of interest, subjects will be exposed to only the critical message rather than to three as they were in this research. Therefore, subjects would be spending a shorter amount of time in the laboratory and the possibility of demand artifacts affecting the results should be reduced. One final change will be to run approximately twenty-five subjects per cell instead of the sixteen per cell used in this experiment. This will provide more power to pick up smaller effects that possibly were not detectable in this
research. If these changes are implemented, a stronger test of the hypothesized effects should be provided, and evidence in support of or against the proposed relationships will be much more useful.
BIBLIOGRAPHY


A Luggage Carrier

This model has several unique features. First the platform rests on long metal legs which keep it high off the ground when the cart is upright. Second, the platform’s height is adjustable from low to high. High slung platforms keep soft cargo well off the ground, while in the low position, cargo can be stacked close to the axle to improve stability. Wide, large diameter wheels make traversing rough terrain easy. The telescoping handle that locks into place and the two adjustable length elastic cords allow for a variety of load configurations and unconventional freights. It is made of high strength, lightweight tubular steel, and has a total capacity of two hundred pounds. A chrome finish helps retard rust, and permanently lubricated bearings allow easy movement even during freezing weather. The wheels can be removed, the platform folded up, and the handle recessed for easy sto-
Drive On Car Famps

This product is designed for both ease and safety. The use of a long and wider than usual incline makes them especially easy to climb, and the deep wells with raised front edges help prevent overshoots. In addition, the inclines are dimpled to improve traction. They are exceptionally safe because they are equipped with extended, tilted fronts to prevent flipping, and extendable side braces to prevent tilting. The bottoms are coated with thick, durable, non-skid rubber to prevent slippage when in use. Each of the pair has a rated capacity of five tons, and can be used individually if desired. The maximum lift is ten inches. They are held together by tempered steel bolts with shear strengths of 14,000 pounds. They are made of high strength pressed steel, and each unit weighs sixteen pounds. For storage, the inclines can be easily removed, and the side braces can be folded back so that the pair can be stored in less space than one fully assembled unit. The units are coated with baked on enamel paint to prevent rust and provide for a long product life. Total price for the pair is $52.
A Portable Fire Extinguisher

This model is filled with ammonium phosphate, which is nonconductive, and is therefore the only household unit on the market that is effective against solid, liquid, or electrical classes as described by Underwriter's Laboratories. It will discharge three gallons into a ten foot diameter circle in approximately eight seconds. The discharge tube is sixteen inches long and mounted on a 180 degree swivel that unlocks by turning a thumb screw. A thumb switch turns the discharge valve on and off, and when not in use, a ring pin locks the switch off to prevent accidental discharge. It has an easy-to-read pressure indicator with a needle that shows the unit's status. The unit can be recharged as often as needed. Overall dimensions of the unit are eighteen inches in length and four inches in diameter, and it weighs 4 3/4 pounds. A snap release mounting bracket is optional. The price for the fully charged unit is $24.
A.3 MESSAGE THREE IDEA UNITS

(A Portable Fire Extinguisher)
(This model is filled ammonium phosphate, which is non-conductive, and is therefore the only household unit on the market that is effective against solid, liquid, or electrical classes, as defined by Underwriter's Laboratories.) (It will discharge three gallons into a ten foot diameter circle in approximately eight seconds.) (The discharge tube is sixteen inches long, and mounted on a 180-degree swivel that unlocks by turning a thumb-screw.) (A thumb switch turns the discharge valve on and off, and when not in use, a ring pin locks the switch off to prevent accidental discharge.) (It has an easy-to-read pressure indicator with a needle that shows the unit's status.) (The unit can be recharged as often as needed.) (Overall dimensions of the unit are eighteen inches in length and four inches in diameter, and it weighs 4 3/4 pounds.) (A snap release mounting bracket is optional.) (The price for the fully charged unit $24.)
Appendix E
MANIPULATION OF INVOLVEMENT AND NEED

B.1 PRETEST 1 - LOW INVOLVEMENT, LOW NEED

In this study, you will be given messages about various products. After reading the messages, you will be required to evaluate the characteristics of the products. As compensation for participating in this study, you will receive 8 points extra credit on the next exam. The details of the evaluation procedure will be described after the messages have been read.

