The Impact of Consumer Knowledge, Information Mode and Presentation Form on Advertising Effects

SANJAY NAGARAJ

Dissertation for the degree of Doctor of Technology to be presented
with due permission for public examination and criticism in E3, KTH,
Lindstedtsvagen 26 at the
Royal Institute of Technology, KTH, on June 1st, 2007, at 10.00 Am

Respondent: Sanjay Nagaraj
Opponent: Professor Micael Dahlén
Examination Board: Docent Ann Lantz,
Professor Rita Mårtenson, Professor Kjell Grønhaug
Supervisor: Professor Nils Enlund
Co-Supervisor: Professor Richard Wahlund
Chairman: Professor Roger Wallis

TRITA-CSC-A 2007: 5
ISSN-KTH/CSC/A—07/05—SE
ISBN 978-91-7178-685-2

ACKNOWLEDGEMENTS

I am indebted to a lot of people for the dissertation, which would have been impossible without the support, help, and patience of my family, friends, and colleagues, in Sweden and in the United States. It is my privilege to express my gratitude to a number of people for their helping part in various stages of my Ph.D. dissertation. First, I wish to thank my family (Thyag, Vasu, T.S. Nagaraj, Radha, and Vikram) who have encouraged and supported me since I started my doctoral research. They were a tremendous source of inspiration through out my studies. I also would like to thank all the people who helped me during a series of laborious reviews: Dr. Mark Barnard, Dr. Michael Houston, Dr. Richard Bagozzi, Dr. Kent Monroe and numerous other external professors who have critically assisted me to get to the stage at present. In addition, I would like to thank Silja Paasilinna, and Anna Jonsson who during the course of the first three years has repeatedly provided encouragement and helpful comments. I would also like to thank Merily Vaiksaar for being there to support me during the course of my revisions. Furthermore, the assistance from Niclas Öhman from the Stockholm School of Economics in charting the analysis and providing data advice; Scott Melnyk, Brian Murphy and Francis Taunton for a content review, is greatly appreciated

I also very much like to acknowledge the much-needed academic affiliation opportunity provided to me by Dr. Richard Wahlund and Dr. Nils Enlund, without whom my research would not have been possible. They have been a tremendous point of inspiration and engine to this dissertation. I would especially like to thank Dr. Viswanathan for providing me with good consult with the methodological and content value of information mode research. I am grateful to this well orchestrated team of scholars and friends. This dissertation is dedicated to all those who have shaped this research and for what I have achieved today.

ABSTRACT

Consumers consistently acquire information on product attributes available to them. In considering the many and varied effects of advertising a very central issue is how these attribute information in an ad is processed, that is, how consumers were able to comprehend and remember what an ad claimed. Researchers also seem to believe that the use of persuasive ads increases recall of attribute information, enhances attitude toward the ad, brand, and positively affects intent to purchase. Such information in marketing communications is often presented either in a vivid or non-vivid form and they are conveyed in either numbers or adjectives. The complexity of numerical information and the fact that they are being used on a frequent basis to make many important decisions makes numerical cognition a challenging and important domain for this research. In this research we draw the reviews and advances in consumer research on comparisons between two types of information in an advertising setting and combining it along with two types of presentation forms. Yet a few empirical investigations of presentation forms, typically vividness and its interaction effects with information mode, have been conducted in a consumer-behavior context. Further to add to this research is the inclusion of consumer knowledge moderates the way such information is processed. Although the effects of vividness in terms of its ability to impart a persuasive communication have yielded mixed results, we extend the scope of vividness research and attempt to examine vividness effects and its interaction with information mode in print ads. Since different consumers use different skills and strategies to evaluate information, it is suggested that individual differences in product knowledge may be an important moderating factor in information processing and final response to product ads.

In order to address the research issues, a conceptual framework based on the availability valence hypothesis (availability theory) was created. Sixty individual hypotheses were the resulting derivatives from the framework. To test the hypotheses and the conceptual model, a 2x2x2 factorial design was employed and examined responses from 160 students from both arts and computing science program of a major university. Experiments examined the persuasive impact of a new brand containing two forms of presentation and information mode. The conclusions from the study reveal that vividness has an impact on recall and attitudes. The impact on recall and judgment was more pronounced for novices in comparison to experts. The interactions between presentation form and information mode also revealed that the consumer knowledge moderates the way information is processed for recall and subsequent judgment. Experts were able to able to recall attribute information more accurately than novices irrespective of the presentation form and the judgment imparted was based on the information available. All functional properties of the variables in the proposed model had an impact on the effects of advertising during memory and judgment tasks. We also provided a theoretical rationale based on extant literature on the availability model as to which presentation form and information mode may influence the recall and judgment resulting in intent to purchase. The presentation form and information mode highlights the similarities in the benefits offered by an existing base brand. Theoretical and practical implications of the results are discussed as well as the limitations and future directions of this study.

TABLE OF CONTENTS

Table of Figures

List of Tables

CHAPTER I

1 INTRODUCTION

For year's advertisers and consumer behavior researchers have studied the effects of advertisement on recall, attitude, and other evaluations related to the ad and the brand. This includes cognitive responses, such as attention (Grass and Wallace 1970), recall (Appel 1971), brand preference (Heilman, Bowman & Wright, 2000), and brand evaluation (Batra and Ray, 1986; Ray and Sawyer, 1971). These areas of research reflect the growing convictions of many advertisers that consumers liking and disliking of an ad can influence its effectiveness regarding attention, recall, brand evaluations, other cognitive related responses, and reactions (Mackenzie, Lutz and Belch 1986; Silk and Vavra, 1974).

For decision alternatives, consumers consistently acquire product information on product brand attributes available to them. Such information in marketing communications is often conveyed either in numerical and verbal modes or both. Results from past studies on information mode showed that judgments of numerical estimates and verbal expressions vary considerably across subjects. (Lichtenstein and Newman, 1967; Hakel, 1968; Parducci, 1968; Bass, Cascio and O'Connor, 1974; Lopes and Ekberg, 1980; Budescu and Wallsten, 1981; Pepper, 1981; Byeth-Marom, 1982; and Zimmer, 1983). Despite the increasing importance of numerical information in marketing, the marketing and advertising literature is scant on the effects of numerical attribute information on consumer evaluation of products. In addition, research on the relationship between presentation forms and information mode has not been reviewed in the past, despite the growing importance of numerical attribute information and the persuasive nature of vividness in advertising. Hence, the importance of vividness in terms of ad evaluation is of interest. Although the effects of presentation form, vividness, in terms of its persuasive communication has yielded mixed results, this research attempts to examine and discuss the role of vividness and the mode of information used with the inclusion of a moderator, consumer knowledge, as a determinant of how consumers respond to product advertisement.

Consumers' product knowledge is likely to affect product attribute information evaluations and recall in ways that are not entirely predictable (Agrawal, 1995). For example, consumers' make judgments and decisions about products and services under conditions of uncertainty and only rarely complete information is available for all important features and benefits of a given product for them to make a decision. Studies have shown that the general interpretation of knowledge depends on individuals currently active knowledge structures (Higgins and King, 1981; Wyer and Srull, 1981). In the knowledge literature, accessibility of attribute information guides the interpretation of that information about the possible relationships among elements of product class (Rao and Monroe, 1988). Furthermore, highly accessible attributes related to product information in the ad are likely to guide the encoding of the information.

Product information is presented in combination with a specific mode of information and presentation form. First, for instance, as in any product information, both numerical information and verbal information is likely to affect consumers' evaluation of the attributes. Information about product attributes can be conveyed using several modes such as numerical labels (e.g. 50 calories) or verbal labels (e.g. low calories). For example, Viswanathan and Childers (1996) discuss scenarios wherein a consumer in a store who examines a new product, Brand X on the shelf and that h/she notices from the nutritional index on the package that the brand has a numerical value (e.g., 90 calories and 4 grams of dietary fiber per serving). Furthermore, the

consumer notices a claim on another brand of the same product that has verbal information indicating “low calories” or “very low calories". The question is what information should the consumer use to make a well-informed decision? To make it more real, let’s say that the consumer upon shopping finds another product, Brand Y, that h/she purchases regularly that has numerical information of 150 calories, and 3 grams of dietary fiber per serving. It is then conceivable that the individual based on the prior usage of Brand Y rates it as being “low” in calorie content (refer to Viswanathan, 1994). The consumer rates these by trying to recall the information about the new brand in order to make comparisons with the regular brand on these attributes (Viswanathan and Childers, 1996). When trying to recall the calorie content of the new Brand X, and comparing it to Brand Y that the consumer normally uses, decides that Brand Y has a lower calorie (though h/she does not remember the precise numerical information), and higher dietary fiber content per serving. The consumer then proceeds to compare the two brands on each of the attributes using the information available in order to choose between them. During the comparison process numerical information is available on both brands (i.e., “3 grams” versus “4 grams”), while verbal information on calories was available for both brands (i.e., “low” versus “very low”). For the attributes of calorie content, verbal information was available on one brand while numerical information was available on the other (i.e., “low calories” versus “150 calories”). In this example, the consumer had to compare both Brand X and Brand Y using numerical and/or verbal labels in order to evaluate and make a decision about the product. It is also highly probable that a consumer may have to compare more than 2 brands during their decision making process.

Secondly, on the presentation form area, studies have suggested that information that is vividly presented is more effective and much more persuasive than information that is non-vividly presented (e.g., Nisbett and Ross, 1980; Taylor and Thompson, 1982). In general, an ad provides information about a brand on several attributes using certain distinct characteristics. For example, the usage of vivid colors, bold type, markers, isolation techniques for specific attributes, font size, colorful pictorials and texture etc. can draw attention to a particular stimulus. These attention-getting presentation devices for specific attributes are referred to as vivid and the ones that are not so prominent are referred to as a non-vivid stimulus. Considerations should be given on the basis that attribute information of a product whether it is vivid or non-vivid may or may not be interpreted accurately. Thus the accuracy, misinterpretation, and confusion of information (Brengman, Guens, and De Pelsmacker, 2001) along with the ability to process it, depend on the individual’s knowledge level (Alba and Hutchinson, 1987).

Different consumers use different skills and strategies to evaluate information (e.g., Bettman, 1979), implying that variables such as individual difference in knowledge may be important moderators in information processing. Individuals might differ in their responses to arguments the message contains, with some people analyzing and reacting to each argument and others reacting mainly to the communication’s overall point rather than to the argumentation. It is hardly surprising that reactions to communications are highly variable, because individuals differ in disposition and in prior experiences they have had in relationships to the attributes in the ads, product category, and overall presentation contexts in which influence is exerted. This can affect their attitude and responsiveness to advertising (Buchanan, 1964). Possibly, a reason attributed to this responsiveness is that a consumer’s decision-making approach is made via different patterns as they gain knowledge through experience with a product (Bettman, 1979). The moderating effects of consumer knowledge on processing and evaluation of numerical and verbal product attributes, and their interaction with vivid and non-vivid attribute information in advertising have also, until now, received little attention in the consumer behavior literature. The effects of vividly presented information, for instance, vivid-verbal or vivid-numerical in an advertisement in general may be moderated by several individual and situational factors. This

depends on the individual's information processing, the necessity to process that information, and the individuals ability to evaluate the brands in the product class upon exposure to the information in the advertisement. These refer to the high and low levels of knowledge (Park and Lessig, 1981).

In the knowledge literature, for example, novices are less able to understand the importance and implications of information that is complex in nature and one that requires substantial ability to process (for e.g., quantitative information) and they are likely to use attributes that are easily comprehensible (Viswanathan and Childers, 1997) or attributes that have been made vivid through features (Kisilieus and Sternthal, 1986; Mahewaran and Sternthal, 1990; Barton and Muthukrishnan, 1991). Research has shown that advertisers may not provide much information in their ads to define some of the product terms (Rifon, Reece, and Harris, 1991), and information when provided may be inconsistent across ads (Reece, Rifin and Pashupati, 1992).There are numerous studies of numerical scaling of verbal expressions, for instance, in the traditions of attitude measurements. However, up to now there is no systematic comparison of verbal and numerical representations of attribute information in relation to levels of expertise and vivid presentation.

In essence, research in marketing has focused on different ways in which attribute information can be combined to lead to a brand decision. However, there is very little understanding of the nature of memory for attribute information and how it is subsequently employed as an input to decision making at the product attribute level. An understanding of issues relating to information mode from an ad at the attribute level would be crucial to knowledge development and knowledge literature as a whole. The importance of this knowledge development depends on the accessibility of such information in consumer memory and decision-making.

1.1 Objective of the Present Study

Research have explored the relations between responses to ads and their impact on attitude toward the brand and attitude toward the ad (e.g., Batra and Ray, 1986; Mackenzie, Lutz, and Belch, 1986; Lee and Lee, 2001; Gardener, 1985; Horner, 1990; McKenzie and Spreng, 1992; Miniard, Bhatla, and Rose, 1990; Mitchell, 1993; Mitchell and Olson, 1981; Muehling and Laczniak, 1988; Petty, Unnava, and Strathman, 1991; Madden, Allen, and Twible, 1988). However, this kind of work is emergent and is not fully linked to different levels of processing, such as processing differences between product category expertise and product attribute functionality expertise. There are several factors affecting consumer ad attitude, brand attitude formation, and recall of attribute information, such as product experience, product familiarity, and product knowledge. To achieve this objective, the present study utilizes the individual differences in knowledge (differences between experts and novices) that captures their cognitive orientation. For this study, it is assumed that ads act as an important source of information about the brand because consumers will be exposed to novel ads for fictitious brands in this study.

Many researchers have assumed that a consumer uses the same criteria to evaluate all brands in a product class (Green and Wind, 1975; Rao and Craig, 1975). However, the attributes that an individual recalls or uses to evaluate a brand in a product class may vary. To some extent, attributes may be influenced by knowledge level of the consumer within a product class, and/or by the presentation of the advertisement the consumer sees for the brand. In order to recall and evaluate the attribute information, the information must be available in the consumer's memory (Kisielieus and Sternthal, 1984). If a consumer can easily retrieve examples from memory, then we can infer that the event must be fairly frequent or common and more available (Tversky and Kahneman, 1973; and Kisilieus and Sternthal, 1984; 1986). Information that is more available in

memory will be utilized more in making the evaluation than information[1] that is not readily available. Furthermore, induced recall via advertisements may or may not directly refer to product use during a subsequent brand evaluation in a product category (Mitchell and Olson, 1981). On the other hand, an enhanced recall of an attribute does not imply or indicate an increase emphasis on that attribute during a subsequent brand evaluation. Marketers have assumed that by just using the specific attributes in the advertisement, and encouraging recall, consumers will increase their use of that information for brand evaluation. Thus marketers are actively using the attribute recall of a claim to test advertising effectiveness.

In the areas of social cognition and evaluative processes, the availability of information in memory is supported by consistent findings of larger effects in conditions of recall and decision-making. Therefore, when consumers make an evaluation, the vividly presented information is much more available in memory than that of non-vividly presented information. Furthermore past research has not examined the processing function of a consumer's knowledge level that may actually moderate the relationship between vividness in the advertisement and the criteria used for evaluation. Cognitive psychologists, for example, have reported differences in decision-making and problem solving (Chi, 1981), information type and information use (Fiske and Kinder, 1981), comprehension and recall (Bransford, 1972, Bransford and Johnson, 1972) among individuals with varying degrees of knowledge levels. Consumer behavior researchers on the other hand, have investigated the effects of product knowledge on information integration (Park 1976), information retention (Alba, 1983; Gardner, 1983) and encoding of information in memory (Prince et al., 2005; Hutchinson, 1983, Mitchell et al., 1983, Appleton-knapp, Bjork and Wickens, 2005). Findings from these studies report differences in the information processing (Venkataramani et al., 2006) among consumers with low and high knowledge levels. Despite these differences, studies have not investigated knowledge influence on memory and judgment of vivid and/or non-vivid numerical and verbal information type of advertisements

It is therefore, the intent of this dissertation to examine consumers' response to two types of information mode (i.e., numerical and verbal information) and two types of presentation form in terms of information processing and the process involved in new brand evaluation of a product. To do so, the research under the availability hypothesis is critically evaluated and integrated with the inclusion of consumer knowledge. We expect the results of this research will demonstrate the moderating effects of knowledge operating on advertising effect in the context of presentation form and information mode.

[1] Information that is available in the memory is based on the manner in which it is conveyed, i.e., in this research, the information conveyed emphasizes either numerically or verbally.

1.2 Section Summary

Academics in marketing develop and test models and different theories in related areas of marketing and consumer behavior. By using the availability model, we hope to contribute to the literature by empirically testing how the inclusion of consumer knowledge level affects attitudinal judgment and recall when information is provided in a verbal or numerical mode and presented in a vivid or non-vivid form. In addition, the scope for examining the information mode and consumer knowledge literature is to attempt to demonstrate that consumers utilize their product knowledge to differentiate among attribute information in a manner consistent with the relative importance of the attributes. Theoretical implications of this research relate to how different consumers process and use numerical and verbal information in combination with a specific presentation form.

This research may also have important implications for the general usage of information in product evaluations and could possibly benefit academics, marketing practitioners and public policy makers. Better understanding of consumers' reactions to a new class of advertising may contribute to the development of persuasive, marketer controlled communication process, and advertising practice of the advertising of certain products. In this regard, public policy could aim to develop norms for the use of specific information mode on packages by manufacturers to describe specific attributes. Marketers will, certainly, be the beneficiaries of a better understanding of how consumers react to advertisement, in a context when advertisements use a different mode of information to communicate important attributes. One use could well include developing better and more effective advertisements by actively using specific mode of information to convey product attributes. Furthermore, public policy makers will gain a better understanding of advertising effects when product decisions are heavily weighed on the mode of information and type of ad presentation. In addition, how consumers' knowledge levels may impact their efficiency and directionality in the evaluation of attributes in the ad is an important contribution of this study.

The remainder of this dissertation is organized as follows. First, Chapter 2 contains a review of relevant literature regarding the process underlying information mode, presentation form followed by consumer knowledge. In addition, the literature also reviews the relevant research in the area of nutritional information. Numerical information via nutritional values has significantly contributed to making the existing point-of-purchase environment more accessible and relevant to a wide variety of selection of healthy choices. In Chapter 3, a conceptual framework is developed to explain the processes involved during memory and judgment related tasks, and several hypotheses are derived from this framework. Chapter 4 describes the methodology used to test the hypotheses. Chapter 5 discusses the data analysis relevant to the hypotheses. Lastly, the limitations, avenues for future research are discussed in Chapter 6.

CHAPTER II

2 LITERATURE REVIEW

In this chapter, literature relevant to the objective of how consumers' recall and evaluate a product presented in a specific information mode and presentation forms are reviewed. The review is organized into three main sections: information mode; presentation form; and consumer knowledge. Each section is researched as illustrated in Figure 1. The first section reviews the information mode literature. Two different types of information mode are examined. The organizations of the information mode are done in the following manner.

First, the characteristics of verbal information are reviewed followed by literature review on the usage of verbal information in a visual context. The second part discusses the processing aspects of verbal information. Under the numerical information section, details of the representation and usage of numerical information is examined. Since past studies have used percentage values[2] as information format, the significance of examining nutritional information to its usage and comprehension becomes important in this research. Hence, a review of nutritional information literature is also discussed in subsequent sections. Sub-sections of numerical-nutritional information include the impact of numerical information, and reference information that has ties to the comprehension of information mode literature.

The second section reviews relevant literature on presentation forms, vivid and non-vivid presentation. This section is also organized into two areas: First we introduce the characteristics of vivid and non-vivid presentation form along with demonstration of vividness. Secondly, cognitive processes underlying presentation form are reviewed.

The third section reviews relevant literature of consumer knowledge consisting of two main sections. The first part of this section introduces the characteristics of expertise (content of knowledge) in the most general and domain independent manner so that we can compare the expertise approach in the realm of stored knowledge, problem solving, and decision-making. The second part of this section reviews the processing of information by experts and novices, differences between experts and novices, elaboration and retrieval of information, comprehension, memory and judgment. Finally, each of the literature review sections is briefly summarized.

2.1 Information Mode

Different types of information with varying contents are used as attributes to entice consumers into buying a product. Among those, two important modes of information (numerical and verbal information) are predominantly used in ads to specify product attributes. Numerical and verbal information are the most common tools used among advertisers in marketing communication for

[2] The Percentage of Daily Values (National Research council, 1989): This value provides the total listing of daily value, for example, for **Total Fat**, consumers are provided with a gram total, then a number under % Daily Value. This number represents the percentage of the daily value for fat that a person gets by eating one serving of the labeled food. This percentage is based on a diet of 2,000 calories per day. Irrespective of the calorie level, a consumer can still use the percentage of daily values as a reference. If the consumer uses a 1,500-calorie diet, 1,500 equal 75% of 2,000. So the consumer will then want their percentage of daily values to equal 75%. The goal is to choose products (e.g. foods) that together will provide them with that 100% (or 75%) daily value day for each nutrient.

presenting attribute information. Researchers have highlighted the importance of studying numerical and verbal information during product evaluation and choice decision-making process (Viswanathan and Childers 1996).

Consumers are frequently faced with situations where they have to compare brands on specific attributes using numerical and verbal mode while making a choice or evaluation. For example, information represented in the form of a USRDA[3] percentage value, attributes using strings of mathematical measurement units, or notations attached to numbers, are termed as numerical information. Information that is conveyed in an evaluative form (e.g., very crunchy, high fiber, very low fat) is often referred to as verbal information. Since this form of information mode is evaluative in nature, it may introduce a spontaneous decision-making. On the other hand, numerical information is non-evaluative in nature and is specifically linked to an attribute via a mathematical unit of measurement (Viswanathan and Childers, 1996). As numerical information does not have meaning for itself, the use of some sort of reference information is needed to obtain a meaning from it.