The messages are taken from forthcoming issues of Consumer Reports. They are very accurate and factual, and, in general, they have been found to be very useful to consumers in making product decisions. However, the messages have been shown to be of very little help in performing product evaluations like the one you will be required to perform. In fact, in similar studies, most people could perform a satisfactory evaluation based solely on their own knowledge. For example, for the first message you
will read, 97 percent of the readers were able to perform the evaluation perfectly based solely on knowledge they had before reading the message. For the second message, the percentage was 95, and for the third, it was 98 percent.

B.2 PRETEST 1 - LOW INVOLVEMENT, HIGH NEED

In this study, you will be given messages about various products. After reading the messages, you will be required to evaluate the characteristics of the products. As compensation for participating in this study, you will receive 8 points extra credit on the next exam. The details of the evaluation procedure will be described after the messages have been read.

The messages are taken from forthcoming issues of Consumer Reports. They are very accurate and factual, and, in general, they have been found to be very useful to consumers in making product decisions. Furthermore, the messages have been shown to be very useful in performing product evaluations like the one you will be required to perform. In fact, in similar studies, most people could not perform a satisfactory evaluation without relying heavily on the messages. For example, for the first message you will receive, 97 percent of the people that did
well on the product evaluations indicated that the information contained in the messages was essential in performing the task. For the second message, the percentage was 95, and for the third, it was 98 percent.

B.3 PRETEST 1 - HIGH INVOLVEMENT, LOW NEED

In this study, you will be given messages about various products. After reading the messages, you will be required to evaluate the characteristics of the products. As compensation for participating in this study, you will receive 8 points extra credit on the next exam. The exact amount of extra credit you receive will depend on how well the product evaluation is performed. If the evaluation is performed very well, you will receive the total amount of extra credit. Otherwise, you will receive a smaller proportion of the total amount. The details of the evaluation procedure will be described after the messages have been read.

The messages are taken from forthcoming issues of Consumer Reports. They are very accurate and factual, and, in general, they have been found to be very useful to consumers in making product decisions. However, the messages have been shown to be of very little help in performing product evaluations like the one you will be required to
perform. In fact, in similar studies, most people could
perform a satisfactory evaluation based solely on their
own knowledge. For example, for the first message you
will read, 97 percent of the readers were able to perform
the evaluation perfectly based solely on knowledge they
had before reading the message. For the second message,
the percentage was 95, and for the third, it was 98 per-
cent.

B.4 PRETEST 1 - HIGH INVOLVEMENT, HIGH NEED

In this study, you will be given messages about various
products. After reading the messages, you will be re-
quired to evaluate the characteristics of the products.
As compensation for participating in this study, you will
receive 8 points extra credit on the next exam. The exact
amount of extra credit you receive will depend on how well
the product evaluation is performed. If the evaluation is
performed very well, you will receive the total amount of
extra credit. Otherwise, you will receive a smaller pro-
portion of the total amount. The details of the evalua-
tion procedure will be described after the messages have
been read.

The messages are taken from forthcoming issues of Con-
sumer Reports. They are very accurate and factual, and,
in general, they have been found to be very useful to consumers in making product decisions. Furthermore, the messages have been shown to be very useful in performing product evaluations like the one you will be required to perform. In fact, in similar studies, most people could not perform a satisfactory evaluation without relying heavily on the messages. For example, for the first message you will receive, 97 percent of the people that did well on the product evaluations indicated that the information contained in the messages was essential in performing the task. For the second message, the percentage was 95, and for the third, it was 98 percent.
Please answer each of the following questions by placing an "X" at the point in the following scales that you think most closely represents how you feel.

1. How important to you are the product evaluations you are going to perform?
   
   very important: ... not at all important

2. How important to you is your performance on the evaluation task?
   
   very important: ... not at all important

3. How valuable to you is it to perform well on the evaluations - that is, to do them correctly?
   
   very valuable: ... not at all valuable

4. Based on the information you have already been given, the messages you are going to receive are most likely to be:
   
   very factual: ... not at all factual

   very inaccurate: ... very accurate

   very good: ... very bad

   not at all believable: ... very believable

5. How much do you want the information contained in the messages?
   
   want the information: ... do not want the information

   very much: ... at all

6. How much do you feel you need the information contained in the messages to perform well on the product evaluations?
   
   need the information: ... do not need the information

   very much: ... at all

7. If additional information that would help you perform the evaluations (beyond that contained in the messages you are going to receive) could be given before performing the evaluations, how likely would you be to read it?
   
   very likely: ... very unlikely

8. How helpful do you think the information contained in the messages will be in performing well on the evaluations?
   
   very helpful: ... not at all helpful

9. At this particular moment, my need for information about the products to be evaluated is:
   
   very high: ... very low

Please go to next page.
10. If you had the option of performing the evaluations with or without reading the messages, how likely would you be to perform the evaluations without reading the messages?

very likely:____:____:____:____:____:very unlikely

Now please pass this booklet in and we will proceed with the rest of the study.

Thank you
In this study, you will be given messages about various products. After reading the messages, you will be required to evaluate the characteristics of the products. As compensation for participating in this study, you will receive 10 points extra credit on the next exam. The details of the evaluation procedure will be described after the messages have been read.

The messages are taken from forthcoming issues of Consumer Reports. They are accurate, factual, and unbiased, and, in general, they have been found to be very useful to consumers in making product decisions. In fact, the messages were written for the explicit purpose of helping consumers make product choices. However, the type of evaluation you are going to perform is quite different from the typical product choice task. In this type of evaluation, the messages have been found to be almost no help at all because the facts contained in the messages are already known by people like yourself. In fact, in similar studies, most people like yourself could perform a satisfactory evaluation based solely on their own knowledge. For example, for the first message you will read, 97 percent of the readers were able to perform the evaluation perfectly based solely on knowledge they had before
reading the message. For the second message, the percentage was 95 percent, and for the third, it was 98 percent.

**B.7 PRETEST 2 - LOW INVOLVEMENT, HIGH NEED**

In this study, you will be given messages about various products. After reading the messages, you will be required to evaluate the characteristics of the products. As compensation for participating in this study, you will receive 10 points extra credit on the next exam. The details of the evaluation procedure will be described after the messages have been read.

The messages are taken from forthcoming issues of Consumer Reports. They are accurate, factual, and unbiased, and, in general, they have been found to be very useful to consumers in making product decisions. In fact, the messages were written for the explicit purpose of helping consumers make product choices. The type of evaluation you are going to perform is quite different from the typical product choice task. Nevertheless, in this type of evaluation, the messages have been found to be extremely helpful because the relevant facts contained in the messages are not generally known by people like yourself. In fact, in similar studies, most people like yourself could not perform a satisfactory product evaluation without re-
lying heavily on the information contained in the messages. For example, for the first message you will receive, 97 percent of the people that did well on the product evaluations indicated that the information contained in the messages was essential in performing the task. For the second message, the percentage was 95 percent, and for the third, it was 98 percent.

B.8 PRETEST 2 - HIGH INVOLVEMENT, LOW NEED

In this study, you will be given messages about various products. After reading the messages, you will be required to evaluate the characteristics of the products. As compensation for participating in this study, you will receive 10 points extra credit on the next exam. The exact amount of extra credit you receive will depend on how well the product evaluation is performed. If the evaluation is performed very well, you will receive the total amount of extra credit. Otherwise, you will receive a smaller proportion of the total amount. The details of the evaluation procedure will be described after the messages have been read.