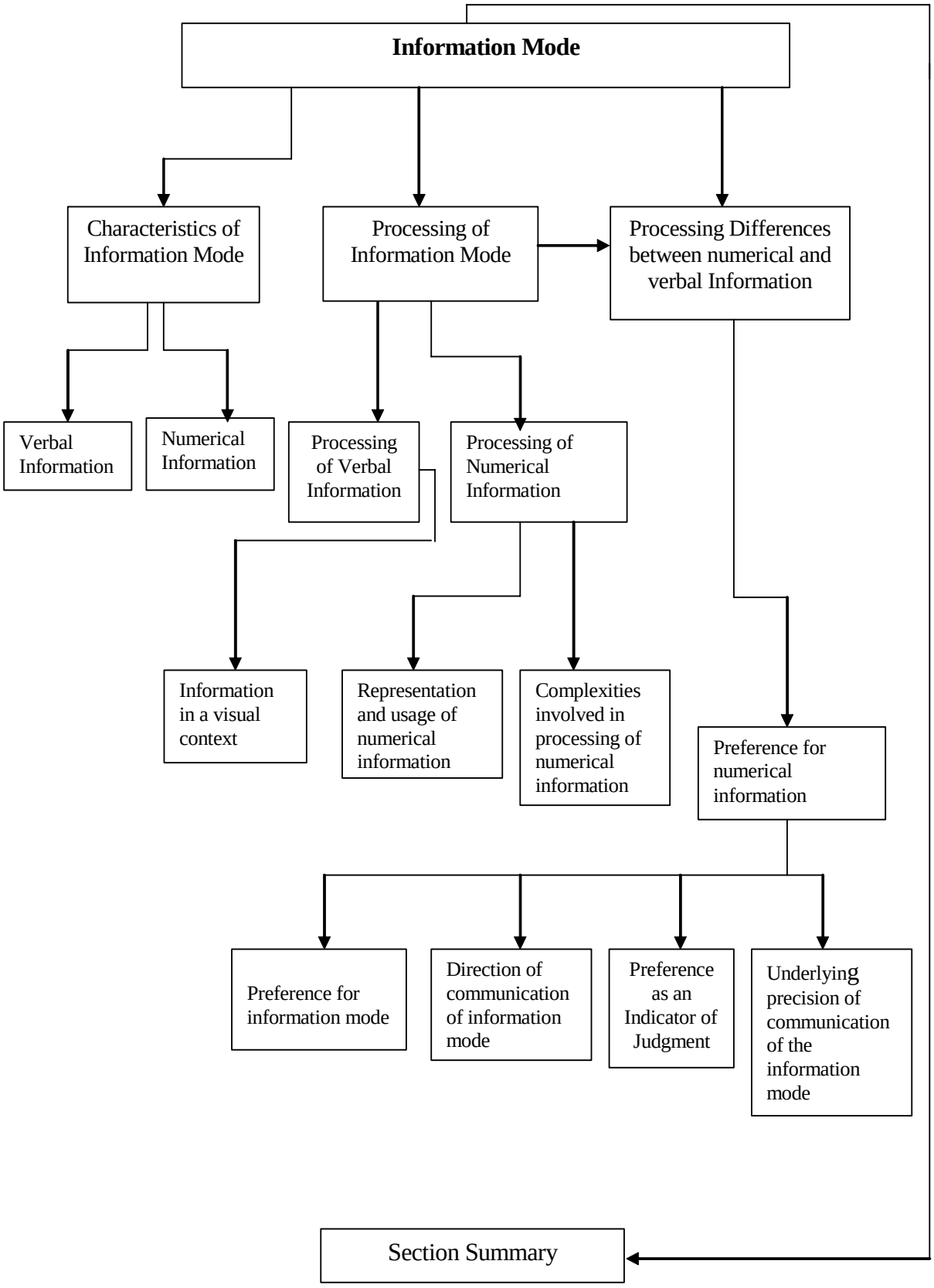
Effects of advertising have been examined in the past, although, the influence of numerical versus verbal information content in advertising has not been examined. Studies in the area of information mode have primarily compared numerical information to verbal information with respect to information processing, memory, preference, and comparative judgments (see Viswanathan and Childers, 1996; Viswanathan, 1993; Viswanathan and Narayanan, 1994). Although studies have examined various aspects of advertising message content and format, none of the studies in the literature cited has made an attempt to measure subjects' attitude toward to ad, and recall tested for all verbal and all numerical modes. On the other hand, some studies have compared the differences between visual and verbal information and their effects on brand attitude (Holbrook 1978; Mitchell and Olson 1981) prior to the studies focusing on the comparison of verbal and numerical information. Other researchers have examined the differences between verbal message format and visual formats in terms of their effects on information processing, memory and evaluations concerning the product (cf. Moore and Hutchinson, 1983; Shimp, 1981).

Overall, studies have indicated that the consumer information acquisition process is strongly affected, and is highly dependent upon the manner in which information is presented (e.g., Bettman, 1979; Bettman and Kakkar, 1977). How strongly this processing involving information mode affects memory and judgment will be a crucial point of discussion in the forthcoming sections of this chapter. The flow chart below illustrates the organization of the information mode literature review.

[3] *U.S. Recommended Daily Allowances* (U.S.R.D.A.) – This translates to the evaluation of the daily requirements of a substance required by humans in order to avert a deficiency disease, often quantified in percentage values.

Figure 1: Organization of Information Mode Literature

CHART: Information Mode



2.1.1 Characteristics of Verbal Information

We start this section by first introducing a definition of verbal information along the lines of advertising. In a linguistic sense, according to Osgoode (1959, p. 45), verbal information is "a linguistic construction in which a referent is associated with or disassociated from a complement via a verbal connector." The referent here is none other than the advertised brand, and the complement is an adjective or adjective phrase that's describes the advertised brand or states how the advertised brand of a particular product category will benefit the consumer. Many advertising researchers have identified the fundamental dichotomy in the verbal content of ad messages, for example, inherent vs. arbitrary, valid vs. invalid, informative vs. persuasive, factual vs. evaluative (Preston and Bowen, 1971; Marquez, 1977; Holbrook, 1978; and Shimp, 1979). These distinctions in verbal content have been emphasized in a wide range of disciplines (Holbrook, 1978). In establishing and maintaining information in a verbal mode, the derivation of the term verbal information comes from the reinforcing functions of adjective descriptors in the form of beliefs (Wright and Barbour, 1975). Typically in a marketing environment, a brand is linked to some attribute or a set of attributes in the advertisement that are thought to be appealing to consumers. These attributes portrayed as verbal information take the form of: very high calorie, low fat, high in fiber, large disk space, or very large screen display etc. Ads for instance attempt to use verbal information to communicate of intentions e.g., "I should buy this product at this store" (Johnson, 1979). Still other advertisements attempt to establish verbal information about entire product category in the form of choice rules (e.g., when buying Brand X, buy the cheapest brand).

Advertising language consists of words and sentences that combine to form claims and representations. The advertiser's objective in making assertions is to associate the advertised brand with a set of choices and evaluation rules valued highly by consumers (Shimp, 1974). Under these objectives, the utilization of actual ads consisting of only verbal information is subject to different affective conditions, namely positive, negative, and neutral (Srull, 1983). Results from Srull's study showed that the attitude toward the product depended on the information recalled when the affective response was positive. Similarly, Scammon's study (1977) illustrated that information in a verbal form is evaluative in nature and may have made the evaluation processing easier due to the nature of information processing. She also noted that due to the evaluative nature of verbal information, most of the information that is used to communicate to consumers, uses verbal terms when expressing their opinions spontaneously. Mitchell and Olson (1981) noted that at a descriptive level, subjects apparently by some inferential process developed beliefs about brand attributes based on minimal brand-specific information and that the attitude toward the ad also mediated brand attitudes. Their results provide an indication that individuals are capable of developing different perceptions of brands based on visual information only that provides no explicit brand information in a verbal mode. Researchers have also acknowledged that consumers' responses to advertising messages may be mediated by not only the information content of the message, but by advertisement format as well (cf. Appel, Weinstein and Weinstein, 1979; Weinstein, Appel and Weinstein, 1980). Studies have suggested that when the information mode is varied, the meaning imparted also varies and as a result information mode manipulation has an effect on evaluations and recall (Appel et al., 1979; Rossiter, 1981).

2.1.2 Characteristics of Numerical Information

In the information mode literature, it has been suggested that quantitative information is one of the most important characteristics of communication (Witt 1976). The characteristics of the numerical information are better explained through nutritional values, and hence we will discuss it in the following sub sections. Information is referred to as numerical when it is represented as a number in the context of a unit of measurement (e.g., 60Mph in 3 sec). Central to the conveyance of information mode, numerical information is based on the specific unit of measurement associated with it that provides the context for interpretation of the number (Viswanathan and Childers, 1996). In addition, for numerical information to be meaningful the specific unit of measurement must be linked to the particular attribute needed for evaluation (Viswanathan and Narayanan, 1992). In this context the meaningful unit refers to the relative location of the brand on an attribute that is in a numerical mode. Apart from information being conveyed via a numerical or verbal mode, information may be in a numerical-verbal, numerical only or verbal only mode (Campbell and Clark 1994; and McCloskey 1992). It is also clear that the effects of quantifying all information are not known in spite of the fact that numbers have achieved an important status in our thinking. For example, applications of both the dependency and the strength of quantification have been illustrated primarily by studies on decision-making (Slovic, Fischoff and Lichtenstein, 1977; Einhorn and Hogarth, 1981; Pitz and Sachs, 1984). The provision of numerical information has been a major area of interest since the early 1970s, especially in the provision of nutritional information for making purchase decisions of food products easier for consumers. At a more concrete level, a number is a property of the sets of objects in the external environment, which must be recognized and mentally represented before any form of numerical cognition can develop (Dehaene, 1992). To beat the ambiguity of the word 'number or numerical information' the term numerosity is used to refer specifically to a measurable numerical quantity, for example, a unit of measurement that provides an associative meaning to the number (Gelman and Gallistel, 1978). For instance, numerical information can be presented verbally (e.g., thirty five calories) or in Arabic numerals (e.g., 35), or in Roman numerals (XXXV). These systems of numerical information, i.e., different notations, can be used to convey the same meaning (Dehaene and Akhavein, 1995).

Numerical information in a verbal mode is a common thing in everyday life. We frequently use numerical information in the form of spoken or written words – saying 'sixty three,' writing 'one hundred', viewing 'twenty three percent' or listening to 'six hundred'. For example, for a pair for sunglasses that cost $26.95, you write 'twenty-six dollars and 95/100'. The usage represented here is in a verbal-numerical form to convey what actually a numerical value is of '26.95'. Comprehension of written verbal-numerical information involves (a) identification of the individual letters, (b) identification of the word as a whole, and (c) retrieval of the words' meaning. In contrast, comprehension of numerical information[4] involves identification of the digits and retrieval of the digits' meaning to the number value as a whole (McCloskey 1992 & 1991). Campbell and Clark (1994) showed that a verbal-numerical representation activates both 'visual and written' codes for digits and as well as articulating and auditory codes in most people. Their model points out the cognitive processes required for converting one form of representation to another. They also suggest that these conversions require a considerable amount of processing after the proper acquisition of information. In a

[4] Figure 3 illustrates (dependencies) context condition and a set of rules, e.g., the processing demand taking place will lead to some kind of an outcome.

study by Fischer and Jungerman (1996), results showed that the subject's numerical equivalents for the verbal labels were clearly lower in the context situation than in the context free situation.

From this section, key questions about the acquisition, retention, and processing of numerical information includes the following: (a) what forms of numerical knowledge do we acquire, and (b) how do we extract this knowledge as we work with numerical information? These issues have led to an increase in research on numerical cognition (Ashcraft 1992; Dehaene, Bossini and Giraux, 1993; McCloskey 1992). For instance, the usage of the term 'Numerical' refers to a symbol representing a number (e.g.: '2,350') versus 'Two thousand three hundred and fifty'.

These are different numerals representing the same number. Here the latter indicates a written form of verbal-numerical information. Thus in a day-to-day activity and encounters, whether it may be the temperature in Celsius or the price in dollars, the meaning of the numerical information is critical. For example, watching a visual representation of the weather forecast on television, which gives the viewer verbal information "Tomorrow's forecast – the weather in highs fifty-five to sixty three", the normal behavior for consumers is to think about what to wear the next day. This is referred to as a semantic processing. Then you have a Sears advertisement listing clearance and sale prices of $39.99 to $69.95 for a pair of jeans, in this situation a consumer tries to contemplate and decide whether h/she is willing to pay that much (semantic representations of numerical information).

It has been illustrated in earlier studies (e.g., Moyer and Landauer, 1967) that the semantic representations are calculated and used in various types of numerical processing. When deciding whether the price of the jeans ($39.99 to $69.95) is reasonable or determining which numerical value is larger in magnitude, implies that the number-semantics presumably dictate the represented value. These representations play a role whenever meanings of numerical information are directly included in a task (Starkey and Cooper 1980; Sudevan and Taylor, 1987; Tzelgov et al., 1992; and Dehane et al., 1993). Therefore attributes for decision-making may require some sort of specificity that links the attribute closely. Thus, this research will use specific unit of measurement to the numerical attribute to accomplish this linking procedure. However, complexities with respect to understanding the meaning of the number and the unit of measurement during processing are always a concern and will be discussed in the following sections.

2.1.2.1 Provision of Nutritional Information in a Numerical Mode

Review of the nutritional information literature acts as a primer for logic in explaining the characteristics of numerical information. For instance, research in the past has focused on numerical versus verbal information (Yalch and Yalch, 1984; Viswanathan and Narayanan, 1992 & 1994). However, there is still a lack of understanding of how consumers utilize the information from an advertisement and impart judgment based on these two types of information modes. Most studies on information mode, numerical information in particular, have focused on different aspects of nutritional labeling. Yet there is no systematic pattern to this communication (e.g., some brands emphasize on attributes with a specific unit of measurement numerically and other represent attributes in a generic sense, i.e., very high or very low). For this reason, the unit specific measurement for numerical information in comparison with the evaluative nature of verbal information is crucial to this research. Despite different shopping style differences, consumers in general, are more concerned than previously about their choice of brands (see Heimbach and Stocks, 1979). The importance of numerical information in brands was first

demonstrated through the provision of nutritional information[5] (e.g., daily dietary fiber, USRDA values, calorie content, fat etc.) or RNI (recommended nutritional intake). An example of numerical information is the contextual form of nutritional information, wherein, the information is represented in USRDA percentage value and/or other attribute information specified along a mathematical unit of measurement (refer to the illustration on nutritional facts in Figure 2).

Figure 2 Illustration of Numerical-Nutritional Information

Nutrition Facts
Serving Size: 1 cup (30g)
Servings Per Container: 14

Amount Per Serving	Cereal	Cereal with 1.2 cup Skim Milk
Calories	120	160
Calories from Fat	10	10
		% Daily Value **
Total Fat 1g*	2%	2%
Saturated Fat 0g	0%	0%
Cholesterol 0mg	0%	0%
Sodium 0mg	0%	3%
Total Carbohydrate 21g	7%	9%
Dietary Fiber 2g	8%	8%
Sugars 1g		
Protein 4g		
Vitamin A	0%	4%
Vitamin C	0%	2%
Calcium	2%	15%
Iron	6%	6%

* Amount in Cereal. One half cup skim milk contributes an additional 40 calories, 65mg sodium, 6g total carbohydrate (6g sugars), and 4g protein.

** Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories:	2,000g	2,500g
Total Fat	Less than 65g	80g	
Saturated Fat 0g	Less than	20g	25g
Cholesterol 0mg	Less than	300mg	300mg
Sodium 0mg	Less than	4,400mg	2,400mg
Total Carbohydrate 21g		300g	375g
Dietary Fiber 2g		25g	30g

Calories per gram:
Fat 9 — Carbohydrates 4 — Protein 4

The Food and Drug Administration devised the United States Recommended Daily Allowance (USRDA) for nutritional labeling. These are the lists on processed foods and vitamin products that tell what percentage of each of 19 essential nutrients you get per serving or dose (numerical estimates). It is a rough guide because it doesn't differentiate among people of different ages and sex who have different nutrient requirements.

The USRDAs, in turn, are based on the RDAs-Recommended *Dietary* Allowances derived by a prestigious group of nutritional scientists who advise the Food and Nutrition Board, a committee of the National Academy of Sciences-National Research Council. Every five years or so, the board reviews and revises its recommendations. As the board defines them, the RDAs are "the levels of intake of essential nutrients considered, in the judgment of the Food and Nutrition Board on the basis of available scientific knowledge, to be adequate to meet the known nutritional needs of practically all healthy persons."
Source: National Research Council, 1989)

A study by Heimbach and Stocks (1979) showed that 76 percent of the respondents claim to pay attention to the ingredient list of food products (ingredients listed in verbal mode only, without any numerical value specified along a unit of measurement). Furthermore, 64 percent of the respondents stated that they paid attention to the information on the nutrition label. It is suggested that these attention levels are attributed to the higher education level and higher income levels. On the other hand, it may also be possible that because of higher income,

[5] In the recent years, information in a numerical mode has spread to areas other than food products (e.g., computers, mobile phones, specifications of housing space dimensions, industrial consumer goods, pharmaceuticals etc.).

consumers may actually ignore the ingredients, as long as it is a known brand or a brand they learnt about from an advertisement. Studies have also provided evidence that many consumers find current percentage values from labeling incomprehensible (Heimbach and Stocks, 1967). Only ten percent had any idea of what The United States Recommended Daily Allowance (USRDA) means, a basis necessity for understanding the nutrition information. Vandenberg (1980) showed that consumers do seem to use the nutritional information on the food labels. However, the study did not collect information as to how consumers use various components of the overall label.

Conversely, according to Jacoby (1977), consumers expressing a strong desire and preference for percentage information, devote only a negligible proportion of their pre-purchase search to actually acquiring such information[6]. An explanation for this is that consumers are not equipped properly to effectively interpret and use numerical-nutritional information because they lack prior training. Moorman (1990) contributed to a comprehensive analysis on consumer utilization of nutrition information. Results pointed that the disclosure of nutrition information facilitates the utilization of that information (also see Biswas & Barton, 1993). Results from another study on consumer use of nutrition information illustrated that consumers did use food labels represented numerically depending on personal reasons and levels of satisfaction (Bass 1991). Scammon (1977) showed that, presenting nutritional information in advertisements could affect consumer's belief about products. She manipulated the amount and representation of nutritional information in verbal and numerical mode presented to subjects in a television commercial for two different brands of peanut butter. The results indicated that a significantly greater percentage of subjects receiving nutritional information selected the more nutritious brand as compared to subjects receiving no nutritional information. This provides a foundation for understanding the importance of providing nutritional information using numerical representation in advertisements. In addition, nutritional information may help us understand how numerical information may affect consumer's evaluation and the utility level of the product and their choice of products[7]. In understanding the post-structuralist scene of consumer's self-conception and self-care practices (Thompson and Hirschman 1995), we can make references to consumer's practice of frequently checking nutrition and ingredient labels (Herman and Warland, 1990). Jacoby (1977) also summarizes an extensive group of studies from the mid 1970's in which consumers said that they want and will use nutrition information either from the brands directly or from the ad representing the brands. However, we should take note that providing numerical nutrition information to consumers in advertisements or on labels does not guarantee the usage of that information. For example Brucks, Mitchell and Staelin (1984) showed that subjects paid attention to the nutrition information but did little processing, as measured by brand beliefs. Tyebjee (1979) stated that the numerical representation of nutrition information is thought to have very little effect on attitude and behavior. The reason attributed to this is the consumer's inability to process and understand the nutritional information. However, learning process motivated by personal relevance influences consumers to acquire and process numerical nutrition information better. Here the learning process is an internal spontaneity to process information by the personal relevance of the numerical or verbal information. On the other hand, ability to process facilitates comprehension and elaboration of acquired information that may be an effect of the learning process (Greenwald and Leavitt, 1984; Petty and Cacioppo, 1986).

[6] Researchers have reported findings suggesting that consumer memory adds importance role during acquisition of the information presented (in this case it may be either numerical or verbal). Slovic (1972) suggested that consumers' as decision-makers tend to use only the information that is displayed explicitly. Johnson and Russo (1978) noted significant difference in consumer memory for selected elements of product information.

[7] The generic descriptors were inherently evaluative in nature and may have made the respondents evaluation process easier since some of the information processing was already done (Scammon, 1977).

Research on stimulus characteristics that includes information content and ad format suggests that consumers utilize more nutrition information when it is presented in an easily processed form (Levy et al., 1985; Muller, 1985; Scammon, 1977; Viswanathan and Hastak, 2002). Muller (1985) tested and monitored the changes in brand sales for four different factors that were tested (i.e., information format, variation among brands, nutrient importance and the amount of information presented). The main objective was to determine whether and how these factors would affect the use of nutrition information in the brand choices being made by consumers. Results showed that as the amount of information increases, consumer's use of nutrition information decreases. This is consistent with the findings that numerical information may be easier to distinguish compared to its verbal counterpart, and it may also be subject to increased interference as the number of pieces of information presented increases numerically (cf. Viswanathan and Childers, 1996). Hence confusion between digits used appears to be a significant factor as the number of pieces of information presented numerically increases. The lack of comprehension and low elaboration of the information provided to them may also contribute to confusion. According to Keller and Staelin (1987) comprehension and elaboration of either verbal or numerical mode improves the decision quality during purchase. Research also suggests that consumers do not utilize nutrition information adequately or specifically at the point of sale (Daly 1976 and Jacoby et al. 1974). It is therefore possible that a provision of summary or reference information may facilitate the comprehension of numerical information better, and this may further render a helping hand for consumers to compare brands during brand choice and purchase decision-making (also see Cowburn and Stockley, 2004).

2.1.2.2 Reference Information in a Numerical Mode

Numerical information does not have any meaning by itself and by making available to some kind of reference information it provides proper meaning to it (Viswanathan, 1994). In a simple form, a number derives its meaning in comparison with other numerical information (cf., Venkatesan et al., 1986). While several researchers have mainly studied ways of simplifying processing of nutrition information on part of consumers through the use of different nutritional presentation formats (cf., Russo et al., 1986; and Muller, 1985), some past studies have also focused on the effect of reference information. At a theoretical level the issue of focus in this section relates to the information mode and the inclusion of some form of reference values that would facilitate consumers understanding of specific numerical values included in the information. The provision of some kind of reference information for numerical information is beneficial to get the exact meaning of that information during evaluation and choice. Such situations arise commonly because product information is often available in numerical form, such as nutritional values and contents on packages or in verbal form, such as in advertising (e.g., high in fiber, low cholesterol etc). These studies have compared different formats for presenting daily reference values[8] (Levy et al., 1991).

We have come to understand that the recommended daily values facilitate the interpretation of numerical nutrition information. Since consumers often search for nutrition information with the goal of making a choice or judgment this may then require the interpretation of brand information relative to all available brands. Research has also indicated that when nutritional information is presented in print ads, consumers want to have the nutritional contents in a numerical mode and specified in detail (Miller 1978). Empirical results suggests that consumers are more likely to incorporate nutritional information in a numerical form into their purchase decisions if the information is directly accessible on a point of purchase

[8] For example, the presentation of the fiber content of a granola bar, 5g, the daily value which is 25g, and the percent of daily value of that granola which is 20.

display that facilitates nutritional comparison among available brands (Venkatesan 1977). The interpretation of raw nutrition information that is presented on packages can be simplified through the use of several types of reference information (e.g., new labeling requirements, FDA's proposed Daily Reference Values, 1990). Also, the provision of additional reference information in the form of numerical values (U.S. RDA) with nutrition information led to greater ability to process and more accurate comprehension than presentation of numerical nutrition information without reference information (Moorman 1990). A parallel in terms of the usage and interpretation of numerical information can be found in FTC's appliance energy labeling. This involves the presentation of yearly energy costs of most efficient and least efficient models (cf. Consumer Information Remedies, 1980).

Scammon (1977) found that the nutritious brand was identified more accurately with verbal information than with percentage numerical information[9] when comparing verbal information with percentage USRDA values. The descriptive inferences are likely to be derived from numerical information during choice when compared to learning (i.e., a descriptive form such as, 'high' calories may be obtained from a numerical form such as '325' calories). The key difference between the 'high' calories and '325' calories is that the inference of 'high' in calories is readily available in the verbal label (Viswanathan and Childers, 1992). The authors argue that for such a process, a judgment task would involve the usage of attribute information to assess brands and therefore the need to meaningfully interpret numerical information. Therefore, it is necessary that numerical product attribute information be compared with other information to derive its meaning[10] (cf. Venkatesan et al. 1986). On the contrary, verbal information has an evaluative inference attached to it, i.e., verbal information required less processing than percentage information, (cf. Scammon, 1977; Huber, 1980). Although numerical and verbal information may differ in terms of being specifically linked to a particular attribute, this may be a matter of degree.

An adjective descriptor such as high or low could be used for almost any and every attribute in a product category. For example, product category as computers, verbal attribute labels can include: CPU's life, warranty information and speed. On the other hand, equivalent numerical information is likely to be more specifically linked to an attribute (e.g., number of hours for CPU's life, number of weeks or months for warranty and speed of the microprocessor). The same applies to nutritional disclosures expressed along the unit of measurement of grams, saturated fat, polysaturates, monosaturates, calorie content, cholesterol, protein, fiber content, etc. However, equivalent verbal information such as high or low fat content or cholesterol content, being generic descriptors may typically apply to a larger number of attributes of products. Another example in this context, a consumer having to decide to buy a can of baked beans with low fat' content, is faced with the task of choosing a brand of beans that had low fat content and high fiber when compared to available brands of canned beans. Even if the nutritional information are expressed in different formats, such information would still have to be used by consumers just like raw numerical information presented on packages in order to assess a brand relative to all available brands (Viswanathan, 1994). Consumers would have to make several brand comparisons based on the numerical information on a specific brand relative to all available brands.

[9] For example, "good" versus "40" percent of the USRDA value on the attribute protein content.

[10] Research on number representation in cognitive psychology (Hinrich et al, 1982) also suggests that numerical information is encoded approximately rather than exactly in the memory when the magnitude conveyed by it is emphasized. This may be due to the reason that the magnitude conveyed by a number is extracted and encoded in an approximate form. An implication of past research is that some comparison process has to occur in order to interpret numerical information by comparing across several brands. The comparison process of information would also provide a frame or reference for consumers to interpret nutrition information (cf. Consumer Information Remedies 1979). Processing of information depend on the individuals personality, knowledge level, motivation and ability to process.

The task of making a choice from among a set of brands by judging one or a few brands would be facilitated by providing reference information about a set of brands with in a particular product category as the benchmark. It is also argued that descriptive inferences are likely to be derived from numerical information and used during choice since such a task would involve the usage of numerical information in decision-making. Another perspective contributing to investigations done by Hinrichs, Berie and Mosell (1992) was the observations that we think of numbers as magnitudes for which approximation of the exact value of the number is a reasonable and common mode of representation.

Studies have also supported the idea that numbers are represented internally as magnitudes and that inherent in the interpretation of numbers as magnitudes is the idea of rounding or approximation (Hinrichs et al., 1981 & 1982; Moyer and Landauer, 1967; Sekular et al., 1971). For example, we may say that the price of a pair of jeans costs about $20 when its exact price is $22.99, and we may say that a there is almost half a dozen donuts in the jar when there is actually only 5 muffins. In both the cases, the approximations of the value of the product would give the individual considerably information about the value of the number. This magnitude property of numbers provides a strong contrast in the way in which we typically use numerical information. Stanley (1991) found that consumers do use at least some nutrition information (e.g., numerical information as percentage values or verbal information as adjective descriptors) and it increases over time. This suggests that the importance of consumer decision-making can be better examined by considering a situation where consumers are attempting to learn product information (see Stanley, 1991). Therefore, with the provision of reference information the learning of numerical attribute information should be better.

2.3 Processing of Verbal Information

The interpretation consumers' give to verbal labels varies considerably depending on effects and on individual differences in language usage (Beyth-Marom, 1982). Studies have examined the combined effects of information in a verbal and visual mode in terms of their effects on information processing, recall, recognition and beliefs concerning the product (cf. Mooreman and Hutchinson, 1983; Shimp, 1981; Alesandrini, 1983; Edell and Staelin, 1983; Gardner and Houston, 1986; Lutz and Lutz, 1977; Mitchell 1983; Mitchell and Olson 1981; Percy and Rossiter, 1983; Rossiter and Percy, 1983). When verbal information is presented along with pictures, or any other form of visual information, the verbal mode of information should be integrated and abstracted from their visual form (Haber 1970 and Warren and Morton 1982). This integration may be due to an automatic processing rather than purposive semantic processing (Posner and Snyder, 1975). Hence, it is suggested that stimuli are automatically processed and stored, and if a stimulus is attended to, verbal information enters the short-term-memory. It is through the process of rehearsal, either by simple repetition of the stimulus or more detailed analysis, that the information is eventually transferred into long-term-memory and stored (Bettman, 1979). These stored patterns are well described by the separate 'memory stores' model. Craig and Lockhart (1972) developed a conceptual framework for memory that involves a hierarchy of processing stages. They indicated that "retention is a function of depth, and various factors, such as the amount of attention devoted to a stimulus, its compatibility with the analyzing structures, and the processing time available, will determine the depth to which it is processed." They also maintained that repetition of verbal information at merely the sensory or primary level does not facilitate memory and a deeper analysis is required for its retention.

Accordingly, repeated viewing of an ad then results in lasting memory of the verbal information contained in it. However, this is only if the rapid sequence of verbal information and the image is continually perceived at the primary level. Nelson (1979) however, reviewed the issue with the contention of Craik and Lockhart (1972) that memory durability depends on

processing incoming stimuli into deeper levels. He found that it was possible for improvement in a recall task to occur with a second exposure to verbal information at a phonemic level. As substantiation, recall, and recognition improve with practice and respondents learn new ways of processing the expected information more efficiently (see Haber 1970). Baddley (1978) disagreed with the position that memory follows only as a result of processing input at deeper levels. Cited evidence showed that rehearsal at the primary memory level does enhance memory and that processing of only the orthographic features of the verbal information can result in lasting memory traces (Baddley, 1978). On the other hand, the multiple-store theory posits that verbal information is rehearsed in the short-term-memory during the intervals between presentations, even as new stimuli are being perceived (Shafer and Shiffrin, 1972). Consumers therefore may be able to remember images from ads they have seen or similar ones before, since the processing requirements will be less if memory nodes already exist with which associations can be made.

Therefore, as presentation rate of verbal information increases, recall decreases (see Penny 1975). This will hold during a comparison process wherein attributes of two different brands having verbal anchors will lead to more overlap, hence resulting in a decrease in recall. This is consistent with Viswanathan and Childers (1996) research, wherein, the potential for interference with an increase in the number of pieces of attribute information in a particular mode needs to be considered. Viswanathan and Childers (1996) also noted that since verbal information lacks specificity, it may be difficult to distinguish from other information and therefore may be subjected to difficulties in encoding and retrieval. However, verbal information also conveys meaning more readily than numerical information. The key to memory performance for verbal information depends on the amount of internal processing that is required to analyze and transfer incoming stimuli rather than the rate of information input. Hence, memory performance is better for incoming stimuli for which associations in the long-term-memory already exist, rather than for unfamiliar input. Specifically, memory performance on verbal information could be enhanced by specifically linking verbal information to a particular attribute, such as presenting all information on an attribute in a verbal form, or by using verbal labels that apply exclusively to an attribute (cf. Viswanathan and Childers, 1996). Overall, it is suggested that the keys to processing and memory differences between different types of information mode lie in how specifically information is linked to an attribute and how readily it conveys meaning.

2.3.1 Processing of Verbal Information in a Visual Context

Researches have also indicated that there is a link between verbal and visual information (see Nagy, 1976). Interest in how the learning and memory of conceptual information is influenced by the mode in which the information is presented has led researchers to focus their interests on the similarities and differences in pictorial and verbal processing. One of the most frequently cited findings from these research efforts is that concepts are more likely to be remembered if presented in a pictorial form compared to a verbal form (Paivio and Smythe, 1968; Shepard, 1967).

The sensory semantic model (Nelson et al. 1977) has been successful in explaining the usual superior memory for pictures by assuming that (a) pictures have more distinctive sensory codes than do words and (b) pictures are more likely to undergo semantic processing than are their verbal labels. Craik and Lockhart (1972) stated that a semantic processing, results in more durable memories than phonemic processing (i.e.), pictures directly activate meaning whereas words typically first activate a phonemic code and then activate meaning. It has been noted that verbal information has always depended on the visual information (e.g., Nagy 1976). Nagy (1976) showed that the importance of verbal information increased as the presentation form

(visual attractiveness) increased. When visual information is crucial to the judgment, the influence of verbal information also depended on the relative value of the visual information (Shanteau and Nagy, 1976). Comparative judgment study between verbal and visual information examined by Debevec and Romeo (1992) examine how visual information in an ad interacts with and influences the processing of verbal information and whether verbal information facilitates or inhibits self-referent judgment. Findings show that verbal focus of an ad encouraged varying levels of self-referencing and differential attitudes and intentions when a product visual was featured. Findings also showed that a self-copy accompanied by the product visual was an effective strategy in encouraging self-referencing and favorable attitudes and intentions.

Severn, Belch and Belch (1990) examined the role of visually explicit stimuli in the processing of verbal information in a persuasive message. The resulting effect on recall, attitudes, behavioral intentions, and higher-order cognitive responses were measured. The outcome was that the use of verbal information in ads for vivid appeals appeared to interfere with message comprehension, particularly when there was substantial information available for processing. In such cases, processing tends to focus more on the execution of the message in terms of its sex appeal elements, drawing cognitive processing away from evaluation of the product and/or the message. However, the use of an explicit advertising appeal did not interfere with the individual's ability to recall a brand name. This directs our argument to state that verbal information may give room for interference during information processing. In addition, the integration of verbal and visual information may shed light on consumer's recall and evaluation process. The integration of visual and verbal information to the formation of recall and attitude toward the ad may be explained through the application of the consumer integration theory.

The integration of information has two advantages over other frameworks for investigating this combination. First, it provides a theoretical approach to human judgment and decision-making (Shanteau, 1975). The premise behind information integration is that judgment results from the evaluation of information that has been acquired from a presented stimulus. The goal is to derive a quantitative description of the process used to arrive at the final judgment. This quantitative or numerical description reflects the subjects' information integration strategy. The second advantage is that the information integration can be done based on the individuals subject (domain) level (Shanteau, 1975). Loftus and Cole (1979) and Loftus (1979) also demonstrated the interdependence of visual and verbal memory in adults. Loftus (1975) reported that the wording of oral questions affected the recall of the number and the action of characters in the visual scene. This indicates that consumers use thematically consistent semantic information to interpret or elaborate visually experienced events. Furthermore, this also tells us that adult memory is often interactive and constructive rather than passive and static (Paris and Lindauer 1977).

Verbal information was found to be congruent with visual information, and facilitated the increase of correct recall and recognition of visual representation (Duncan et al. 1982). There are a limited number of examples of research that examines visual versus verbal information either on consumer judgment or on recall of brand in the consumer behavior literature in cognitive psychology. One of the most pervasive literature findings is that pictures are more memorable and vivid, when it comes to creating emotions, than verbal information. Numerous studies have illustrated that pictures are more easily recalled or recognized than words (Paivio, 1969; Lutz and Lutz, 1978). Kieras (1978) reviewed the imagery effects on the performance of verbal learning tasks. It was found that visual images in the memory explain their ability to evoke mental imagery. This is consistent with Bower's (1970) research, which stated that imagery is a more reliable encoding process than verbal encoding. Also, in a verbal encoding less stability between items occurs when selecting a functional cue from a word. Kazan-Saad (1986) concluded that, in verbal information, there are two conceivable information-processing possibilities and subsequently, there may be two possible outcomes. Firstly, subjects store verbal

information exactly as heard or seen and then decode it when the visual recognition sheet is presented. Secondly, subjects immediately transform the verbal information into a visual memory code (Loftus, 1972; Loftus and Bell, 1975). This reveals the central processing characteristics of verbal information. Another issue is the possibility that the recall and recognition advantage of semantic elaboration context may be limited to retrieving the names of pictures and not their appearances.

Unnava and Burnkrant (1991) examined the impact of pictures on memory as a function of the imagery-provoking ability of verbal information. Findings show that the presence and use of visual presentation increased the recall of verbal information (also see Posner, 1967). The authors noted that pictures that exemplify verbal product attribute information in an ad enhanced ad recall only when the verbal information was of low imagery. There is substantial evidence that visual (picture) recognition improves as more information about the visual details of pictures is encoded (Loftus 1972; Loftus and Bell, 1975; Loftus and Kallman, 1979; Potter, 1976; Potter and Levy, 1969). For instance, ads using both visual and verbal information, picture recall and recognition improve with longer exposure duration presumably because more information about the specific details of a picture is extracted as the duration of the exposure increases (Potter and Levy 1969). They also found that picture recall is better when subjects were encouraged to use more verbal information details during encoding than they are merely required to examine the pictures.

A corresponding visual to verbal transformation is a common ability among individuals and is assumed in models of memory in which verbal rehearsal of visually presented information plays a role for its more permanent storage (Atkinson and Shiffrin, 1968; Sperling, 1960; Waugh and Norman 1965). There is evidence suggesting that visual representation and verbal information processing of pictures are functionally distinct processing domains that may be under strategic control, although, each may independently facilitate the long-term retention of pictures. This suggests that pictorial and verbal information combined would produce vivid characteristics that help the retention of information in the long-term memory (Graefe and Watkins, 1980; Proctor, 1983; Watkins et al., 1984). There is also evidence that processing of a picture for its verbal characteristics may provide additional levels of description that increases the elaboration and distinctiveness of the memory record for that item. Wiseman, MacLeod and Lootsteen (1985) support the argument that a visual stimulus represented by pictures along with information that comprises of adjective description of the object in a sentence form improves picture recognition. Subjects in their experiment were exposed to either photographs only or verbal information only where more information was provided for the verbal information condition. Results indicate that verbal information aided picture recognition and enhanced recall of verbal information. Three explanations were considered: (1) integration of verbal information with the picture, (2) formation of semantic representation in addition to the picture, and (3) elaboration of the pictorial, initiated by the verbal information. Overall, their findings show that with elaboration post-picture verbal information improves attention and perhaps rehearsal of the representation of the picture.

2.4 Processing of Numerical Information

Despite some interesting research on information mode, there is still very little we know about how consumer's process, remember, and evaluate numerical information[11]. The information processing approach points out the effects of nutritional information in print ads clearly

[11] For example, reviewing the nutritional information during shopping, identifying a person based on social security number, telephone numbers and the number of calls made, paying a bill, or during purchase decision-making based on the price of the product are indicators of consistent use of numerical information.

(Mitchell, 1978; Bettman, 1979; Sims 1980). For instance, at the encoding stage the consumer imparts meaning to the information and the judgment end-result determines how information is encoded and stored in the LTM (Brucks, Mitchell and Staelin,1985). Brucks et al. (1985) found that the amount of information linked to the advertised brands and the encoding of this information affected nutritional knowledge. Translating nutritional information in numerical form, this approach is useful in understanding the usage and comprehension of information that is encoded. However, the usage ease of numerical information disguises the fact that very complex cognitive processes are required to recall and evaluate numerical information or to even make a simple numerical comparisons or calculations (Viswanathan and Childers, 1997).

According to Dehaene (1992), cognition of numerical information recognizes three different stages underlying individual's ability to process numerical information: (1) number processing involving the ability to transcode numerical information; (2) process of quantification[12], where an individual is able to identify the importance of the numerical value; and (3) approximation and processing of quantities[13], where encoding is automatic, fast, and independent of what number is encoded. This encoding is fast and independent of which particular number is encoded (Monroe and Lee 1999). In addition, "tasks such as measurement, comparison of price information, or approximate calculations, solicit an "approximate mode" in which we access and manipulate a mental mode of approximate quantities" (Dehaene, 1992, p.20). It is also purported that two hemispheres of the brain mediate and process different kinds of information and handle different kinds of tasks and problems (Raudsepp, 1992). The left hemisphere specializes in information processed sequentially in a linear and ordered way. Therefore, those who employ the left side of the brain to process information, in general are more adept at solving problems that call for analysis, planning and organization. For those who are right brain dominant are more comfortable with processing information that is complex, ambiguous or difficult to define (Dehaene, 1992, Raudsepp, 1992). To further understand the processing complexities of numerical information, it would be essential to familiarize with different numerical representations and processing of those representations.

2.4.1 Processing, Complexities and Comprehension of Numerical Information

Numerical information, in general, is considered to be of complex in nature (Monroe and Lee, 1999). Apart from some pragmatic considerations such as understanding the usage of numerical versus verbal information in imparting nutritional and price information, the broader issue in studying numerical versus verbal information is one of understanding how consumers process and evaluate attribute information. A review of the literature suggests that a stimulus with numerical information may be encoded as a nominal representation, in which case the exact value is encoded and stored in the memory (Monroe and Lee 1999, Viswanathan and Childers, 1996). However, it is also noted that numerical information presented may be encoded as a magnitude representation, and either the exact value or an approximation of the exact value of the number is encoded and represented in memory (Monroe and Lee, 1999).

[12] The quantification process is classified into three sub-processes: counting, subitizing, and estimation.

[13] The process of approximation and process of quantities according to Monroe and Lee (1999) is the process by which "Arabic numerals are first converted into an internal magnitude representation." The calculation process or number transcoding involves the ability of an individual to mentally manipulate and process the sequence of words or symbols according to the calculation rules (e.g., 32 Kph).

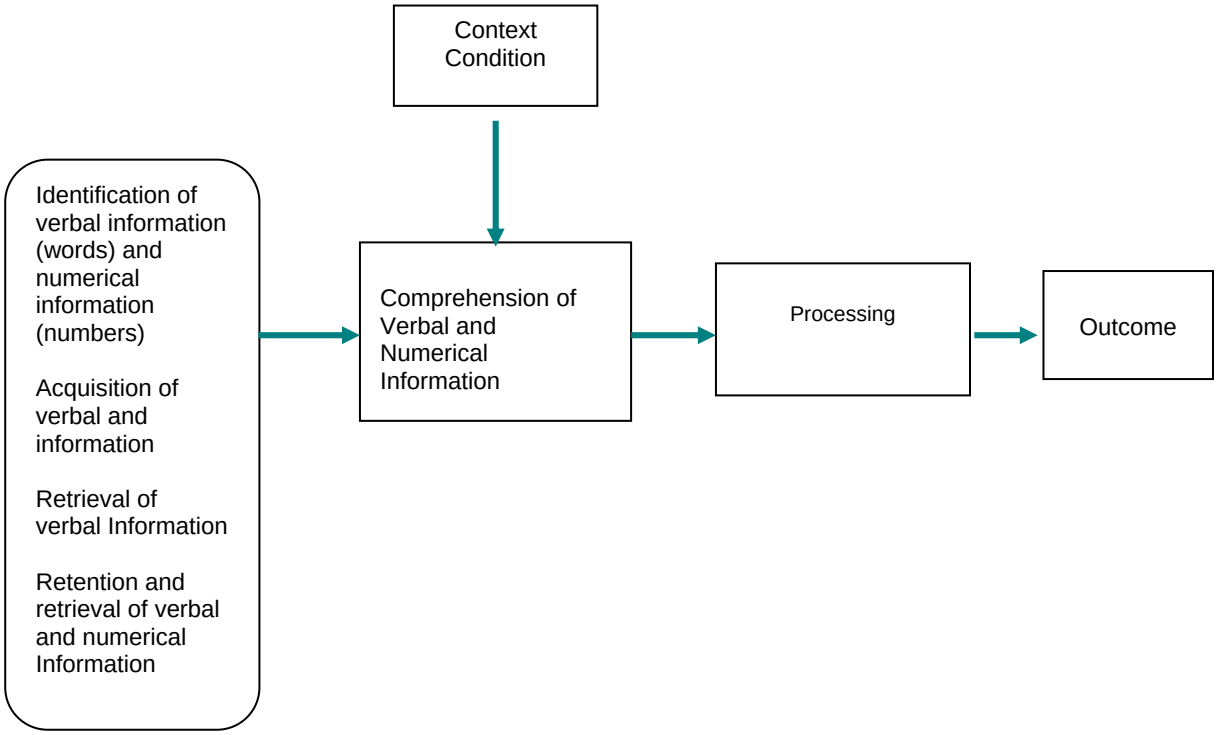
When information is quantified with mathematical units and notations, they are normally excluded from being processed. Instead an easier version of the information and/or a short cut is used to make a decision. Studies have indicated that the consumer information acquisition process is highly dependent upon the manner and the type in which information is presented. It should also be noted that often consumers are faced with the task of understanding complex information and numerous studies have suggested that message format and complexity contribute to the way consumers' process information and evaluate product attributes (Bettman and Kakkar, 1977). Consumers' information acquisition and comprehension are strongly affected by the information mode. For example, Luskin (1976) found that when appliances are packaged with a highly technical operating manual and other relevant quantitative information, customers perceive these products to be difficult to operate and also relatively durable and expensive. Despite the processing goals and given the complexities of numerical information, Erev and Cohen (1990) showed that most decision-makers preferred to use probabilities that are in a numerical mode. They termed this as a communication paradox. A primary goal of the comprehension process is to form a meaningful relevance for the attributes to be processed. When a meaningful relevance for the attributes is formed, it results in a better evaluation. According to Day (1976), in order to use particular information during shopping, a consumer must first absorb all the necessary information, physically separate the data, interpret it, retain the information absorbed, organize the data for evaluation, and then make a choice. Unless the product attribute information is easily accessible, comprehended, and interpreted, it is unlikely that the consumer will use the product information in the choice process (Day 1976).

Results from Russo and Dosher's (1983) study showed that attribute based processing are less frequently used for verbal than for numerical information (e.g., a Diet Coke presents itself to consumers as a 1.5 calorie while Pepsi-Max emphasizes that they are low in calorie and low in sugar). Payne (1982), Russo and Dosher (1983) also asserted that consumers' limit their cognitive resources and allocate them very carefully. For the lay person, understanding and calculation of information in a numerical mode rests on the ability to read, write, produce, and comprehend numerals, or information that uses numerical values, along with mathematical units of specification, also termed as number transcoding (e.g., Deloche and Seron, 1987). Therefore, number processing, in its fundamental form, seems to be intuitively linked to the ability to mentally manipulate sequences of numerical expressions.

For instance, in an environment where prior knowledge is present, most of our insights on the nature of expertise have been developed in the context of problem- solving rather than comprehension of the attribute information, whichever order they may be represented in.

Definitions of how knowledge affects comprehension during the information acquisition process are illustrated in Figure 3. The arrows pointing to the dependent measures iterate the important stages of the information processing that affect attitude formation and the retrieval of information from the memory. This is partly based on the fact that there has been, until recently, a general lack of connection between these two domains.

Figure 3: Path Model of Processing Conditions for Verbal and Numerical Information



The relationship between the mode of information of the attribute presented and the degree of comprehension that have been studied in the past show that there is very little doubt that difficulty and the mode of information inhibits comprehension (Weiss 1969). It is also suggested that the difficulty of numerical information will inhibit comprehension, evaluation and ads that contains numerical information should be harder to remember, longer to decode, and hence will negatively affect recall (Anderson, 1970; Bross, Shapiro and Anderson, 1972; and Klare 1963, also see the section on reference information, p. 32). The problems encountered when using attribute information can be examined from at least two perspectives. Firstly, consumers may utilize the information by being exposed to it, processing it, and form impressions or judgment about the brand. The second direction would be that consumers utilize the information by reading it and, upon processing the data, form impressions about which brands in a product category are better based on attribute claims. The focus is on usage of information, wherein the effects of attribute information is measured through recall tests, consumer knowledge, and the ability to process and evaluate the brand presented via verbal or numerical mode. These two views of information usage focus on the cognitive aspect of the use, so that the effects of numerical information mode would be measured by shifts in brand choices. In summary, comprehension in general implies the creation of a coherent mental representation of information, wherein the information of relevance to the type or route of processing affects recall and evaluation.

It has also been noted that large proportion of the consumer population has observed the increased availability of numerical nutritional information (Jacoby, 1971; Bass, 1991; Biswas and Barton, 1993). On the other hand, the proportion of consumers actually using such information is considerably lower. The probable reason may be that the individual is only able to focus on a small portion of information at any time. In order to establish coherence the consumer must frequently re-instate the attention to the attribute that is under construction. Although the preference for a brand, based on a key attribute, would induce a learning process wherein the attribute relevance becomes coherent leading to comprehension Erev and Cohen 1990).

Consequently, identifying factors that are responsible for the apparent attenuation of the usage of numerical information is still an empirical problem. Hence, it is relevant to review the factors governing preference and usage of numerical information. The mode of information during processing also becomes important in the overall consumer decision-making process. However, the main differences between numerical and verbal information mode has to be established before we examine the preference paradox.