The messages are taken from forthcoming issues of Consumer Reports. They are accurate, factual, and unbiased, and, in general, they have been found to be very useful to
consumers in making product decisions. In fact, the messages were written for the explicit purpose of helping consumers make product choices. However, the type of evaluation you are going to perform is quite different from the typical product choice task. In this type of evaluation, the messages have been found to be almost no help at all because the facts contained in the messages are already known by people like yourself. In fact, in similar studies, most people like yourself could perform a satisfactory evaluation based solely on their own knowledge. For example, for the first message you will read, 97 percent of the readers were able to perform the evaluation perfectly based solely on knowledge they had before reading the message. For the second message, the percentage was 95 percent, and for the third, it was 98 percent.

B.9 PRETEST 2 - HIGH INVOLVEMENT, HIGH NEED

In this study, you will be given messages about various products. After reading the messages, you will be required to evaluate the characteristics of the products. As compensation for participating in this study, you will receive 10 points extra credit on the next exam. The exact amount of extra credit you receive will depend on how well the product evaluation is performed. If the evaluation is performed very well, you will receive the total
amount of extra credit. Otherwise, you will receive a smaller proportion of the total amount. The details of the evaluation procedure will be described after the messages have been read.

The messages are taken from forthcoming issues of Consumer Reports. They are accurate, factual, and unbiased, and, in general, they have been found to be very useful to consumers in making product decisions. In fact, the messages were written for the explicit purpose of helping consumers make product choices. The type of evaluation you are going to perform is quite different from the typical product choice task. Nevertheless, in this type of evaluation, the messages have been found to be extremely helpful because the relevant facts contained in the messages are not generally known by people like yourself. In fact, in similar studies, most people like yourself could not perform a satisfactory product evaluation without relying heavily on the information contained in the messages. For example, for the first message you will receive, 97 percent of the people that did well on the product evaluations indicated that the information contained in the messages was essential in performing the task. For the second message, the percentage was 95 percent, and for the third, it was 98 percent.
Please answer each of the following questions by placing an "X" at the point in the following scales that you think most closely represents how you feel.

1. How important to you are the product evaluations that you are going to perform?
   very important: _______ _______ _______ _______ _______ not at all important

2. How important to you is your performance on the evaluation task?
   very important: _______ _______ _______ _______ _______ not at all important

3. How valuable to you is it to perform well on the evaluations - that is, to do them correctly?
   very valuable: _______ _______ _______ _______ _______ not at all valuable

4. Based on the information you have already been given, the messages you are going to receive are most likely to be:
   very factual: _______ _______ _______ _______ _______ not at all factual
   very inaccurate: _______ _______ _______ _______ _______ very accurate
   very good: _______ _______ _______ _______ _______ very bad
   not at all believable: _______ _______ _______ _______ _______ very believable

5. How much do you want to read the information contained in the messages before you perform the product evaluations?
   want the information, _______ _______ _______ _______ _______ do not want the information
   very much: _______ _______ _______ _______ _______ at all

6. How much do you feel you need the information contained in the messages to perform well on the product evaluations?
   need the information: _______ _______ _______ _______ _______ do not need the information
   very much: _______ _______ _______ _______ _______ at all

7. How helpful do you think the information contained in the messages will be in performing well on the evaluations?
   very helpful: _______ _______ _______ _______ _______ not at all helpful

8. At this particular moment, my need for information about the products to be evaluated is:
   very high: _______ _______ _______ _______ _______ very low

9. If additional information that would help you perform the evaluations (beyond that contained in the messages you are going to receive) could be given before performing the evaluations, how likely would you be to read it?
   very likely: _______ _______ _______ _______ _______ very unlikely

Now please pass this booklet in and we will proceed with the rest of the study.

Thank you.
Appendix C

EXPERIMENTAL MANIPULATIONS

C.1  LOW INVOLVEMENT - LOW NEED

In this study, you will be given messages about various products. After reading the messages, you will be required to evaluate the characteristics of the products. As compensation for participating in this study, you will receive 20 points extra credit on the next exam. The details of the evaluation procedure will be described after the messages have been read.