2.5 Processing Differences between Verbal and Numerical Information

Consider a situation where consumers are attempting to learn product information that is conveyed numerically for some brands and verbally for others. Based on adequate processing of numerical attributes the information may be easier to distinguish from other information on a different attribute in to verbal information (cf. Viswanathan and Childers, 1996).

Figure 4: Unit Specific Measurement Chart

	Brand X	Brand Y
Verbal	Very High	High
Numerical	560 Calories	1 Gm

Unit specific measurements distinguishes the high or the low anchors

Let us revisit the comparative analysis of verbal and numerical information purported by Viswanathan and Childers (1996). The rationalizations would be that numerical information is likely to be specifically associated to a particular attribute, for example, a can of baked beans having 560 calories per serving and the same brand or a different brand having a fat content of 1 gram. These two pieces of information may be relatively easy to compare because each number is a piece of numerical information (560 and 1) conveyed in the context of a unit of measurement that is clearly linked to an attribute (energy in kilo joules and fat in grams). Each number represents a high or low meaning to the context of comparison. However, because numerical magnitudes do not readily convey meaning, confusion between information conveying similar meaning is therefore unlikely. For example, energy of 560 calories is considered as being a little high for two servings and fat content of 1 gram is considered as being low. These two pieces of information are unlikely to be confused even though they impart the same meaning. This does not convey meaning readily due to the presence of the unit specific measurement. On the other hand, verbal information is not specifically linked to a particular attribute but readily conveys meaning in a generic sense. For instance, a brand of baked beans has a high calorie content,

wherein calorie is described using high/low as the anchor. The same brand or a different brand has a 'low' fat content, wherein fat is described using high/low as the anchor. Such information may be difficult to distinguish because the verbal information is not specifically linked to an attribute, but rather a general descriptor that readily conveys meaning in terms of high/low for the information provided (cf. Viswanathan and Childers, 1996).

In other words, unlike numerical information, verbal information along an attribute may be relatively difficult to compare from other verbal information along the same attribute. This is because of verbal attribute information traits, wherein it readily conveys meaning in terms of high/low for the information provided as compared to numerical information. Another example would be an advertisement for a can of Brand X Meat that claims a 'low' fat content and another ad for the same product representing Brand Y Meat claims 'very low' fat content. Similarly, here too the difficulty to distinguish the attributes between two brands is high because the meaning imparted by both the ads for both attributes in terms of 'high' or 'low' are readily available and quite similar. However, if the ad for Brand X claims that it has 1 gram of fat and the ad for Brand Y claims 2.2 grams of fat, these two pieces of information may be relatively easy to distinguish because they do not readily convey meaning[14]. Huber (1980) studied the effect of the mode of attribute information on different aspects of decision-making. By using verbal or numerical information with numerical labels operationalized as anchors on a rating scale, the author characterized the decision alternatives either numerically or verbally. Results showed that evaluations were made more frequently on verbal information as its values are evaluative in nature, whereas computations of differences and maximum values were performed more frequently on numerical information. However, the decision alternatives were not matched, so a direct comparison could not be made. To exemplify, when the number of alternatives was small, numerical representation appeared to invite more attribute based comparisons than verbal representations.

A major difficulty that is encountered when designing an experiment investigating the effects of different methods of expressing information about the same attribute is the choice of a common framework. In any case, the numerical information has to be translated into verbal representation system before a comparison could be made. Hedonic price techniques are sometimes presented as a method to infer consumer reaction to information that is presented in the marketplace and to discover where new information or education of consumers is needed. These findings are consistent with the notion that evaluativeness forms an important part of the meaning of verbal information (Osgood et al. 1957). Holbrook (1978) used larger proportions of numerical versus verbal information to operationalize factual versus evaluative messages. It seems that numerical information may be easier to utilize in making overall evaluations along specific units of measurements when compared to verbal information. Studies of verbal probability expressions have found a high variation in the magnitude values assigned to verbal expressions as well as a high degree of overlap (Byeth-Marom, 1982). However, Erev and Cohen (1990) exploring the communication mode preference paradox[15], found no difference between the efficiency of the verbal and the numerical assessments.

In general, studies point to the differences between numerical and verbal information more in terms of their precision with which magnitudes are conveyed. Verbal information is argued to lead to more overlap with each other during a comparison process due to their imprecision, thereby necessitating more repeated observations to arrive at a comparative judgment (Jaffe-Katz et al., 1989). High intra-individual variability, specifically in terms of information context, and inter-individual variability in the interpretation of verbal expressions have been cited (cf. Pepper, 1981). It appears that information in a verbal mode is interpreted as

[14] The meaning imparted is based on a reference information

[15] The occurrence of judgmental biases was unrelated to communication mode, but the conjecture fallacy was marginally related parameters such as involvement (e.g., monetary incentives for the subjects).

conveying relatively discrete nature of representation (Viswanathan and Narayanan, 1994) as compared to numerical information. Drawing a parallel with categorization research (cf. Cohen and Basu, 1987), information in a verbal mode typically conveys broader magnitude categories than numerical information. Research suggests that the efficacy of numerical and verbal information depend on part on the individual's cognitive capability (Leung, Low, and Sweller, 1997). The authors compared numerical information in the form of equations to verbal information in the form of words. They suggested that in studying numerical information (equations) with unfamiliar notations, a heavy extraneous load, cognitively, is generated because mental integration of notations (for e.g., unit specific unit of measurement) to infer the appropriate meaning is required. In addition, a numerical notation that was familiar to the subjects was found to be more effective than its equivalent information in a verbal mode. Explanation from a numerical cognition perspective suggests that, after a subsequent period of usage and practice of notation(s) by individuals, their processing may become automated and the cognitive load may be reduced during processing (cf. Leung, Low and Sweller, 1997).

The overall examination of differences between the two types of information mode leads us to believe that numerical information in their communication is more precise as compared to its verbal counterpart. The following section examines the preference for numerical information in a context of comparing information mode along the lines of precision versus vagueness.

2.6 Preference for a Specific Mode of Information

It is commonly thought and widely argued that numerical information is precise and involves unambiguous communications that allow expected value or utility calculations. On the contrary, verbal information have been acknowledged to be vague, are subject to different interpretation by different individuals, and not useful for meaningful calculations (Behn and Vaupel, 1982; von Winterfeldt and Edwards, 1986; Paolos, 1988; Steen, 1990). By examining the literature on preference for numerical information (PNI) we can understand how frequently consumers use and understand numerical information (precision versus vagueness). Therefore, reviewing the function of preference becomes necessary. This section of the literature review borrows from arguments by Budescu and Wallsten (1995); Olson and Budescu (1997); Wallsten et al. (1993); Viswanathan (1993).

Preference for numerical information is defined as "the proclivity toward using numerical information and engaging in thinking and involving numerical information" (cf. Viswanathan, 1993). Past research has also addressed issues regarding the ability to use numerical information. Attitude toward numerical information in an advertising perspective has not been addressed and measured, although some researchers have acknowledged its importance (cf. Evans, 1989). Some examples are the development of scales toward the measurement of change in attitude for statistics among students of introductory statistics (Wise, 1985), attitude toward mathematics (Aiken, 1974), attitude and levels of numerical knowledge among adults and children (Shepherd, 1984; Webb, 1984)[16]. For the notes just described, it can be suggested that the quality of numerical expressions can be evaluated more clearly, whereas that of its verbal counterpart cannot. Wallsten, Budescu and Zwick (1993), noted in their study that given an opportunity to choose between precision (numerical estimates) and vague adjective descriptors (verbal estimates) under different conditions, there was a clear preference for numerical information as a mode for precise communication (i.e., with the numerical mode chosen in approximately 75 percent of the cases). The strength of the information mode argument is the distinction between numerical and verbal information. While most conveyors of information used verbal terms when

[16] Wise (1985) in his study, describes the development and validation of a new scale referred to as ATS (Attitude Toward Statistics) to be used in the measurement of attitude change in introductory statistics.

expressing their opinions spontaneously, most decision-makers preferred to receive numerical probabilities. It has also been suggested that adjective descriptors are ambiguous and the uncertainty of verbal information is consistent across people, however, they vary from one individual to another (also see Budescu et al., 1988; and Wallsten et al., 1985).

Lack of a strong reason for why one type of information mode should be or is preferred over the other is still a question that needs to be thought of in detail. In general, people often are reluctant and resist expressing information that is numerical or quantitative (Budescu et al., 1988). One reason that is quoted in favor of preference for verbal information is that it is perceived as easier to understand in forming a judgment (Budescu and Wallsten, 1985 & 1987; Wallsten and Budescu, 1990). The ease in understanding verbal information can be attributed to its ability to deliver meaning directly. For example, both advertisers and researchers in advertising tend to prefer using verbal information while receivers of the ad are partial to numerical information (Brun and Teigen, 1988; Erev and Cohen, 1990; and Wallsten et al., 1993). Irrespective of the how complex numerical information can be, preference for numerical information can influence the usage, interpretation, and thinking. In addition, some subjects report being quite willing to modify their preferences for a particular mode of information when the original mode of communication is not enough to make a judgment and one that is contingent upon different situational factors (Erev et al., 1991; Wallsten et al., 1993).

The proclivity towards using numerical information (Viswanathan, 1993) also follows the direction of communication that has also been found to affect preferences for a mode of information (Brun and Teigen, 1988). In comparing verbal and numerical probabilities of a game event payoff structure, findings show that subjects readily switched their preferences for verbal or numerical modes of expression depending on which was more rewarding. Hence, individual may prefer numerical information but, if h/she lacks the ability to interpret the information, the evaluation may not be precise enough to make an accurate decision.

2.6.1 Preference as an Indicator of Subsequent Judgments

Advertisers are aware that consumers are exposed to numerous amounts' of uncertain information and that they must also use this information for making decisions irrespective of just choosing a specific mode of communication (Budescu et al., 1988). It is therefore reasonable to expect that preferences for a particular mode of information (Viswanathan, 1993) will influence how the information is encoded, retrieved, and then processed during decision-making situations (Olson and Budescu, 1997). For example, if there is a strong preference for needing numerical information during decision-making, then it is expected that equivalent information in a verbal mode will be treated totally differently. However, if the verbal information is considered to be less precise and ambiguous it may be discounted right away upon receiving such information (see Budesu et al., 1988; Erev et al., 1991). In the dyadic study, Budescu and Wallsten (1990) found that individuals receiving verbal information systematically interpreted its content as less extreme than what the advertisers intended. However, if the consumer perceived the verbal information as more realistic during processing and decision-making, then it is possible that the numerical information will be ignored or discounted (Windschitl and Wells, 1996; Zimmer, 1983). Therefore, in general, when information either in a verbal or numerical mode is discounted or ignored, it is expected that its influence on decision will also be reduced.

2.6.2 Underlying Precision of Communication of Information Mode

Despite our knowledge of how well consumers use numerical and verbal probability expressions, we have little systematic information regarding relative preferences for the two modes of expression. Two important issues discussed on the usage and preference for a particular mode of information are (a) how people use and understand numerical and verbal representations and (b) the conditions that affect their preference for the use of each.[17] People frequently use vague verbal terms in issuing forecasts or describing opinions regarding uncertain events (Beyth-Marom, 1982; Budescu and Wallsten, 1987). It has been speculated that verbal terms are sometimes favored because they seem more natural, are easier to use and understand, and they reflect the degree of precision in the advertiser's opinion (Budescu and Wallsten, 1990). Preferences may develop in response to external factors such as a reflection of more basic psychological principles (e.g., Erev et al. 1991). For example, preferences might be based on a desire for balance between levels of precision in the representation and the underlying uncertainty of the information presented (Budescu and Wallsten (1995). Budescu and Wallsten (1995) also suggest that the vague representations of uncertainty, such as, verbal information, depend on internal sources, such as imperfect knowledge, while precise numerical information depend on external, quantifiable sources with or without reference information for comparison (cf. Olson and Budescu, 1997). This suggests that the preference variable depends on the underlying precision of the information conveyed.

With reference to preference and underlying precision, Wallsten et al. (1993) found that their survey responses indicated a general preference for receiving information numerically and conveying the piece of information verbally. They also found that subjects indicated a preference for numerical information when the situation was unimportant or when the information base was weak. Behn and Vaupel (1982); Von Winterfield and Edwards (1986) pointed out that regardless of the direction of information, their respondents quoted numerical information to be accurate and precise, and subjects preferring the verbal information stated that it was easy to understand. Preference for numerical information may also be important in terms of its relationships with constructs from past research that tap individual differences in interests, knowledge structures, and temperaments that may involve the usage of numerical information. In situations where consumers are using numerical nutrition information to make a product evaluation, only a basic level of quantitative ability may be required to use the numerical information, even though oversight of numerical information during an evaluation may lead to poor decision-making. To use numerical information requires interpreting the meaning conveyed by it to make proper decisions. Interpretations of numerical information may only require a basic knowledge of mathematics, such as for comparing numerical information to some reference information to derive the meaning conveyed by it (cf. Viswanathan, 1993). Cohen (1996) examined health policy implications of providing smokers with tar yield information in cigarette advertising in a numerical mode[18]. Results showed that few smokers knew the tar level of their own cigarettes (except 1 mg to 5 mg tar cigarette smokers) and the majority could not correctly judge the acceptable relative tar levels of cigarettes.

Viswanathan (1993) also noted that in situations where only a basic knowledge of math is needed, that the utilization of numerical information might be largely influenced by the attitude

[17] Much of works on information mode comparison and preference reviews are documented by: Wallsten (1993; Olson and Budescu 1997; Budescu and Wallsten 1990; Budescu, Weinberg and Wallsten 1988; Budescu and Wallsten 1985; Wallsten, Budescu, Zwick and Kemp 1993; Wallsten, Budescu, and Zwick 1993).

[18] A national probability telephone survey on smokers' knowledge and understanding of tar numerical values and the percentage of tar delivered was conducted on a sample of 1,005 adults. Consumers who smoke were not sure whether switching to lower tar cigarettes would reduce their health risks (smokers did not understand the minimum and the maximum tar value information provided in a numerical mode). Many smokers relied on absolute numbers in making trade-off between number of cigarettes smoked and their tar levels.

toward numerical information and not by the ability or motivation. Irrespective of the ability or motivation to use numerical information, it is easier to compare with other numerical information because there is less interference among numerical values (Viswanathan, 1993). This line of thinking is evident from the study by Jeff-Katz et al. (1989). The authors focused on the comparison of pairs of numerical labels, pairs of verbal labels and pairs of numerical-verbal labels. It was hypothesized that faster comparisons were made for pairs of numerical labels when compared to verbal probability expressions. They stated that the relatively precise nature of numerical expressions leads to less overlap and interference between a pair of numerical information. Verbal information was argued to lead to more overlap and more confusion with each other than numerical labels because of their imprecision, thereby resuscitating more repeated observation to come to a judgment.

In summary, the preference factor is important in terms of its relationships with consumers' cognitive styles, encoding that may involve the usage of numerical information. Because numerical information is precise and non-evaluative in nature, preferences for it may be related to tendencies toward being analytic or more elaboration being needed that may involve the usage of numerical information. (Viswanathan and Narayanan, 1994). In examining the comparative judgments for numerical and verbal labels, it was found that the comparison of pairs of numerical labels is easier than the comparison of pairs of verbal labels or numerical-verbal pairs. The findings of their study provide additional support for the impact of format of information presentation on information processing which has been reported in a previous research (Lindberg, Carling and Montgomery, 1993).

Table 1: Summary of Selective Empirical Studies on Information Mode

Study	Task	Manipulation of Information Mode	Stimuli		Key Findings
			Numerical	Verbal	
Viswanathan & Narayanan (1992)	Learning Vs. Choice	Within subjects	2-10 Rating scale	Very poor to excellent	More attribute-based search & less processing time for numerical information
Viswanathan & Narayanan (1994)	Choice of high/low labels	Within subjects	12 digit display width	Wide display width	Faster comparison for numerical labels
Jaffe-Katz et al. (1989)	Choice of high/low probabilities	Within subjects	Percent 20%	Unlikely	Faster comparisons for numerical labels
Viswanathan & Childers (1996)	Learning Vs. Choice	Within subjects	12 digit display width	Wide display width	Higher recall and recognition and lower processing time for numerical information
Childers et al. (1992)	Learning Task	Within subjects	Battery life 400 hours	Long battery life	Faster recognition of numerical information
Viswanathan (1994 1995)	Judgment task	Within and between subjects	125 calories	High calories	Higher recall and recognition for verbal information

Study	Task	Manipulation of Information Mode	Stimuli Numerical	Verbal	Key Findings
Scammon (1977)	Exposure to an ad for butter	Between subjects	Niacin content 20% of RDA value	Niacin is 'good'	More accurate identification of nutritious brand for verbal information
Viswanathan (1994, 1995)	Judgments task	Between and within subjects	125 calories	High calories	Verbal information was given more weight during judgment
Artz & Tybout (1991)	Exposure to product claims	Between subjects	60% reduction	Significant-reduction	When source trustworthiness increased, favorability of attitude for verbal information
Yalch and Yalch (1984)	Exposure to teller ads	Between subjects	95% of the bank tellers.	Virtually all bank tellers	As source expertise increased favorability of attitudes were toward quantitative information

2.7 Section Summary

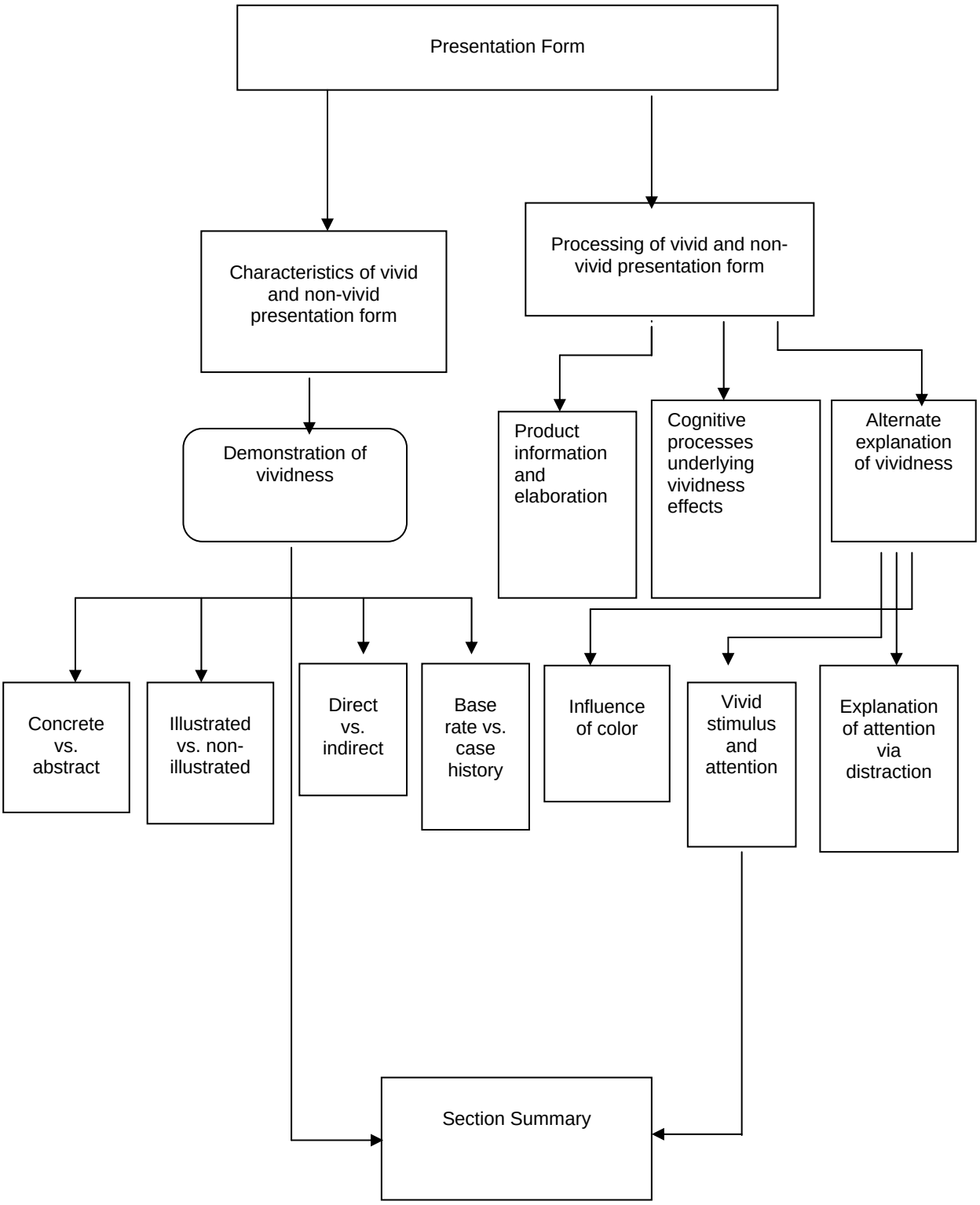
The main focus of this information mode literature was to understand the two widely used modes of information in marketing communications. More emphasis was put on numerical mode of information as it has more parameters in the characteristics in comparison to verbal information. Specifically, numerical information such as 35.7 calories is characterized as a number in the context of a unit of measurement whereas verbal information such as 'high calorie' is characterized as a generic descriptor. Overall, from reviewing literature it is understood that numerical information is inherently more precise than verbal informational inputs, thereby rendering adjacent attribute levels more indistinguishable in the verbal than in the numerical mode. Numerical information is argued to be easier to compare and distinguish from other information than is for verbal information. Numerical information is also more specifically linked to an attribute when compared to verbal information. It should also be noted that there is a lack of understanding on how consumer expertise moderates the processing of numerical and verbal information, even though some research in the past has focused on numerical versus verbal information.

In summary, the study of attitude toward information mode and recall, and the importance of information mode have several applications in settings that involve the usage of numerical and verbal information. Application settings include the ability to process information, comprehension of information, and preference for a mode of information. Using these lines of reasoning and with relevant literature in commercial memory and advertising research, hypotheses are derived and tested for recall and attitude of the information mode.

2.8 Presentation Form

This section reviews the concepts and characteristics behind the vividness effects and how they influence one's memory and judgment. Researchers have identified two types of presentation forms: (1) vivid and (2) pallid presentation (non-vivid). Vividness has been conceptually defined as a "communication characteristic achieved by qualities of a message that enhance cognitive elaboration" (see Taylor and Thompson 1982). This effect is usually achieved by the use of product pictorials, symbols, and colors that may have a superior ability to attract the attention of consumers. Vividness also has been defined as "producing strong or clear expressions on the senses" (Webster's 9th New Collegiate Dictionary 1983). A vivid stimuli "is likely to hold our attention and to excite the imagination to the extent that it is emotionally interesting; concrete imagery provoking and proximate in a sensory temporal or spatial way" (Nisbett and Ross (1980, p. 45). On the contrary, non-vivid information lacks these characteristics that vivid information has. Therefore, it has been presumed that vividly presented information is more likely to attract and hold our attention than non-vivid information: (1) is likely to hold a favorable attitude towards the product and (2) enhances the likelihood of usage leading to product use information. This section of the chapter will review the literature on the (a) characteristic differences between vividly and non-vividly presented information; and (b) processing differences between vivid and non-vivid presentation form. A flow chart in figure 6 illustrates the organization of the presentation form literature review.

Figure 5: Organization of Presentation Form Literature



2.8.1 Technology and Presentation Form – Primer

It is no secret that there is a fundamental transformation occurring in the nature of business communication today. More than a revolution, it is literally an explosion of advertising innovation, as well as complexity in the advertising techniques and change that takes the form of new technologies, new enterprises, business strategies, and an extraordinary array of original products and services. Common wisdom expounds that both the chicken and the egg -- the impetus and the answer -- for all this change is the information portrayed and its relentless drive towards making the advertising message more efficient. The new drive toward advertising, for example, is through the internet and is emerging as a new medium vying strongly with the more traditional media (Yoon, 2003; Zhang, 2000; Li and Bukovac, 1999). For instance, in order to promote attention on internet, one presumably has to perform the task of seeking information from a sequence of scattered web pages to form a meaningful path (Wang and Day, 2007; Rodgers and Thorson, 2007). The aim of their study was to explore changes in the distribution of attention to banner advertisements for all product categories (cf., Cho, 2003; Dahlen, Ekborn, and Morner, 2000).). Today companies are realizing the strategic advantages that innovative advertising via creative product claims can make provision for an increase in ROI, better flexibility to change, and access to best-in-class advertising practices. In addition, companies are also looking for and executing new and innovative ways to leverage the claims to a profitable sale, and one by inducing a positive receptiveness for the consumer.

The importance of advertising innovation to business success at this point in time cannot be denied. Innovative technology has to be continuous, creative and fast. Companies cannot survive without finding avenues to product claims without utilizing the latest technologies for creating a persuasive ad (Biocca, Daugherty and Li, 2002). Hence, this urgency and importance to define the state of presentation form (vividness) with different creativity. The migration from traditional media formats to the digital formats (Huang, Leong, and Stanners, 1998) such as text descriptors, and imagery and multi-media functions in product claims, provides us the information with added clarity that is not visible in the traditional advertising. For example the usage of color combinations in the formulation of an ad enhances the clarity of the inherent message intended to the consumer. Color, hence, plays a varied and important role throughout human exposure to conditions that influences decision-making. They also help with the recognition of different object portrayed (applicable to ad creation). Certain objects are very closely linked to their color and helps consumers immediately recognize them. This enables us to store, process, and recall the information in a more efficient manner. This has led the formerly distinct industries of media, telecommunications, and information technology to converge. Advertising agencies and mass media organizations have traditionally targeted content production towards a single delivery channel. However, recent economic and technological changes in the advertising industry have led content providers to extend their brands to cover multiple delivery channels.

2.8.2 Characteristics of Vividly and Non-Vividly Presented Information

Vividly presented information is used in communication because it attracts more attention than non-vivid information, thereby increasing the perceived importance of the presented information (Mackenzie, 1986). Hence, a presentation form that grabs an individual's attention and is able to evoke imagery is considered to be a primary characteristic of vividly presented information. A common belief among marketers is that increasing the vividness of a message enhances its persuasiveness. This belief seems to have a logical reasoning and has received support in empirical research, although vividness also has been found to undermine persuasion or to have no effect. Manufacturers employ logos and trademarks as a corporate strategy to distinguish their

products; brand managers rely on television and pictorial media to promote their brands; advertising agencies use intense copy strategies that tend to induce consumers to picture. These, for example, appear to predict that vividly presented information is more persuasive than non-vividly presented information. We can also argue that the vividness concept is just an empirical question by itself and it depends on the quality of the presentation (picture-clarity, picture-size, color, background texture, and font size etc).

Empirical studies of vividness effect are still questioning the credibility of vividness in advertising, in spite of its popularity. Although one might expect a vividly presented communication to be more persuasive than a similar message presented in a non-vivid form, previous studies have not consistently supported such a view (also see Chaiken and Eagly, 1979, 1983; Kisielius and Sternthal, 1984; Mitchell and Olson, 1981). Researchers have also expanded their investigations towards why vivid pictures are more easily recalled. The frequent use of vividness as a persuasive communication in advertising has led to a wide spread belief in this part. It is also evident that the vividness of a message does not affect persuasion (see Taylor and Thompson, 1982). Despite the absence of a proper explanation for vivid effects, and with the empirical evidence supporting a conceptually sound phenomenon referred to as salience[19], it was proposed that the persuasive effects of vividness can be observed only under conditions of differential attention (Taylor and Thompson, 1982). For instance, it has been suggested that the non-vivid version is given as much attention as the vivid version when each is presented separately, which explains why studies that have relied on such manipulations have been unable to produce reliable results for vividness.

One problem facing the vividness research is the failure to distinguish between a vivid and a non-vivid presentation form (Taylor and Thompson, 1986, p.173). A study that presented messages on 2 social issues tested the idea that vividness effects are most likely to occur when the message recipients are not constrained to pay attention to the information. When a low level of attention constraint was established by presenting a message to individuals in a seemingly incidental manner, vivid messages were less memorable and less persuasive than non-vivid messages. Process data suggested that the vivid elements in a message (i.e., colorful language, picturesque examples, and provocative metaphors) interfered with the individual's reception of its essential meaning and thereby reduced its memorability and persuasiveness. In contrast, when the subjects' attention was constrained by instructing them to attend to a message, its vividness had no impact on their memory for its contents or on it persuasiveness. Persuasion can be measured by asking subjects to render attitudinal judgments about the message advocacy. Therefore two questions can be raised: (1) Under what situation does a vivid presentation has an effect on recall and judgment and (2) What kind of presentation factors is necessary in the ad that is likely to produce reliable vivid effects?

In testing the impact of vivid print and television ads and its effect on persuasiveness, findings show that persuasiveness was increased equally across the three ad channels when the ads were more vivid (Fogarty, 1995). Researchers who have examined vividness effects have acknowledged judgments to be very much opinionated toward relevant information that is most accessible in memory (Nisbett and Ross, 1980). On the contrary, non-vivid information lacks these characteristics that vivid information has. This distinction in characteristics between vivid and non-vivid information is exemplified in a study examining the relationship between longevity and physical exercising. According to the statements reported in Time magazine, *"people who are active and fit can expect to live a year or so longer than their sedentary counter parts" versus "for each hour of physical activity you can expect to live that hour over and live*

[19] Salience is closely linked to attention. For example, attention selection and engagement are determined bottom-up by the salience of ad objects and top down by their informativeness to consumer goals. Ad objects capture attention reflexively and immediately when they are salient (see Parkhurst, Law, and Niebur, 2002).

one or two more hours to boot" (Elmer-Dewitt 1986). Here both statements relay the same message, but the second part of the statement is more vivid and concrete than the first. In theory, vividness is manipulated by the use of concrete or abstract versions of the appeal, the presentation format or the presence and absence of instructions to image the message (Kisielius and Sternthal, 1984). Kisielius and Sternthal (1984) also found that verbal information presented alone was shown to induce more message consistent judgments than verbal information accompanied by pictorial analogs. The authors used the availability-valence hypothesis to test the vividness effect, wherein the judgment depended on the favorableness of the information available in the memory. Their findings showed that verbal information alone yields a more favorable judgment with the cognitive elaboration of information, since they were expected to inhibit favorable judgment. The lack of cognitive elaboration may also lead to interpretation difficulties, which in turn inhibits judgment. Furthermore, the interpretation difficulties arise when different presentation forms were used to operationalize vividness (Mitchell and Olson 1977).

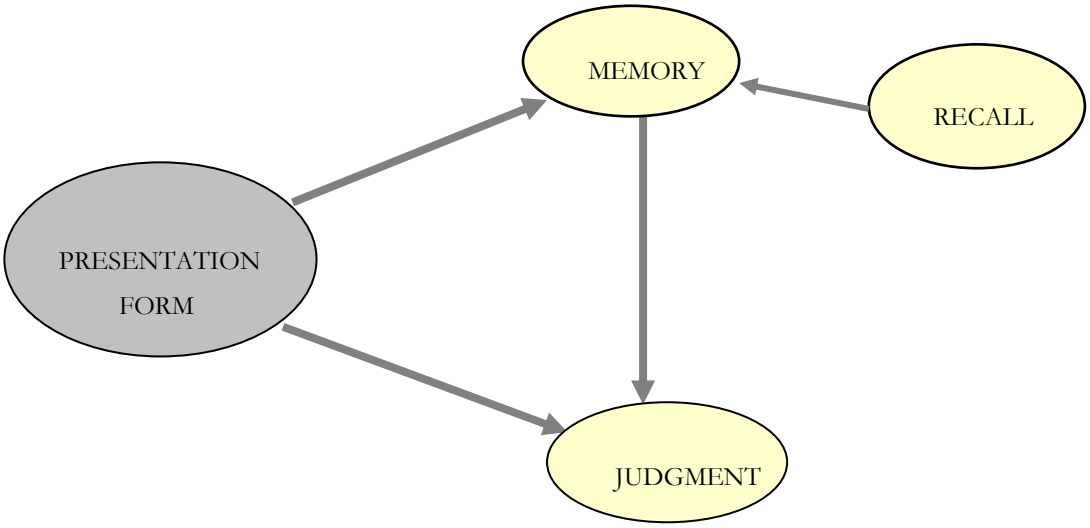
It was noted by Rossiter and Percy (1978) that one cannot determine whether the significant judgment effects observed are due to inter-treatment differences in the information presented or to imagery. On the other hand, results show that vivid presentation is better recalled than non-vivid presentation, since recall affects judgment (Bower 1970), and (Lutz and Lutz, 1978). Contrary to findings by Bower (1970), and Lutz and Lutz (1978), results from Taylor and Thompson (1982) found no difference between the recall of vivid information and non-vivid information. Studies by Reyes, Thompson and Bower (1980) also provided inconsistent results, though some findings indicate that vividness does enhance persuasion (see Taylor and Thompson, 1982). In order for a vivid presentation to be persuasive, it needs to gain attention. With reference to vivid presentation competing for attention, Cornoldi et al. (1992) conducted four experiments: (1) in the first experiment the subjects' generated vivid images using one of the six characteristics (color, context, detail, genericity, saliency, shape and contour) at a time. Results indicated that their overall vividness ratings were not influenced by the characteristics, while recall was enhanced by color.

In the second experiment, the subjects created six images for each item, each with a specific characteristic. Results showed that the most frequent characteristics associated with recalled items were saliency, context and color. The third experiment assessed the contribution of the six characteristics when they were all present in the same image. Results indicate that higher vividness ratings corresponded to better recall. In the fourth experiment subjects created images first, where they enriched themselves by adding the characteristics one at a time, and then the vividness of the image. Results showed that the different characteristics related to different experience of image vividness. McGill and Anand (1989) also pointed out that vivid information is more imaginable, and more intense than non-vivid information. The authors predicted support for the divided attention hypothesis when vividness was manipulated in a manner more relevant to the judgment. Their results indicated that a procedure of placing vivid and non-vivid information in the same message might not be sufficient enough to produce an effect for vividness. During high elaboration tasks, subjects appeared to absorb the vivid attribute's higher influence more than non-vivid attributes. These results provide additional insight into the role of cognitive elaboration in producing vivid effects.

As a vivid presentation form is disproportionately influential on availability of information (Taylor and Thompson, 1982; and Taylor and Wood, 1983), it is necessary to review and highlight the characteristics of the availability model. Shedler and Manis (1986) were the first ones to directly test the availability model to explain vividly presented information on judgment. The authors were interested in examining the model to explain vividness effects using a causal model procedure (see Figure 6). They found that vividness significantly affected and influenced both memory and judgment independently. There are different processing objectives

involved with different evaluation and judgment tasks for example, immediate task and memory based tasks.

Figure 6: Shedler and Manis - Established Causal Model



The processing objective is apparent to those making immediate judgments before they encounter any information, though it is different in the case of memory base judgments. Individuals must extract specific items from long-term memory into working memory to make a memory base judgment, and the judgment will necessarily be based on information available in memory (cf. Hastie and Park, 1986). When particular information is not in the memory, it then will not be able to influence the judgment. The importance of the availability model is that, a positive relationship can be expected between recall and judgment during a memory based judgment task. Furthermore, judgment and subsequent evaluations will be consistent with the type of information recalled either in a vivid or non-vivid form. Hastie and Park (1986) also found support for the predicted memory-judgment and evaluation relationships. The relationship between memory and judgment were dependent on the individual's processing objectives. According to the independence explanation, delayed- judgment vividness effects result from initial judgments (for example, via differential attention to or differential perceived value of vivid information) which then are stored for later recall. Their results were very different from Reyes et al, who found that judgments were significantly correlated with the arguments the subjects had recalled, memory based judgments.

Tverskey and Kahneman (1973) described the availability heuristic[20] as "estimates frequency or probability by the ease with which instances or associations could be brought to mind." Some of this may be relatively easy to access, although other information is less accessible. This accessibility or ease of recall is termed as "availability". If one can easily retrieve examples from memory, one infers that the event must be fairly frequent or common and/or well rehearsed. In order to make evaluations one needs to recall relevant information from memory. Information that is more available in memory will be utilized more in making the evaluation than information that is not readily available. In the areas of social cognition (Wyer and Srull, 1989) and evaluative processes (Hastie and Parks, 1986) the availability of information in memory has been seen to influence estimates and judgments (DeNisi, Cafferty

[20] A frequently researched heuristics pertains to the availability of information in memory (Tversky and Kahneman, 1973; Shedler and Manis, 1986). Specific to their research, an individual may hold large amount of information in memory that is potentially retrievable under suitable conditions.

and Meglino, 1984). If the information in memory is accurate and undistorted, the availability heuristic will serve its purpose for the individual making the evaluation. Hence, we can note that a vivid presentation stated that vivid information is more likely to be stated and remembered than non-vivid presentation. At the time that Nisbett and Ross (1980) first described the vividness effect, research had not yet explored the effect of vividness on judgment and decision-making. They noted that that the attention and processing concept arose from the intuitive obviousness of a vividness presentation. Therefore, information that is easily remembered is by definition more available and thereby likely to be retrieved at some later date and affect inferences (p.45). According to Taylor and Thompson (1982) "everyone knows that vividly presented information is impactful and persuasive." Hence, factors that affect the flow of information can affect the availability. Situational settings that are uncomfortable and grossly embarrassing to think about can push people into denial, making these thoughts unavailable. This may also be why we can seem egocentric: because our own experiences are more available to us. With reference to consumer behavior, Taylor and Thompson also suggest that vividness effects occur under conditions of differential attention. For instance, when an incoming message must compete for an individual's limited attentional resources, then vivid information may capture attention whereas non-vivid presentations might be overlooked. Winkler, Tebbets, Jemmott, and Johnson (1979) provided additional support for a differential influence of vivid information on immediate judgment (cf. Taylor and Thompson, 1982). Reyes et al (1980) and Winklers et al (1979) results also suggest that delayed judgments are biased by vivid information while immediate judgments are not.

2.8.3 Demonstration of Vividness in Past Studies

This section on vividness extrapolates the research by Taylor & Thompson (1982). Lets start with itemizing the studies that have examined the effectiveness of vividness on judgment. For example, studies on vividness were done by manipulating concrete specific language versus pallid abstract language; pictorially illustrated versus documented written text; case-history information versus other forms of presentation (Taylor and Thompson, 1982). A few other ways of demonstrating vividness are via semantic contrasts and three-dimensional advertising. Semantic contrast is a technique that's introduces the product using the natural color of the actual product (e.g. Motrin-Orange), although, creating the background scene as black and white. This can be conceptually treated to create a vivid presentation. Three-dimensional advertising is yet another way of creating a defined vivid presentation (Li, Daugherty and Biocca, 2002). The vividness created is based on an innovative form of interactive print advertising that provides pre-purchase options using 3-D visualization technology to simulate real products (Coyle and Thornson, 2001). However, most of the studies have always taken into consideration the information concreteness aspect during a manipulation of vividness. Information concreteness is defined as the degree of detail and specificity about objects, actions, outcomes, and situational context (Mackenzie 1986). It should also be noted that studies in the area of vividness have only yielded mixed results.

2.8.4 Concrete versus Pallid Information

Initial reference to vividness has always been through in terms of concreteness of the language. For example, Reyes, Thompson and Bower (1980) had two subject groups read a description of a court case involving drunk driving. All the subjects were given the same evidence. The only difference in the experiment between the two groups was the vividness of the arguments. Results showed that subjects recalled more evidence that disagreed with their initial impression of the

defendant. Their judgments reflected their differential recall. Subjects who had read vivid prosecution arguments judged the defendant to be guilty more often than those in the vivid defense condition. By manipulating the concreteness of language, researchers also found results consistent with the Reyes et al. study. Borgida (1979), Frandsen (1963) and Gotlieb, Taylor and Ruderman (1977) failed to find a bias in favor of vivid information on judgment and/or recall measures collected shortly after the information had been presented. However, Shedler and Manis (1986), Beighley (1952), and Taylor, Wood and Thompson (1988) found that subjects were in favor of the vivid information on immediate judgments and/or recall measures.

In summary, approximately seventeen percent of the immediate judgment measures favored vivid information. Thirty three percent of the recall tests given right after the information had been presented were in favor of more vivid information. Therefore vivid information representing concreteness should be able to influence a more favorable attitude than non-vivid information.

2.8.5 Illustrated versus Non-Illustrated Vividness Information

It has been argued that pictures make information more imageable and thus are more vivid than information in written form (Taylor and Fiske 1978). Written information supplemented with a pictorial illustration is considered more vivid than the written information presented alone[21] (Pieters and Wedel, 2004; Manis, Dovalina, Avis and Cordoze, 1980; Shedler and Manis, 1986 and Sullivan and Macklin, 1988). This more image-able information was found to be readily available in memory and therefore have a disproportionate influence on judgments (Taylor and Fiske, 1978). The multiple pictorial cues along with the message embedded in the ad are considered to be more vivid than just a bland message as a standalone entity. However, across these illustrations, there was no support for vivid information having a biasing influence on immediate judgments when vividness was manipulated. Manipulation was in terms of a supplemental illustration. Half of the recall tests given right after presentation resulted in the information with illustrations being recalled more often than the information that was presented only in written form. As with studies on concrete manipulation as vivid studies, all recall measures were biased in favor of the more vivid presentation. Therefore a pictorial illustration along with a written form of presentation of attributes or scenarios should be able to provide a more favorable reaction towards vivid information than with just the information alone.

2.8.6 Direct Experience versus Indirect Experience

Manipulation of direct-experience-research has been used by several researchers Borgida and Nisbett (1977); Croft, Stimpson, Ross, Bray, and Breglio (1969); Frandsen (1963); Keating and Latane (1976); Sullivan, Andrews, Hollinghurst, Maddigan and Noseworthy (1976-1977); and Tyler (1980).Scenarios and events that are experienced directly are postulated to be more vivid for an individual than casual experienced events (Borgida and Nisbett, 1977). When an individual experiences something personal, the experience becomes more proximate in sensory, temporal, and spatial ways as well as more emotionally stimulating and interesting than indirect experience. Therefore, an individual should be able to remember personally experienced events better than indirect experience, and therefore be more influenced by them when making later judgments or evaluation. Hence, any direct and personal relevance to events during the presentation of the information is considered to be vivid and therefore may be influential during

[21] For example, a milk product category ‘Jersey Maid’ that just says ‘very high’ in fortified calcium and vitamins. This is compared with another milk product category ‘Lactancia’ that says ‘high’ in fortified calcium and vitamins. This is included along with other pictorial cues in the background (e.g., a cow, healthy happy family drinking milk, an athlete running or swimming and a text stream ‘milk does the body good for a healthy diet’).

later judgments. The results from the above authors reveal that seventy-five percent of the recall tests favored the more vivid information.

2.8.7 Base Rate Information versus Case History Information

According to Nisbett and Ross (1980), case-history information is posited to be more vivid than most probative, statistical, and data-summary information because of its more concrete and emotionally stimulating nature. The most frequent manipulation for this kind of vividness involves presentation of a single case study versus statistical information of greater evidentiary value (Hamill, Wilson and Nisbett, 1980). Results showed that the case-history information had a significant influence on judgments concerning attitudes while base rate information did not. Their immediate judgments were influenced by the vivid case history but not by the pallid statistics. Other studies also provide support to the above results (Nisbett and Borgida, 1975, Ginosar and Trope, 1980).

2.9 Processing of Vivid and Non-Vivid Presentation Form

Different processing strategies exist in order to perform tasks that are based on varying degrees of processing demands. Processing demand is sometimes referred to as 'information competition', and has been found to be a boundary condition for vividness effects (Wilson et al. 1989). The level of processing demand is high in scenarios that place a large demand on attention (such as an overload of information or multiple tasks) and the demand is low for situations where the processing is less intensive when compared to the high processing demand. It was found that as the amount of information presented increased, individual's ability to recall the situation significantly decreased. In other words, greater processing demand attenuates recall (Kimble and Zehr, 1982; Loftus, Dark and Williams, 1979). An explanation for this processing demand and situational recall can be attributed to the different processing strategies executed by the individual. Information processing strategies may be different when individuals expect to perform a demanding task than when they expect to perform a similar task that poses minimal demands on the subject (Higgin and Lurie, 1983). Social psychological research has found that recall was more profound when students were presented with small amounts of information (Culross and Davis, 1989). Jacoby, Speller and Kohn (1974) examined consumers' brand choice behavior. Their results showed that as number of brands presented to the consumers increased, the consumers reduced the time they spent to acquire the information. Furthermore, they also reacted to the quantity of information presented to them by giving less attention to the information presented. Consumers could be expected to be more susceptible to the vividness effect, if they are not carefully focusing on the more relevant attribute information. A lower processing capability will result in no vividness effect since an individual will be using a relevant focused strategy when processing the information. However, in conditions requiring more elaboration the individual's strategy is expected to become focused less carefully and hence, one would then be prone to process a presentation that is more vivid than non-vivid. It has also been suggested that higher emotional interest of a vividly presented information leads to an effective processing and encoding, thereby increasing the availability of the information.

Irrespective of the theoretical mechanisms underlying the vividness effect, the availability of vividly presented information will have more of an impact on judgments than non-vivid information. Researchers have also contended that judgments are biased toward relevant information that is most accessible in memory, linking recall with judgment (e.g., Nisbett and Ross, 1980). The vividness literature has set forth several arguments suggesting that when information is presented vividly, it is readily encoded and available for recall and attitudinal judgments. The encoding of a vivid stimuli increases the likelihood of recall at a later time

(Nisbett, Borgida, Crandell and Reed (1976); Bower (1972); Paivio (1971). The availability is dependent on cognitive elaboration that results in a weak or strong encoding. Cognitive elaboration refers to the generation of associations to the information in the message (Anderson and Bower 1979). We will now focus on elaborations induced by vivid presentation and how they affect memory and judgment.

2.9.1 Product Information and Elaboration Induced by Vividness

Studies examining the effects of vividness have stressed that a vivid stimulus would always give rise to cognitive elaborations in favor of the position advocated by the vivid communication. Taylor and Thompson (1982) noted that cognitive elaboration did not provide enough evidence to show that vividness had any effect on memory or judgments[22]. Their consensus was that the persuasive differences between vivid and non-vivid information is questionable, although vividness did have a significant effect on judgment when it was presented in a case-history form. A different approach was taken by Kisielius and Sternthal (1984) involving the availability-valence hypothesis. This hypothesis viewed the vivid stimuli as an agent that stimulates either positive or negative thoughts in response to a communication. The thoughts that are available in the memory during a purchase may later be determined by the valence of the vivid communication. In performing this operation consumers typically did not access all the information they had processed previously, rather, they relied on previously stored information that was most available (see Kisilieus and Sternthal, 1984 &1986).