The messages are taken from forthcoming issues of Consumer Reports. They are accurate, factual, and unbiased, and, in general, they have been found to be very useful to consumers in making product decisions. In fact, the messages were written for the explicit purpose of helping consumers make product choices. However, the type of evaluation you are going to perform is quite different from the typical product choice task. In this type of evaluation, the messages have been found to be almost no
help at all because the facts contained in the messages are already known by people like yourself. In fact, in similar studies, most people like yourself could perform a satisfactory evaluation based solely on their own knowledge. For example, for the first message you will read, 97 percent of the readers were able to perform the evaluation perfectly based solely on knowledge they had before reading the message. For the second message, the percentage was 95 percent, and for the third, it was 98 percent.

C.2  LOW INVOLVEMENT - HIGH NEED

In this study, you will be given messages about various products. After reading the messages, you will be required to evaluate the characteristics of the products. As compensation for participating in this study, you will receive 20 points extra credit on the next exam. The details of the evaluation procedure will be described after the messages have been read.

The messages are taken from forthcoming issues of Consumer Reports. They are accurate, factual, and unbiased, and, in general, they have been found to be very useful to consumers in making product decisions. In fact, the messages were written for the explicit purpose of helping consumers make product choices. The type of evaluation
you are going to perform is quite different from the typical product choice task. Nevertheless, in this type of evaluation, the messages have been found to be extremely helpful because the relevant facts contained in the messages are not generally known by people like yourself. In fact, in similar studies, most people like yourself could not perform a satisfactory product evaluation without relying heavily on the information contained in the messages. For example, for the first message you will receive, 97 percent of the people that did well on the product evaluations indicated that the information contained in the messages was essential in performing the task. For the second message, the percentage was 95 percent, and for the third, it was 98 percent.

C.3 HIGH INVOLVEMENT - LOW NEED

In this study, you will be given messages about various products. After reading the messages, you will be required to evaluate the characteristics of the products. As compensation for participating in this study, you will receive 20 points extra credit on the next exam. The exact amount of extra credit you receive will depend on how well the product evaluation is performed. If the evaluation is performed very well, you will receive the total amount of extra credit. Otherwise, you will receive a
smaller proportion of the total amount. The details of the evaluation procedure will be described after the messages have been read.

The messages are taken from forthcoming issues of Consumer Reports. They are accurate, factual, and unbiased, and, in general, they have been found to be very useful to consumers in making product decisions. In fact, the messages were written for the explicit purpose of helping consumers make product choices. However, the type of evaluation you are going to perform is quite different from the typical product choice task. In this type of evaluation, the messages have been found to be almost no help at all because the facts contained in the messages are already known by people like yourself. In fact, in similar studies, most people like yourself could perform a satisfactory evaluation based solely on their own knowledge. For example, for the first message you will read, 97 percent of the readers were able to perform the evaluation perfectly based solely on knowledge they had before reading the message. For the second message, the percentage was 95 percent, and for the third, it was 98 percent.
In this study, you will be given messages about various products. After reading the messages, you will be required to evaluate the characteristics of the products. As compensation for participating in this study, you will receive 20 points extra credit on the next exam. The exact amount of extra credit you receive will depend on how well the product evaluation is performed. If the evaluation is performed very well, you will receive the total amount of extra credit. Otherwise, you will receive a smaller proportion of the total amount. The details of the evaluation procedure will be described after the messages have been read.

The messages are taken from forthcoming issues of Consumer Reports. They are accurate, factual, and unbiased, and, in general, they have been found to be very useful to consumers in making product decisions. In fact, the messages were written for the explicit purpose of helping consumers make product choices. The type of evaluation you are going to perform is quite different from the typical product choice task. Nevertheless, in this type of evaluation, the messages have been found to be extremely helpful because the relevant facts contained in the messages are not generally known by people like yourself. In
fact, in similar studies, most people like yourself could not perform a satisfactory product evaluation without relying heavily on the information contained in the messages. For example, for the first message you will receive, 97 percent of the people that did well on the product evaluations indicated that the information contained in the messages was essential in performing the task. For the second message, the percentage was 95 percent, and for the third, it was 98 percent.