For the availability-valence hypothesis to be of value, it is necessary to know the factors that influence cognitive elaboration. According to Anderson and Bower (1980), the greater the number of associative pathways, the more easily an individual can access the information based on the availability of that information. According to Nisbett and Ross (1980), within the limits of human resource capacity, an increase in cognitive elaboration of information may lead to an increase in its availability as a basis for judgment. In other words, when attention is limited, and more time that is spent attending to and processing information, the more vivid information of equal or greater relevance is attributed to the inferential task at hand (Nisbett and Ross, 1980, p.54). According to Childers and Houston (1984), it is the elaborate encoding of associative relationships among the stimulus components that aids memory, not the additional cues that are generated. This results in a single memory trace with a strong retrieval path. Bower (1972) noted that a stimulus is differentiated from among other stimuli in an attempt to maximize differences between stimuli. Therefore, in this research the stimulus differentiation argument suggests that a vivid stimulus results in a more distinctive memory code, and provides greater access to the distinct nature of the stimulus. This has a more reliable encoding process than a non-vivid stimulus. Consequently, Jacoby and Craik (1979) also related encoding distinctiveness of an individual to the discrimination of one stimulus from another during encoding. It mainly refers to what is encoded as supposed to the quantity of information encoded. Therefore the cognitive processing and encoding of vividly presented information is more distinct and more available than non-vividly presented information.

2.9.2 Vividness Effects – Cognitive Process

We consider two issues that addresses the cognitive processing underlying the effects of a vivid presentation is: a) is vivid information more available in memory? (b) Does memory serve as the basis for judgment? The Traditional view of effects of vivid presentation is that they occur due to better recall of information and attitudinal judgments being influenced by the recalled

[22] The authors reviewed over twenty-five studies on vividness, and the operationalization of vividness was done in a number of different ways (concrete statements, direct experience, case histories etc).

information. Literature postulates that vivid information is more available in memory than non-vivid information and therefore has more of an influence on judgments. Hence, we will review two general explanations for the increased availability of vivid information in the memory. They are referred to as encoding and retrievability[23]. Vivid information is more likely to be thought about longer and may prompt more rehearsal, more elaboration and effective encoding process. The logic is that, information needs to be encoded if it is to be used later. The first explanation is, vivid information that is concrete and imagery evoking may be encoded only in concrete verbal form (Solso, 1979) and recall of concrete imageable words is better than recall of abstract words (Paivio, 1971). For example, Bhatia (1989) showed that recall was significantly superior among subjects who had been exposed to vivid presentations (also see Ashcraft, 1989). Vivid presentation also had a greater impact than non-vivid version for immediate recall; however, the non-vivid version had more impact during delayed recall when compared to the immediate task.

The second explanation is that the retrievability of information can be influenced by vividness of the presentation. It is possible that both vivid and non-vividly presented information is encoded equally in the memory but that vivid information is just more available. Vivid information has the advantage of being retrieved more easily and faster than non-vivid information. If vivid information is more easily retrieved it will bias judgment. Vividly presented information also induces differential attention, which presumably permits a more systematic assessment of the attributes. Hence, the assessment is affected by the information available for recall. Availability of additional information in memory also provides explanation to the memorability of a vivid presentation form during judgments. It has been suggested that the vividness of information influences the number of locations where information is coded and stored, and the number of pathways from these locations to other information stored in memory. Vivid presentations with colorful and trendy semantic context pictorials should have more access routes to additional information in memory. During exposure to a vivid presentation form, consumers become the recipients of additional colorful, rich supporting images and stored episodes about similar information. This additional information would strengthen the conclusions similar to the vividly presented information that may be originally recalled (Nisbett and Ross 1980).

2.9.3 Distinctive Stimuli and Memorability: An Alternate Explanation of Vividness

Many advertisers are beginning to use concrete language and pictorial symbols in an effort to make the message more vivid and more understandable to consumers in order for them to recall the message later during decision making. The use of vivid stimuli to direct attention to specific attributes of a product's message is increasing. Taylor and Fiske (1978) indicated that attention is usually captured by salient, novel, surprising, or distinctive stimuli. These may be used to enhance the von Restorff effect. In the 'attention age', when the plethora of media around us is constantly battling for a moment of our time, advertisers make much use of this principle, each vying with the other to stand out from the crowd and hence be remembered by

[23] Encoding refers to the acquisition of information and then converting that information into usable mental form (Bower 1970; and Holbrook 1981). Generally, rehearsal is one of the functions that assist encoding. Information that is thought about more often is rehearsed very frequently. Why vividly presented information be attended to and thought about more often can be explained better with respect to the amount of information presented. More vividly presented information means more information in terms of the number of units presented. For example, a vivid description of a crime related to Mr. X involves more code-able information than the non-vivid account of Mr. X's crime. Another possible explanation deals with how emotionally interesting is the vivid information. One is likely to think about the vivid material more than a bland non-vivid material. Retrieval can be thought of as the especially salient or significant aspects of the individual's physical and cognitive environment that initiate and influence the process of recall (Tulving, 1983).

the target audience. The "*Von Restorff effect*" was identified by Hedwig von Restorff in 1933. She conducted a set of memory experiments around isolated and distinctive items, concluding that an isolated item, in a list of otherwise similar items, would be better remembered than an item in the same relative position in a list where all items were similar. There can also be a reverse effect here. A consumer can remember the unique item, but the attention that it grabs from them is removed from other items -- thus one can in fact remember less overall. Hedwig's work relates to Gestalt, where she related it to the figure and ground principles. The Von Restorff effect is also called the *Isolation Effect* or the *Distinctiveness Principle (*Nelson, 1979). The same principle has also been described as *prominence effects* (Gardner, 1983) *environmental salience effects* (Taylor & Fiske, 1978), and *novel pop-out effect* (Johnson, Hawley, Plewe, Elliott, and De Witt, 1990).

Where literature fails to demonstrate reliably that vivid material will have any consistent impact on memory or judgments may be because of method flaws and inadequate conceptual models of how consumers respond and process vivid stimuli. The basic question we should ask ourselves is: why should we use a vivid message? Vivid stimuli serve two purposes. First, they attract consumers' attention and are likely to stimulate evaluative thoughts in order to come to an attitude-based decision-making. Secondly, they enhance cognitive elaboration regarding a message. The nature and content of these elaborations may serve as the basis for vividness effects on memory or judgments (Mitchell 1983, also see Kisilieus and Sternthal, 1984). Kelly at al. (1989) identified the types of elaborations that are most likely to be produced by vivid product warning messages. They also showed that the presentation of vivid product warning messages are more effective in communicating the hazards associated with product use to consumers. The authors also suggests that for a vivid product warning message, the use of red borders and bold script may provide cues that help communicate part of the content of the verbal information. Also, concrete language serves to communicate the essence of a communication in a specific manner within verbal information (Kelley et at. 1989). This is consistent with Engel and Blackwell's (1982) study, which also suggests that the attention getting properties of various manipulations, e.g., color, size of the information, specific markings for principle attributes and size of the product image, constituted as a vivid stimulus. Along similar lines, it has been suggested that an ad with distinctive attribute features is more memorable than non-distinctive ads (Childers and Houston 1984). Concerns as to whether stimulus distinctiveness draws attention to the appearance, e.g., font size of the information and product image, and whether attention facilitates the formation of favorable cognition and A_{ad} can be answered depending upon the type of distinctive cue employed. For example, results from Beattie and Mitchell's (1985) study showed that color pictures with the most important attribute specified, referred to as distinct, and were found to be more effective than non-distinctive ad stimuli. This was relevant in influencing a positive brand evaluation, and may be attributed to the attention getting properties and elaboration inducing capability of a vivid presentation form.

With respect to implications of a vivid presentation form being distinct, Schiefer (1986) investigated the effect of vivid versus non-vivid and verbal versus nonverbal behavior of a lecturer in four categories of information processing. Findings suggest that verbal vividness especially influenced subjects' recall and that nonverbal vividness had a positive impact on the subjects' attention. The implication was such that, a vivid presentation was accountable for the distinctive effect and hence, influences attention and better recall. Furthermore, the superior-attention getting power and enhanced specific communication of a message appear to be necessary for observation of the vividness effect (Taylor and Thompson, 1982). Hence, ad distinctiveness in general is suggested to be a receiver of greater attention. Also, the use of vivid stimuli may improve the memorability of the message by the usage of large pictorial or large pictorialized symbols serving as an attention inducer.

Distinctive reasoning suggests that consumers make discriminations among letters, words, numbers, images and other characteristics that are considered to be distinct (Bower 1972, 1975). According to Gibson (1969), the characteristics that differentiate one stimulus from another are critical factors that are used during evaluation and decision making tasks. This stimulus distinctiveness theory also states that vivid stimuli should promote encoding that focuses on the distinctive nature of a stimulus material and allows it to be processed in a reliable manner. In this research context, the effects of color, attribute font size, and product picture size are used to create a vivid effect in advertising, which in return provides greater access to the distinct nature of the stimulus. According to this model the distinctive features remain constant whether it is printed, written, typed or even interfaced with words or audio.

2.9.4 Influence of Color and Presentation Form

In designing ads one of the decisions the advertiser must take is which color(s) to use in order to create an ad that is both stimulating and grabs our attention. For example, in a market place typically characterized by a cluttered media environment, an important goal of an advertiser is to select colors that maximize attention, and provide a more realistic and appealing portrayal of the product (Wells, Burnett and Moriarty, 1992). These colors in turn may lead to better recall and favorable brand attitudes. Tucker (1987) noted that colors are normally used to generate good feelings and increase the persuasiveness of advertising. Empirical research on color use in marketing can be separated into three streams. The first has examined specific colors used in print ads (see Schindler 1986; Lee and Barnes 1990). The second stream examined the use of Black & White ads (e.g., Meyers-Levy and Peracchio, 1995). The third examined and tested the effects of specific colors on consumer responses. This later stream of research has focused on the effects of hue (Bellizi, Crowley and Hasty, 1983; Crowley, 1993). It is suggested that red colored background elicit greater feelings of arousal than blue backgrounds, however, products presented against blue backgrounds are liked more than products presented against red backgrounds (e.g., Middlestadt, 1989; Bellizzi and Hite, 1992).

The creation of the ad for this paper uses the guidance of Bellizzi and Hite (1992), specifically in terms of the choice of hues that plays an important role in the choice of colors (i.e., blue background with red product contrast). The influence of color directs the attention flow to the specificities of the ad, hence, the use of color in large provides a basic template to create an attention getting stimulus. Therefore, an operationalization of vividness in terms of color should result in a stimulating presentation that is attention grabbing. In other words, a presentation form that is vivid through the influence of color may direct the flow of attention to a particular attribute or object. The demonstration of a vividly presented information as attention getting provides evidence that it may be classified as a distinct stimulus.

2.9.5 Vivid Presentation and Attention

We established in the previous sections that certain types of information are inherently attention drawing or vivid (Taylor and Thompson, 1983, Kelly, 1989). Consumers exposed to an advertisement may use vividly presented information under a limited set of circumstances since vividness may affect attribute recall without affecting attribute use in subsequent evaluation. For example, under some circumstances a vivid stimulus may affect evaluations by directing the level of processing governed by the mode in which the information is provided. In the consumer behavior and psychology literature a vivid attribute in an advertisement is expected to affect the

advertised brand evaluation[24] only when consumers are motivated, willing and able to let it do so (e.g., Sullivan and Macklin, 1988).

Vivid information is heavily weighted during subsequent judgment and is attention drawing across situations (Taylor and Thompson, 1982). Grass and Wallace (1969) maintained that the essential condition that regulates learning via advertising is the viewers' attention. Mitchell (1983) took a similar position, stating that what the viewer attends to is important in determining what is later recalled. In a previous study Mitchell (1982) suggested two critical factors that affect the mental processes, which occur during exposure to a commercial environment: (a) attention and (b) the processing capacity. The implications outline the rationale that we can attend to only a limited number of stimuli at a time. On the other hand, it is also believed that an advertisement's intention is to easily communicate their message quickly without the viewer having to concentrate on the message (Krugman, 1977). Therefore, the recall and judgments underlying vividness depend on the availability of the information in the memory and the attention that is devoted to the presentation (also see Kelley, 1989).

2.9.6 Explanation of Attention through Distraction

Can distraction actually increase the persuasive impact of a message? The odd fact is that it actually does have an impact (Festinger and Macoby, 1968). We can account the distraction effect to the influence of attention that a vivid presentation induces. When an individual is exposed to a persuasive stimulus, h/her attention is distracted and the persuasive impact of the communication is increased (Festinger and Macoby, 1968). However, earlier studies on distraction suggest that, consumers do not remember as much about the product or brand in the divided attention conditions (Venkatesan and Haaland (1968). This suggests that maximum recall or awareness of advertising may occur with minimum distraction[25]. In an attitudinal perspective, it is suggested that counter attitudinal persuasive messages would be successful in changing attitudes when accompanied by mild forms of distraction. It was also predicted that distraction is most effective when the message recipient was committed to h/her original attitude position (also see Mitchell, 1983).

Research in cognitive psychology has illustrated that the performance of memory is dependent on factors related to a specific piece of information that is to be learned irrespective of the levels of distractions involved. If an individual has a goal of learning about or forming an evaluation of the advertised brand (see Kintsch and Van Dijk, 1978; and Graesser, 1981), then the individual will form a verbal representation of what the advertisement is communicating about the product. Resnik and Stern (1977) state that whether or not an ad should be considered informative, depends upon whether the informational cues are relevant enough to the consumer in making intelligent choices among alternatives (e.g., quality, performance, availability, taste etc).

[24] For example, an individual's processing and encoding upon exposure to a stimulus along with his or her knowledge and experience may affect the ad and brand evaluation.

[25] A person in a distracted situation has three cognitive tasks to simultaneously pursue: processing the incoming message, processing the incoming distraction, and counter-arguing against the content of the message. A distraction may be ignored if it is not integrally related to the incoming message in the individual's stimulus field.

2.10 Section Summary

Vivid presentation of information has been operationally defined in terms of concreteness, presence of illustrations, medium of presentation, directness of experience and case-history/statistical information. In general, results from vividness studies indicate equivocal findings. More than 24 studies have operationalized vividness in a number of different ways. There are cases where recall for vivid information is better than that for non-vivid information and others that do not support this finding. The only type of vivid information that appears to have a consistently significant impact on judgment is the information presented in a case history form. Literature as expected shows that vivid information is found to have a disproportional effect on judgments in some studies and not in others. However, one consistent finding in vividness studies is that a delay between information presentation and recall appears to moderate the effect of vividly presented information. This effect depends on the amount of attention that is directed to the attribute stimulus (differential attention).

There are two possible sources of persuasion that have been identified based on the literature review. First, vividly presented information has a consistently greater impact on memory than non-vivid information. Hence, because the information is persuasive, consumers become attentive to the message as a result of vividly presented information, which is a function of this superior memory trace (cf. Taylor and Wood 1983). Secondly, vivid information is consistently graphic, colorful, interesting and attention getting. When these attention-getting parameters are used, consumers' interest in the advertisement and/or message attributes is high. A research example of the attention getting parameters of vivid information is the study by Baesler and Burgoon (1994). Their results showed that vivid and non-vivid statistical evidence was found to be persuasive relative to the delayed time interval (for e.g., 2 days), and vivid statistical evidence remained persuasive through out the interval (7 days). In this paper, vividness is used as a term to refer to various operationalizations such as font size and the use of colors. These operationalizations may influence the provision of cognitive elaboration. The term cognitive elaboration refers to operationalizations affecting attitude and judgments.

2.11 Consumer Knowledge

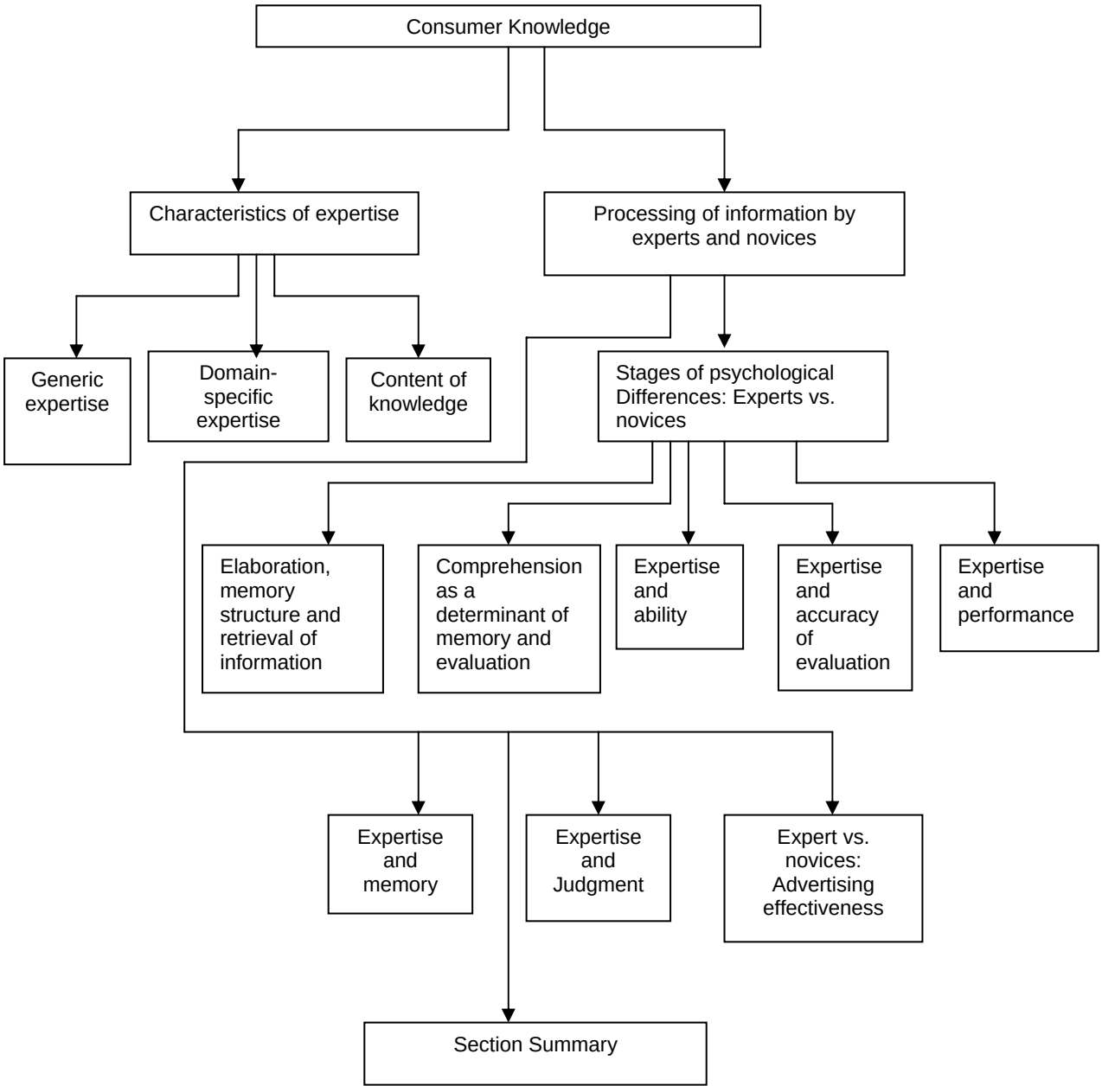
The study of consumers' knowledge has a long history in consumer research and holds a flagship position, as it is one of the constructs that has been consistently defined and applied since its introduction in this discipline. This is a relevant and significant area to this research as we attempt to examine the processing characteristics and how that may influence how consumers gather and organize information, and subsequently, what products they decide to purchase (cf. Alba and Hutchinson, 1987). Understanding how consumers organize information about a brand from a product category in memory has become an important topic in consumer behavior decision making (Hutchinson, Raman, and Mantrala, 1994; Nedungadi, Chattopadhyay, and Muthukrishan, 2001; Bhatla and Rose, 1990; Howard and Sheth, 1969).). One reason for this interest is that it has been frequently demonstrated that how much information is organized in memory affects the appropriate information retrieved towards a judgment (e.g. Hutchinson et al., 1994; Nedungadi, 1990; Wyer and Srull, 1989 More recently researchers have clearly and rigorously tried to conceptualize and measure this all-encompassing construct (e.g., Engel, Blackwell, and Miniard, 1993).

A quite different view of expertise has emerged from research in cognitive psychology (Anderson 1981). Studies within this tradition have revealed expert-novice differences in nearly every aspect of cognitive functioning from memory and learning, to problem solving and reasoning (e.g., mathematics, programming, and physics – see Mayer 1983). Two general themes have emerged from this body of research. First, expertise is domain specific. Any special skills of an expert are lost outside h/her area of expertise, and an expert's cognitive processes are tailored to the unique characteristics of a particular problem area. For example, novices have been found to reason backwards from the unknowns to the givens. Experts, on the other hand, reason forward using stored 'functional knowledge' from the givens to the goal (Larkin, 1979). This forward reasoning ability only develops in specific domains. Thus, the notion of experts becomes "domain-adapted" (Slatter, 1987). Secondly, the thinking of experts relies more on automated processes (Shiffrin and Schneider, 1977) and automated processes are often parallel and function independently. A control process on the other hand, is linear and sequential, and with practice some control processes may become automatized over time (Larkin et al 1980). As experts gain experience, they come to rely less on deductive thinking and give more importance to pattern recognition. They are dedicated to performing a thorough external search (Narasimhan and Ratchford, 1991). The question of who is an expert and how expertise is acquired is closely related to several issues raised in this section of the chapter. Regardless of the exact definition, a common underlying assumption regarding experts is that they perform better than novices, and supposedly are more competent at a given task in their domain field of expertise. Causal real-life observations as well as the existing memory and judgment literature suggest that expertise in decision-making is task specific. Although one can describe some general attributes of a good judgment process, it is knowledge or expertise in a particular domain that is a necessary requirement for making good decisions in that domain.

Literature has clearly suggested that experts in any specific domain have certainly a lot of experience that is consequently translated into knowledge (Kintsch, 1974; Chase and Ericsson, 1981). Experience and training, however, are at best necessary but not sufficient prerequisites for becoming an expert. It is the way by which the experience and training absorbed, processed, accommodated, and structured that would determine its final use and the level of expertise. In a similar way, the achievement and effectiveness of methods for improving judgments and decisions would largely depend on how the information and knowledge contained is processed, assimilated, encoded, retrieved, and then applied. In total, the cognitive science view is that experts within their domains are skilled, competent, and think differently than novices (Anderson, 1981; Chi, Glaser and Farr, 1988). The relevance of the consumer knowledge

literature to this research is classified into: (a) Consumers ability to understand and comprehend complex information; (b) Consumers expertise to process information; and (c) Consumer expertise and recall/judgment. Figure 7 illustrates the organization of the information mode literature review.

Figure 7: Organization of Knowledge literature



2.11.1 Characteristics of Expertise

Literature review analyses in different domain areas (e.g., medicine, physics, music, literature, etc.) have shown that the performance of a task by an expert is primarily a reflection of acquired skill resulting from the accumulation of domain specific knowledge and methods during many years of training and practice (see Alba and Hutchinson, 1987; Brucks, 1985; Markus, Smith and Moreland, 1985). The importance of domain-specific knowledge has led us to focus more on characteristics of expertise in specific domains. Specifically, familiarity and expertise[26] (domain related) have been argued to be the two main components of consumer knowledge (see Alba and Hutchinson 1987).

Operationally, expertise has been defined either in terms of "what people perceive they know about a product or product class" (Brucks, 1985) (also referred to as subjective knowledge), and what people perceive they know depend on their self-confidence in the amount and type of knowledge that is held in memory (Park and Lessig, 1981). On the other hand, we can classify novices as those who do not have the adequate product related experience to evaluate information and rely more on simple heuristics during decision-making (Bettman and Park, 1980). Therefore, consumer product evaluation and decision-making should be based on the amount of knowledge gained through experience, the ability to interpret product information in a meaningful manner, and perform product related tasks successfully and effectively. Consumer researchers are giving more recognition and importance to the functions of stored knowledge mainly because consumers' stored knowledge in the memory strongly influences their cognitive processes (Bettman, 1979; and Olson, 1978). Knowledge area of research has strong ties to consumer behavior, for example, studies have focused on the relationship between knowledge and information search (Beatty and Smith 1987; Moore and Lehman 1980; Newman and Staelin 1972) and others have described the relationships between product involvement and knowledge (Flynn and Goldsmith 1993). Some more have thrown significant light between product knowledge and the amount of information used during decision-making (Brucks, 1985).

Because of the common assumption that what consumers know affects their behaviors, researchers have spent considerable time and effort on examining the effects of knowledge levels on consumer behavior (see Alba and Hutchinson, 1987). For example, knowledge has been shown to affect recall (Arkes and Freedman, 1984), information acquisition and information retention (Chiesi, Spilich and Voss, 1979), information search (Brucks, 1985; Biehal, 1983; Johnson and Russo, 1984; Srull, 1983), information processing strategies (Sujan 1985; Fiske, Kinder, and Larter, 1983) and organization of memory and processing (Sujan, 1985; Alba and Hasher, 1983; Fiske et al., 1983; Chi, Feltovich and Glaser, 1981). Experts have also been found to be more confident in their inferences and are able to make finer distinctions between objects and attributes within a domain (Markus et al., 1985). Any observed differences in processing outcomes between the two groups (experts and novices) are also attributed to differences in their stored knowledge (Sujan, 1985; and Markus et. al., 1985).

To fully understand the role of knowledge on the type of information and form of presentation to convey the attribute information, an extensive research along these lines will be required. It is hoped that this study will serve to stimulate further studies on the challenging questions of what consumers know about the product. Prior knowledge, preference for alternatives, and personality characteristics in turn can affect attitude and responsiveness to advertising (Buchanan, 1964). Despite the vast literature in the area of knowledge, almost all of the expert-novice research has focused on the cognitive consequences produced by subjects'

[26] When an individual is familiar with an object (e.g., a product or product related information) it means that h/she has accumulated a certain number of years of experience (e.g., product-related experience). An individual is regarded as an expert when h/she has the ability to perform product-related tasks successfully (Alba and Hutchinson 1987).

knowledge, and little attention has been directed at examining the moderating effects of knowledge. Different theories provide different explanations of consumers' product expertise. Rather than dwell on the adequacies and inadequacies of these theories, it is better to approach the differences in a more definitive manner. Therefore, two main kinds of knowledge have been identified in the body of our literature search generic expertise and domain-specific expertise.

2.11.2 Generic and Domain Specific Expertise

It is fair to presume that both experts and novices possess generic[27] expertise and are evidenced by the fact that there is a ceiling effect in their free recall (Patel, Groen and Frederiksen, 1986). The authors to this manner implies the existence of some schema or macrostructure representation that is based on consumers experience in different tasks (e.g., judgment or problem solving), and guarantees the retention of crucial facts. On the other hand, generic experts may not be able to filter out any irrelevant information presented to them. Experts can be assumed to use macrostructure representation make use of the most relevant information, retain and then recall them for evaluation (Dijk and Kintsch, 1983).

Contrary to generic expertise, the domain specific expertise is quite predominant in the problem solving literature. It is evident that individuals often differ dramatically in their knowledge of objects in a given domain. Even in a given domain where there are no certified experts, some people have vastly more experience with the objects in the domain, either through their professions or because of their accumulated experience and intensive training. Expertise in a specific domain with years of accumulated training and experience accounts for the stored knowledge used during problem solving and other complex tasks (see Beattie, 1983; Johnson and Russo, 1980; Bettman and Park, 1980; Alba and Hutchinson, 1987). Thus, these kinds of experts make use of their specialized domain knowledge using rigorous evaluation of the situation and think ahead of the object in question (forward reasoning hypothesis) before making a decision (e.g., Kintsch, 1974; Chase and Simon, 1973; Chase and Ericsson, 1981). Furthermore, it is suggested that domain specific product expertise benefits more on recall and accurate judgment by the development of taxonomy of different types of mechanisms acquired through different types of learning and adaptation processes. Examining the knowledge content of experts and novices provides insight to the superior ability of experts in general.

2.11.3 Content of Knowledge

In the area of marketing research, especially for consumer products, one might expect that both experts and novice possess knowledge about generic properties of a specific product category. In this regard, content of knowledge refers to the "domain related subject matter of information stored in the individual's memory" (Engel, Blackwell and Miniard, 1993). This stored information also depends on the domain expertise of the individual at different stages of information acquisition, encoding, recall, and evaluation. Stored knowledge about a domain affects processing of new information about that domain (Brucks, 1986). For example, Brucks (1986) classifies knowledge into three types: (a) knowledge about terminology, (b) knowledge about specific brands and (c) knowledge information for evaluating a brand. However consumers have four levels of product knowledge: product class, product form, brand, and models (Peter and Olson, 1996). The accumulation and associations consumers acquire about the attributes and the benefits provided by those attributes of the product constitute the substance of their knowledge. Chi, Glaser and Rees (1981) showed that experts closely linked explicit physical attributes of objects in LTM and novices showed almost no linkages in their study of knowledge of physical attributes of objects. Findings from earlier studies showed that experienced chess

[27] Generic expertise mainly relies on the acquisition of adequate representations.

players - classified as experts, were able to recall mid-game chess positions better than beginners - classified as novices. This is attributed to experts' superior memory for chess positions (Degroot, 1966).

It is also possible that consumers in general possess knowledge of attributes that actually characterize the product class. However, this knowledge would be more defined and detailed among expert consumers. A detailed knowledge here refers to the experts' ability to relate the product attribute information to the performance of the product. It can also be expected that experts would have more knowledge about how the conditions under which the product will be used would affect the relevant attributes for evaluation. In other words, expertise lies more in an elaborated semantic memory than in general reasoning process (Anderson, 1983). For example, an expert consumer has access to a complex network without any conscious representation of the search process that goes on in its retrieval. Despite the vastly emphasized cognitive literature on the ability of any person to achieve expert performance with practice, there is still considerable evidence in the literature that individuals may differ significantly in overall ability and/or domain specific abilities (Anderson, 1983). Novices on the other hand, may have an overall ability to process information, but they may not have the ability and motivation to process information that is complex and that requires domain specific knowledge to make a meaningful inference. For instance, consumers with no product knowledge (novice) ranked the non-technical advertisement highest for holding their interest and attention (Anderson and Jolson, 1980). On the other hand, the subject group with domain specific expertise found that technical-quantitative information in the ad to be significantly more interesting.

Additional findings also show that consumers purchase consideration was found to be an "asymtotically decreasing function of education level" in the case of non-technical ad treatment. In addition, and subjects purchase consideration almost rose linearly with increase in education level (Anderson and Jolson, 1980). This suggests that the ability to process leads to better performance (memory or judgment) depending on the learning perspective. With regards to learning, Johnson and Russo (1980) argued that all consumers' start as beginners at some point before their first buy with a purchase decision making in a product class. As h/she learns and gains experience, then product familiarity grows and this knowledge affects the acquisition of new product knowledge. Two other explanations, enrichment and the inverted-U hypothesis, demonstrate that greater prior knowledge facilitates learning (Johnson and Russo 1980). According to the authors, enrichment hypothesis argues that prior knowledge provides experienced consumers with better encoding and memory skills. Therefore, when presented with new information, more experience facilitates greater learning. However, Bettman and Park (1980) claim that prior knowledge has an inverted 'U - Effect[28]'. Although experts can understand new product information, they have little need for it. This explanation is consistent with Beattie's (1983) argument that expert consumers are able to process the attribute information about a product class better than novice consumers[29].

Hence, we can infer that attitudes formed by expert consumers are likely to be based more on their analysis of attribute-message content, while those consumers who are novice are likely to form attitude toward the brand (A_b) based on their attitude toward the ad (A_{ad}). In

[28] According to this inverted U hypothesis, novices have difficulty understanding new information and therefore limit their cognitive search, and experts search less.

[29] Better processing means better evaluation of the information provided. Considering the advertising implications for attribute information with a pictorial attached to it, expert consumers are presumably likely to look beyond a picture to evaluate the text (in this context it is the attribute information). Novices on the other hand, are likely to stay with their impressions formed using the visual material. Although the effect of experience is starting to receive some attention in consumer behavior literature (for example, Alba and Hutchinson 1987; Cole, Gaeth and Singh, 1986), it has been a considerable focus of research on decision-making. Expert consumers have been found to be psychologically different from novices in ways such as cognitive structures, cognitive elaborations and skilled memory.

consumer behavior literature there is a general agreement that A_{ad} affects A_b when information for unfamiliar and familiar brands were tested (Thorson and Friestad, 1984; Batra and Ray, 1986; Edell and Burke, 1986). In theory, if a consumer is unfamiliar with a brand of a particular product category, the information acquired from the ad and their A_{ad} should have a relatively strong influence on the A_b. However, if the person is familiar with the brand, they would have already formed an A_b and their A_{ad} should not have a strong effect (Thornson and Friestad, 1984). This provides support to the argument that experts are consciously aware of their stored product category knowledge and may use it to interpret, integrate and evaluate attribute information to form an attitude.

Therefore, in a framework on relationship among belief, attitude and intention to purchase when exposed to attribute information, it is suggested that the individual's knowledge level may be one of the factors that determine the 'perceived diagnosticity' of an input (Feldman and Lynch, 1988). In terms of memory and organization, Spilich et al. (1979) studied text processing by individuals who differed in their knowledge of a particular subject category. Their results indicated that for domain related textual messages, experts not only recalled more propositions than novices, but the information recalled by the former was more related to the significant structural components of the subject matter. This superior memory of the experts can be attributed to two factors: (a) the development of knowledge structure, (i.e.), their knowledge of the category containing more concepts and relations. In other words, the experts are able to organize more input information onto the existing structure for a more crisp retrieval and (b) experts are able to integrate the sequences of actions and state changes of scenario more readily (Chiesi et al. 1979). This memory organization is useful to experts in recalling attribute information for comparing multiple brands.

Numerous studies have indicated that expert consumers are likely to have a thorough knowledge about the attributes of various alternatives and know which attributes are most useful for discriminating between brands (Brucks, 1985). Also, knowledge reflects a consumer's certainty regarding what is known about the brands under consideration, such as the available attributes, the importance of such attributes, and the performance of the brands on such attributes (Urbany et al., 1989). They argue that low knowledge is associated with a reduced ability to comprehend, inefficiently use new information due to increased search cost, and lower elaboration due to lower information search. In summary, it can be noted that accurate evaluation may be made on the basis of either consumer knowledge levels and the ability to process accumulated through years of experience (since ability of the individual is one of the factors that decide the type of processing h/she engages in).

2.12 Processing of Information by Experts and Novices

From information processing point[30] of view, the notion that consumers approach decisions in different patterns as they gain product knowledge through experience with a product has long been a popular topic in consumer research resulting in a growing body of literature on this subject (Bettman 1979; Bettman and Park, 1980; Johnson and Russo, 1984; Brucks, 1985; Sujan,

[30] A common finding in studies of expert cognition is that information processing is less costly for experts than for novices. For example, expert waiters (Ericsson and Chase 1981) and chess players (Chase and Simon 1973) have demonstrated exceptional information processing and memory skills. Their memory allows more efficient encoding of specific-task information; and when essential, experts could search and sit cheaply through more information. But empirical studies show that experts use less information than novices, rather than more, in auditing (Bedard 1989), financial analysis (Bouman 1980; Johnson 1988) and product choice (Bettman and Park 1980; Brucks 1985; Johnson and Russo 1984). Experts also often search contingently, for limited set of important attributes for a limited set of variables, because they know a great deal about their domains (Bouman 1980; Elstein, Shulman and Sprafks 1978). This is attributed to expert's ability to perform some kind of a reasoning that is very diagnostic in nature.

1985; Alba and Hutchinson, 1987; Rao and Monroe, 1988). These studies conclude that decision processes and strategies of consumers who are high on product knowledge differ from those who are low on product knowledge.

Numerous studies also consist of identifying differences between novices and experts (Chi et. al., 1981; Larkin, 1979; Reif and Heller, 1982). For example, experts perceive problems in large meaningful patterns due to a superior organization in their knowledge base (Atkin, 1980; Egan and Schwartz, 1979; and Gentner, 1988; Batra and Ray, 1986; MacInnis, Moorman and Jaworski, 1990; Robert and Macoby, 1973; Schumalensee, 1983; Wright, 1981; Mitchell, 1981; Craik and Lockhart, 1972; Abernathy, Neal, and Koning, 1994). In addition, experts were able to plan their strategy in advance, which verifies that they are capable of accessing their stored knowledge with great accuracy. Cognitive advantage was also shown to be a potential contributor to experts' superior performance on the perceptual tasks Lichtenstein and Fischoff (1977).

When advertisers must communicate information for which prior knowledge is not available, the information processing strategy consists of creating relevant knowledge via exemplar-based-learning (Wittrock, 1974). This is consistent with Wallsten and Budescu's (1981 &1983) findings, that experts were able to perform much more sophisticated cognitive operations on much larger sets of information when compared to novices. The same advertisement may or may not be perceived as complete, interesting or useful depending on the consumers currently activated knowledge. An advertisement based on product attribute information is more likely to be attended to, processed and interpreted by experts for evaluation and they also generate significantly more counter-arguments than novices' (Edell and Mitchell 1978). In addition, experts are more likely to detect missing information and to adjust their judgments accordingly in spite of large sets of information. It is also acknowledged that consumers' prior knowledge influences their reaction to persuasive communication. Bransford (1979) emphasizes the importance of the information processing strategy during an evaluation process. Since a type of processing is important during evaluation, we can then suggest that knowledge influences the information processing of a message when individuals are exposed to a stimulus, and subsequently has an effect on attitudinal judgment. In regards to this, one perspective that is worth reviewing and understanding is the difference in the knowledge structure, elaboration, encoding, and the processing differences between experts and novices.

What difference can one actually expect to find between the contents of knowledge of experts and novices? Obviously, experts do have more knowledge and do know more about the domain than novices do. The discussion on the processing differences is based on the five stages of psychological differences between experts and novices Details of expertise and memory, and expertise and judgment are reviewed based on the associations with to these psychological differences adapted from Shanteau (1989) and Shanteau and Nagy (1984).

2.12.1 Psychological Differences: Experts versus Novices

From previous sections of the knowledge literature it is observed that experts in various domains often display similar psychological characteristics. Without exception, every expert that has been studied in the past has an extensive and up-to-date content knowledge. The psychological differences between experts and novices have been extrapolated form Shanteau and Nagy (1984) and charted out into five stages. First, experts have highly developed perceptual/attention abilities. They can extract information from the source that novices either overlook or are unable to extract. Secondly, experts have a sense of what information is relevant when making a decision. The assessment of relevance can be quite difficult, and experts unlike novices have been observed to use irrelevant information to their detriment (Shanteau, 1989). Thirdly, experts have the ability to simplify complex problems (Shanteau and Nagy, 1984). This ability allows

experts to deal more effectively with the cognitive limitations experienced by novices. Fourthly, experts elaborate more on details and can effectively communicate those details to others when compared to novices. An expert's credibility depends on the ability to convince others of that expertise. Fifth, both experts and novices can follow established strategies when the accuracy of the judgment and decision problems is straightforward. Experts, however, are able to identify and adapting to exceptions. That is, when exceptions are encountered, experts could generate meaningful special-situational strategies. Overall, the specifics of experts' knowledge when compared to novices depend on the domain where h/she has acquired the knowledge.

Scrutinizing the differences between experts and novices, literature has identified three conceptual differences that seem possible. First, the concepts used by experts and novices may have the same general structure but experts just possess more concepts, especially more specific concepts to deal with greater number of detail they know, stored knowledge. Secondly, experts can make finer distinctions based on their knowledge and so use more specific categories. An expert uses not only the basic concepts used by novices but also a set of more specific concepts that are unavailable to novices (Rosch et al., 1976). Research on problem solving has also suggested that experts were better able to categorize cases is because they have richer networks of specific concepts[31] (Johnson et al. 1981, pp. 237). In this line of theoretical concept, experts and novices differ mainly in having more-lower level concepts, not in structural differences in concepts. Therefore this well-organized knowledge stored in the memory is useful in interpreting and synthesizing new and complex information to their memory. Experts are aware of their stored product category knowledge and may use it to interpret and integrate attribute information presented as claims in advertisements. Thirdly, experts are more likely to avoid confusing brands within product classes by their enhanced ability to remember more brand specific information[32].

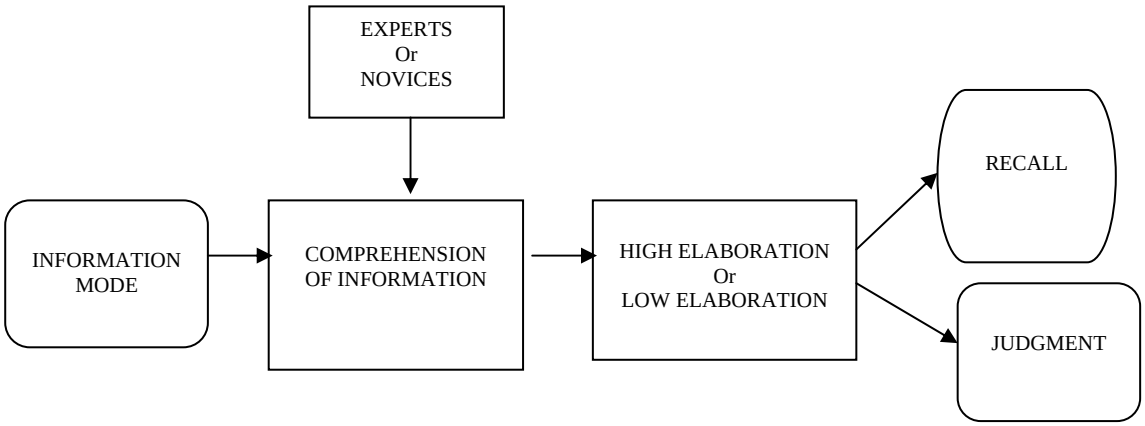
In summary, consumer knowledge is a relevant and significant moderating variable that influences how consumers gather, absorb, comprehend, organize, and ultimately retrieving the information during decision making. Key differences point to the objective information that experts rely on during processing as compared to novices who rely on subjective information. Figures 8 illustrate the information processing under conditions of high-processing and low-processing strategies. They illustrate that the two different information acquisition processes that should cause differences in the amount, content and organization of information about the advertised brand in memory[33] since attitudinal differences can be found between the two conditions, we can expect differences in the information that would be recalled.

[31] For example, experts in the domain of medical technology have a hierarchy of knowledge about diseases that are well organized and extensively differentiated into a number of "diseases variants" that are relatively shallow (Johnson et al., 1981).

[32] According to Anderson, (1983) and Tesser (1992), elaborative processing tends to increase recall and also increases polarization judgment (self-generated attitude change).

[33] For example, in an information mode perspective, it is possible that under a low knowledge condition, a numerical attribute information claim when compared to claims in a verbal mode may take longer to verify about the attributes of the advertised brand and their evaluation of them).

Figure 8: Information Processing Under Conditions of High Knowledge



2.13.2 Cognitive Elaboration, Memory Structures and Retrieval of Information

Extraction of information is attributed to consumer's memory structure and retrieval of information based on cognitive elaboration (see Shanteau, 1989). Hence, the purpose of this section is to establish the varying levels of elaboration used by experts and novices that in turn affects memory and judgment. When consumers are presented with some information they not only encode its meaning but also elaborate or explain it. These elaborations provide means of integrating and retaining information to the extent that they help relate the current information to their knowledge. Based on this integration of information, an independent effect on evaluation process is the result. Cognitive psychology and consumer behavior studies have found that certain types of cognitive responses are only available and accessible to respondents who have well developed knowledge base (Edell and Michell, 1978; Wright, 1975; Wright and Rip, 1980). These studies indicate that attribute information thoughts may be more difficult for novices. Edell and Mitchell (1978) also found that experts produced more overall responses to communication than novices.

Although experts may have stronger associations between concepts in memory it is also likely that they can generate more total thoughts and attribute related thoughts compared to novices without too much elaboration and without spending too much time (Anderson 1982). It is also suggested that novices have an elementary knowledge structure and it is possible that they may prefer to use prior evaluations based on simplistic criteria than to elaborate and process available information in making judgments and choices (see Bettman and Park, 1980). For example, Maheswaran and Sternthal (1990) examined the effects of knowledge, and ad processing on judgments. Both experts and novice were exposed to the message stimuli consisting of attributes, benefits, and both attribute and benefits. Findings showed that experts tended to make comparisons at an evaluative level, whereas novices make comparisons at a literal level. These differences relate to the individual's skilled memory structure[34] that influences recall and judgment. The skilled memory explanation for these differences is that, acquired LTM encoding and retrieval skills give experts an information processing advantage that novices lack resulting in a superior recall and accurate evaluation of the object in question

[34] Skilled memory theory has five established principles (see Ericsson and Polson 1988) that reflect recall and evaluation. They are: experts encode information using existing semantic-memory patterns; the use of retrieval structures at encoding guarantees the accessibility of information at the time of recall; encoded information is stored in long-term-memory and can be retrieved over surprisingly long intervals; the speed of encoding increases with practice coupled with existing stored knowledge; and lastly, memory skill is domain-specific and does not transfer to different situations. However, the recall and judgment reveals the importance of skilled memory that experts have.

(Chase and Ericsson, 1982). Tulving and Thompson (1973) stated that experts develop mechanisms called 'retrieval structures' that are used to encode information in LTM with cues that can be later retrieved efficiently without allocating much resource for processing.

The knowledge that people bring to a particular task is a major determinant of task performance. For example, expertise with experience and performance has been observed in widely varying tasks, including memory (Chase and Ericsson, 1972); expertise and comprehension (Chiesi et al., 1979); and academic problem solving (Chi et al., 1981). All these studies have been shown that expertise is related to performance and knowledge, and performance and knowledge have been associated with elaboration and the ability to process.
Empirical research in cognitive psychology points out the complexity of prior knowledge structures among individuals, making it important in processing conditions needed for recall and judgment tasks (Brucks, 1985; Voss et al., 1983; Chi, 1981; Cohen and Basu, 1987; and Fiske and Kinder, 1980). Results from studies by Alba and Hutchinson (1983), Gardner (1983), and Mitchell et al. (1983) also report differences in processing that affect recall and use of information among consumers who possess varying knowledge of a specific product class. For example, empirical evidence suggests that experts seems to know more about important attributes and their inter-relationships and they possess the ability to comprehend new and complex information faster and are able to retrieve the information needed for decision-making effectively (Alba, 1983 and Alba and Hutchinson, 1987).

A simple exercise designed to demonstrate how knowledge facilitates the rate of retrieval for domain specific information is validated by Muir-Broaddus (1998). The author's demonstration consisted of asking music experts and novice subjects to name seven adjectives that relate to music. Results show that experts completed the task more quickly and accurately than novices. This provides us with a good reason to believe that the greater quality and quantity of knowledge facilitates spreading activation through semantic network (also see Anderson and Bower 1981). From a product category perspective, it is also noted that experts may find similarity between attribute information of the original product and the new product. This similarity rises because of the deep cues of the same brand name. According to Brucks (1985) experts have more cognitive resources that can be allocated to search, enhanced abilities to encode new information, and knowledge of what questions to ask during their search process. The author also found that experts searched more attributes, but only in a more complex purchase scenario. Therefore it is possible that experts may have allocated more effort to assessing each of the complex attributes and therefore, may have searched fewer brands in that product category than novices. Furthermore, it is also suggested that expert consumers who possess high product category knowledge are capable of identifying and focusing their search on specific and important attributes and establish alternatives relatively quickly.

For experts the importance or relevance of the information presented may be made at encoding or at the retrieval level[35]. According to Craik and Lockhart (1972), the interaction between encoding and retrieval is critical in determining what information is recalled[36]. Alba and

[35] Retrieval Explanation: This explanation asserts that experts use their knowledge of a domain to develop abstract, highly specialized mechanisms for systematic encoding and retrieving meaningful patterns in LTM. These mechanisms enable experts to anticipate the information needs of a familiar task and index information in memory in a way that later facilitates its retrieval at the time it is needed. This explanation also states that experts encode new information in terms of existing knowledge base (see Chase and Ericsson 1981 & 1982; Ericsson, 1985; Ericsson, Chase and Faloon, 1980; Egan and Swartz, 1979). The authors suggest that experts use patterns or chunk of information acquired through years of practice and stored as semantic codes in LTM to encode new information. These views suggest that experts have superior memory as compared to novices.

[36] Encoding and Memory: Superior encoding leads to higher recall. Encoding is facilitated with a more elaborate knowledge structure that contains more specific information (see Ansubel, 1963). Information processing during the encoding of an ad is generally under the individual's control. The ad receiver chooses the aspect(s) of the ad to focus (e.g., brand, pictorial stimuli, color, attribute information etc). According to Craik and Tulving (1975), relative to

Hutchinson (1987) noted that an expert is skilled in distinguishing between important and unimportant information as well as between relevant and irrelevant information, and novices focus more on surface details (Chi et al. 1981). Anderson and Pitchert (1978) attributed this finding to the experts' elaborate schema, which discriminates between useful and less useful information. It was noted that when complex product attribute information is presented to novice consumers, the categorization process becomes more difficult, thereby leading to the formation of a greater negative effect (Cohen and Basu, 1987). Hence, comprehension of message and recall may differ among individuals with varying degrees of knowledge (Fiske and Kinder, 1980).

McArthur's (1980) results show that the impact of prior knowledge on message acceptance is an indicator of the amount of prior information an individual possesses of a particular product class that affects their attention, ability to comprehend, recall, and evaluate the information presented (Bransford, 1979; Chiesi et al., 1979). Along the lines of inference to be made based on the information acquired, Payne (1982) and Russo and Dosher (1983) asserted that consumers have limited cognitive resources and are "Cognitive Misers" (Fiske and Taylor 1984, P.12). They allocate them very carefully and expending only the effort necessary to make an optimal decision-making.

In summary, it is clear from the above sections that variation in the efficiency of encoding and retention of information will certainly depend on the combined efficiency of a large amount of different complex processes. However, when opportunities arise for recall of the processed information, the availability of the information is emphasized. How then, might such properties and memory efficiency be related to other cognitive abilities? Is comprehension or interpretational ability just one aspect of general learning and memory? The issue of what, if any, relation exists between expertise and the ability to comprehend information for recall and evaluation is a complex one, to which relatively little research attention has been given. The objective is to detect the ability to manipulate information, perceived relations, and extract it from the memory for judgment.

2.12.3 Comprehension: A Determinant of Memory and Judgment

This section covers the importance of comprehending and interpreting attribute information due to its association and linkage to ability and performance of a task that reflects upon recall and evaluation of the product (Mick, 1992; Graeff, 1995; Graeff and Olson, 1993). Positive effects resulted when knowledge levels varied for complex quantitative information and this could be attributed to brand processing (see Holbrook 1978; Anderson and Jolson, 1980; Witt, 1976). Within this view, consumers comprehend product information by inferring personally relevant meanings about product information and interpret product information based on knowledge activated at the time of comprehension (Lee and Olshavsky, 1994). According to Bagozzi and Dhabolkar (1994), consumers' knowledge structures may be organized into a number of chains and links containing associations between products attribute information, format of product attribute, and personal goals and values. The extent to which consumers infer meaning to the information provided to them is more likely a function of their level of product knowledge (Hayes-Roth, 1977).

---

non-directed processing, semantic elaboration facilitates performance on direct tests of memory. Hence by providing a rich encoding that integrates prior knowledge with stimulus information and contextual cues, elaboration facilitates both recall and recognition. The presence of a cue referring to the encoding context defines a direct memory test. Free recall tests usually provides no additional cues beyond a reference to the encoding context. Other recall tests may use more specific cues. Some cues (product, pictorial, and attribute claims in different formats) are facilitators, aiding retrieval via encoding specificity.

According to King and Balasubramanian (1994) the basis of interpretation of attribute information for experts is more on an objective level and on a subjective level for novices Rudell (1979) contrasted objective and subjective measures of consumer knowledge in the context of information acquisition and processing in a choice setting. Results showed that higher levels of objective expertise were related to greater use of newly acquired information. This usage of newly acquired information is attributed to the ability to comprehend and applicable in a choice setting (Huffman and Houston, 1993). The importance of the ability factor is stressed here because the acquisition of accurate knowledge in a choice setting depends on the experts' ability to interpret and infer precise meaning to the presented information.

DeBont and Shoorman (1995) showed that experts were capable of more extensive processing of information, and thus are better able to articulate evaluations of products and form a rationale attitude (Chaiken and Baldwin's (1981). They implicate the availability of a well-defined stored internal knowledge as a key determinant in whether attitude formation is based on a self-perception process or a process described by traditional attitude theory. For example, individual's who are knowledgeable about sports rated a player more favorably when relevant information about the player's hometown was present as opposed to absent (Gilovich, 1981). In another study, students differentiated the level of ad campaigning of political sophistication and expertise in the income tax system (McGraw and Pinney, 1990). Findings indicate that advertising with some form of political sophistication and which requires domain-specific expertise for imparting judgments have distinct and theoretically meaningful consequences for political cognition. Overall, general comprehension facilitated proper evaluation and in depth processing (in-depth processing relates to the form of elaboration). Other studies that support the relationship between comprehension and expertise were demonstrated by Webb, Diana, Luft, Brooks, and Brennan (1997), and Masson and Waldron (1994), Tardieu, Ehrlich and Gyselinck (1992). Overall, these studies indicate that performance differences attributable to domain specific knowledge reflect upon the encoding and comprehension.

In summary, it is clear that experts have a more coherent organization of information stored in memory than novices and thus results in a better comprehension of the information. Consequently, due to the nature of the comprehension, experts attend to greater amounts of information independent of it relevance and also can process this information more extensively (Fiske, Kinder, and Larter, 1983). Therefore, logic suggests that domain-specific expertise allows enhanced evaluation, overall recall, and larger selective memory effects, and is substantiated by concreted findings. Consumers general ability to acquire, comprehend, and retrieve information during evaluation may be strengthened by these. In this context, experts have displayed the ability to retrieve right information from the memory and make accurate evaluation (Marks and Olson, 1981).

Table 2: Selective Studies of Comprehension as a Determinant of Memory and Evaluation

Authors	Topic	Results
Tardieu, Elrich and Gyselinck (1992)	Levels of representation and domain-specific knowledge in comprehension of scientific texts.	Response time analysis for memory tests showed that experts were faster than novices for inferences. These results indicate that performance differences attributable to domain-specific knowledge reflect differences in the construction of the mental model and comprehension.
Masson, and Waldron (1994)	Comprehension of legal contracts by non-experts: Effectiveness of plain language redrafting.	Comprehension, as measured by was reliably enhanced by the use of simplified words and sentence structure. Apart from the constraints of language, non-experts have difficulty understanding complex legal concepts that sometimes conflict with prior knowledge and beliefs.
Guerin, and Matthews (1990)	The effects of semantic complexity on expert and novice computer program recall and comprehension.	Three experiments were conducted. In experiment 1 and 2, changing the normal semantic structure affected experts more than novices, although experts still outperformed novices. Experiment 3 showed that the experts knew more computer related commands and keywords and outperformed novices during information search. Recall and comprehension measures showed the same effects.
King and Balasubramanian (1994)	Objective versus subjective knowledge.	Experts use more objective information during their encoding and comprehension. Novices, on the other hand, use more subjective information to comprehend and interpret the information presented.

Authors	Topic	Results
McGraw and Pinney (1990)	Ad campaigning of political sophistication and expertise in the income tax system.	General comprehension and political sophistication facilitated proper evaluation and in depth processing.

2.12.4 Expert and Ability

Individual ability is a development process that is tightly linked and related to expertise under both domain specific and general processing conditions (see Barsalou and Bower, 1984). Research justifies and maintains an intuition that there are important underlying differences among individuals in how well they can develop expertise (Barsalou and Bower, 1984; Chase and Ericsson, 1972; Simon and Chase, 1973). Even within individuals, it is hard to believe that there is a lack of potential for the development of some capabilities than others (e.g., mechanical performance requires acquisition of quantitative information via learning, although some individuals acquire quantitative information effortlessly, but also do poorly in mechanical ability). Researchers have assumed that in order to achieve this performance level one uses their prior knowledge requiring extraordinary ability[37]. In advertising perspectives knowledge level reflects the receivers' ability to interpret and process ad claims and is used as an indicator of ability (Andrew, 1989). Huang (1998) examined the impact of information processing goals and expertise on the subject's information elaboration. Experimental results showed that information processing goals led to a deeper information search, e.g., political expertise. The study also suggests that both ability and motivation to process exceeds cognitive ability by which people acquire information (Huang, 1998).

For example, a research on complex chess patterns, Chase and Simon (1973) estimated that the grand masters rely on knowledge base containing some 50,000 familiar chess patterns to guide the selection of moves. This knowledge base provides the expert with the advantage to retrieve information with ease and use that information to perform their task. This gives the experts domain-specific memory capabilities that far exceed those of novices. At the same time experts are also subjected to the basic information processing constraints that all humans face, for example, limited STM, slow LTM storage and retrieval processes (Baddeley, 1976; Simon 1976; Anderson, 1987). Chase (1986) also demonstrated expert's ability to recall large amounts of material was displayed for only brief study intervals, provided that the stimuli or information comes from their domain of expertise. On the contrary, novices' recall of the same material under the same conditions of the same information is quite poor. This can be attributed to low functional capacity of their working memory. It is possible to increase the functional capacity of working memory through learning tasks or practice (see Chase and Ericsson, 1980).

In summary, the skilled memory theory confronts the paradox of expertise and claims that people not only acquire content knowledge as they practice cognitive skills, they also develop mechanisms that enable them to use large and familiar knowledge information efficiently.

[37] The usage of knowledge to achieve performance may be through elaboration within any given level or domain of encoding.

2.12.5 Expertise and Accuracy of Evaluation

Evidence indicates that consumers with greater product experience are better able to encode, interpret, and recall product specific information than their novice counterparts (Srull, 1983; Alba, 1983). As product related expertise increases, the consumers' ability to categorize products by attributes is enhanced (Murphy and Smith 1982). According to Sujan and Dekleva (1987), this smooth and refined categorization structure allows expert consumers to exercise greater sensitivity in making product attribute judgment. Novices on the other hand, tend to rely on less developed heuristics to simplify cognitive effort to process product information Brucks, 1985; Park and Lessig, 1981), and subsequently, less accurate beliefs contained in their LTM (Mason and Bequette, 1998). It is argued that individual product knowledge differences may moderate the accuracy of consumers' product attribute evaluation and subsequent inference (Pechmann and Ratneshwar, 1992). Should the consumer's product attribute beliefs be accurate, then their product specific attribute evaluations should also be equally or more accurate. Hence, it is expected that experts memory based evaluations are more likely to reflect the true attributes possessed of the evaluated product (cf. Rao and Monroe, 1988).

2.12.6 Expertise and Performance

By reviewing expertise and performance on memory we can reject the assumption that an expert is limited by the same information processing constraints as the novice. As expert performance is acquired, the expert is no longer constrained by the limits of short-term-memory capacity and he/she is able to acquire skilled memory to circumvent this limitation. Subsequently, h/she rely more on rapid storage of information in a retrievable form in long-term-memory. These acquired memory skills are integral aspects of the expert performance itself. The most interesting study was provided by Adelson (1984), in which, she found that novices actually had better memory for codes (computer programming performance) than did experts. The reason appeared to be that experts attended more to the overall goals of the task in question, rather than focusing and memorizing the actual code (see Patel et al 1986).

One reason that memory performance of experts appears so striking is that for many domains of expertise most individuals have a minimum of relevant knowledge, in contrast to the vast knowledge and acquired skills of the masters in that domain. Furthermore, most experts have dedicated, on an average, of about ten years or more to perfect their performance on a single activity. In this light one can view expert memory performance as an extreme adaptation to the particular demands of certain tasks. The most impressive expert memory performance are found for types of expertise where extensive planning of sequences to be made and their ability to foresee certain aspects of goals that may be accomplished (see Chase and Ericsson 1981; Chi et al., 1982; Chiesi et al., 1979; de groot 1978; Ericsson, 1988). Table 3 provides some examples of the domain specific activities and processing limitations of novices.

In summary, drawing on different works in the area of expertise, three steps have been identified: first, the ability to interpret cue or attributes in a meaningful manner leading to superior performance of both memory and evaluation; second, identification of problem solving and superior performance; thirdly, theoretical and empirical accounts of how the identified mechanisms of product class knowledge can be acquired through training and practice.

Table 3: Processing Limitation

Domain Specific Activities	Processing Limitations
• Planning and managing complex information. • Forward reasoning during evaluation • Stored knowledge	• Lacks the ability • Lacks the ability to forecast, predict and expect • Lack of knowledge of interrelations among variables
• Source of Information and Decision-making	• Not knowing what information is relevant • Difficulty in combining or integrating multiple information • Lack of proficiency to perform a task
• Accessibility	• Lack of immediate accessibility to relevant knowledge • Limited encoding • Limited information search • Lack of comprehension

2.12.7 Expertise and Memory

As a person learns more and becomes more skillful within a particular domain of knowledge, the structure and processes of memory are altered and refined (Anderson, 1983). Activation in memory research determines the ease of access of information - the more active the information the easier it is to access. According to Anderson (1983) there is only a finite amount of activation that small portion of memory can be active at any one time. The rate of processing of an argument and information in the ad depends on the level of activation (Anderson, 1983) and retrieval (Arkes and Freedman, 1984; Chiesi et al. 1979, Smith et al., 1978) of the relevant concepts. Smith et al (1978) noted that strengths of the associations should be related to greater efficiency in retrieval[38]. This is consistent with the notion that information is retrieved more accurately by experts than novices (Arkes and Freedman, 1984; Chiesi et al., 1979). An example would be a study by Zeitz (1995) on information processing advantages associated with domain specific expertise in literature. Results show that literary experts were superior to novices in gist level recall and the extraction of interpretations, surpassed novices in reasoning about literary texts, and generated arguments with greater hierarchical depth (Barry and Alejandro, 1995). Findings also show the higher recalled information was attributed to the availability of the information stored. Gaultney, Bjorklund and Schneider (1992) replicated a study by Schneider and Bjorklund (1992) on the role of expertise on memory task. There was evidence that most substantial recall difference between the groups was attributed to item-specific effects associated with a more elaborated knowledge base. Tewksbury (1999) provided evidence that processing

[38] They also suggested that the best way to understand this effect is to assume that experts do not typically try to retrieve any one specific fact even to verify an assertion rather they frequently draw on their general knowledge and compute whether or not an answer/decision seems plausible.

goals and domain specific expertise can be powerful determinants of how carefully people process information. For example, experts and participants with evaluation goals were more likely than were their counterparts to process the story and form evaluations systematically. They suggest that communication researchers and marketers need to consider consumer goals and expertise in future investigations.

In summary, consumers' direction and efficiency of information search and information processing varies with knowledge content of information sampled varying with expertise (see Jacoby, Troutman, Kuss and Mazursky, 1986; Brucks 1985; Selnes and Troye, 1989; Park and Lessig, 1981; King and Balasubramanium, 1994; Valenzi and Eldridge, 1973; and Rudell 1979; Park and Lessig, 1981). Consumers are aware of their stored product knowledge and may use it to integrate a new piece of information and properly retrieve them to interpret attribute information presented in the ad. On the contrary, consumers who are novices may lack the stored evaluative standard, and they may not use whatever knowledge they have when presented with a new piece of information about the product. They may feel it is useless to exert any kind of effort to process and evaluate the new information. Therefore novices use ad specific cues that are not product attribute oriented information because product attribute information may seem confusing and meaningless to them (Mitchell and Olsen, 1977 &1981; Owens, Bower and Johnson, 1988).

2.12.8 Expertise and Judgment

Findings consistently have shown that the judgments of experts can be described by fewer significant cues than expected (Shanteau, 1992). Most observers of judgment and decision making accept that in order to make effective decisions, all relevant cues that are both diagnostic and predictive should be included in the decision. Furthermore, consumers also use simplifying heuristics when making judgments (Tversky and Kahnman, 1973). In an environment where consumers are exposed to a number of diagnostic information that requires intense processing, it follows that experts should base their judgments on multiple cues[39] (Einhorn, 1974; Slovic, 1969; and Goldberg, 1968). An interesting situation is that, in each case, more information was available. This suggests that experts may make important decisions without adequate attention to the complete set of cues (Johnson, 1988; Markus et al., 1985).

Essential properties that isolate an expert from a novice are quickness, confident judgments, judgments under pressure, a re-assuring evaluation on attributes under analysis, an eye for the unusual, for missing information and rare complex variables (Chi, Feltovich, and Glaser, 1982; Chi et al., 1982). Studies have also indicated that experts apparently have a richer repertory of strategies (Larkin, McDermott, Simon and Simon, 1980; Chase and Simon, 1973; Johnson and Russo, 1984; Spilich, Vesonder, Chiesi and Voss, 1979; Voss, Vesonder and Spilich, 1980). These strategies and the appropriate organization of knowledge, often allow experts to perform evaluation and memory tasks more efficiently and readily than novices. Expertise also consists of identifying a correct procedure[40] for obtaining a solution or making an evaluation through that solution. Park and Hastak (1994) pointed out that experts have the ability to divide information into "exceedingly small units", as compared to novices, who tend to use more general and common categories during judgment and decision-making noted that consumers who strive to be thoughtful and thorough in their evaluations form their judgments in

[39] According to Shanteau (1992), the term cue, attributes, dimensions have been used more or less interchangeably in the literature to refer to the source of information used by experts. Most of the time, this research uses the term attributes and on occasions uses the term cues.

[40] Though in decisions under certainty no one procedure actually exists and there is no concrete way of assessing the correctness of a process of a rule based upon the outcome of a single case. Emphasizing these processes may also help reconcile the two views of expertise: Do experts in decision-making behave like experts in other domains? Do they possess superior information processing skills?

the manner implied by traditional models of attitude formation. On the other hand, consumers who are not pre-disposed to engage in an effortful processing to come to an evaluation could also encompass other accessible information, or may adopt a simpler approach to forming an overall evaluation (Simmons et al., 1993).

In general, the increased use of goals in their protocols, along with their greater use of knowledge retrieved from memory and their extensively active search patterns, provides us with a consistent portrait of experts in other domains (Johnson et al., 1981). Experts' ability to make finer discriminations among objects than novices when making a judgment has been supported by the growing literature on knowledge and decision sciences (Medin and Smith, 1981). Thus, as consumers acquire high knowledge with the product category, they will be able to evaluate product quality through both intrinsic (actual physical product) and extrinsic (product related attributes). As mentioned earlier, the organization of knowledge, information acquisition, retention and recall depend on individuals' processing functions. The processing functions for experts and novices with respect to reviewing, analyzing and then forming a judgment provide a rationale for different patterns of information search.

2.13 Section Summary

In summary this literature section suggests that experts have greater amount of acquired knowledge and well-organized knowledge structure as compared to novices. These complex knowledge content and structures result in a more accurate and efficient information processing. Relevant studies on individual information processing differences based on knowledge that apply to an ad setting are: the differences between numerical and verbal information, comprehension and interpretation of attribute information (Sen, 1998; Viswanathan, 1993; Viswanathan, 1997; Anderson and Jolson, 1980; Higgins and King, 1981; Wyer and Srull, 1981; Bransford, 1979), skilled expertise (Yi 1993; Rao and Monroe, 1988), expert evaluation based on their well established decision criteria (Bettman and Sujan, 1987; Herr 1989; Bettman, John and Scott, 1986), expert and novices judgment (Spence and Brucks, 1997; Alba and Hutchinson, 1987; Johnson and Sathi, 1984; Johnson and Russo 1981; Cordell 1997). Expert consumers are also able to distinguish between similarities associated with a particular attribute to another than those with a less product knowledge (Maheshwaran and Sternthal, 1990; Sujan, 1985; Herr 1989; Johnson and Russo 1989; Whan and Lessig 1981; Ratneshwar, Shocker, and Stewart, 1987; Hecht and Proffitt, 1995). Chaiken and Maheswaran (1994) also asserted that if the attribute information in the ad is ambiguous, then even elaborate processing of the attributes couldn't provide clear-cut evaluations for novices. In addition, for novices, the interpretation and evaluation of the attribute information in the ad can shift in the direction of the expectancy created by other external factors (for example, via the introduction of an ad that has induces a vivid effect). Experts compared to novices are more aware of the relevance of the information and thereby are able to clarify and comprehend the context for performing a given cognitive task and are more likely to attend to all relevant information (see Johnson and Russo 1984). Therefore, because of their sensitivity to relevant information, experts may be more likely to detect the presence or absence of relevant information than novices. Experts enable central processing route using minimal effort and resources as compared to novices who use the peripheral route even with an increase in their effort and more resources allocated.

Evidence also shows that changes and variation in the knowledge base substantially determine developmental differences in memory performance. Hence, experts have a high memory performance and evaluate information thoroughly based on their comprehension of complex information to form a meaningful representation of the information presented to them. Because experts possess more highly developed conceptual structures, they are better equipped to understand the meaning of product information (cf. Britton, Westbrook, and Holredge, 1978,

Johnson and Kieran, 1983). Empirical findings also indicate that individuals with high knowledge tend to use attribute based cognitive processing (e.g., Conover 1982; Walker, Celsi and Olson, 1988; Lynch and Srull, 1982) and novices rely on affective or ad based processing (Bettman and Park, 1980; Bettman and Sujan, 1987; Sujan, 1985). Furthermore, information search or elaboration is considerably lowered for experts (Brucks, 1985; Simonson, Huber and Payne 1988; Markus et al 1985).

In this research the processes by which information is acquired, stored, retrieved, interpreted and utilized during decision-making should reflect the quantity and nature of relevant information gained through previous product experience. The influential role of product knowledge in information processing is in accordance with recent empirical research (Bettman and Park, 1980; Johnson and Russo, 1981). Noting the necessity for a theoretical framework within which to understand the intricacies whereby product knowledge exerts its influence, Marks and Olson (1981) suggested that researchers should adopt a complete cognitive position. This research is designed to help elucidate the role of knowledge and their structure as a moderator of a product's expertise and processing of information mode in combination with presentation form.

2.14 Chapter Summary

We can note that a consumer's decision to purchase a product may rely largely on the memory for the advertisement h/she has viewed. Thus the importance of studying ad effects or persuasiveness depends on the richness of the contents of the message it conveys. In addition advertisers are also constantly trying to improve the persuasive style of the ad in order for consumers to process the information that it contains and recall that information for evaluation. Consumers are bombarded with ads that contain attribute information that are either in a numerical or verbal mode and that the information mode is also presented either in a vivid or non-vivid form. In this chapter three important variables that are involved in the recall and judgment of an ad were identified and reviewed to understand the impact on memory and judgment. The manner in which attribute information is encoding and retrieved depends on the individual's knowledge. For example, the availability of high levels of prior knowledge about the context or material is the most important condition for excellent performance in recall tests (see Weinert and Hasselhorn, 1986). As identified in the literature review, it is necessary to view the entire picture of encoding differences between experts and novices (including the acquisition, comprehension, encoding and retrieval processes) in order to understand specifically the way consumers' process numerical and verbal information. In addition the inclusion of a vivid or non-vivid presentation form with the information mode makes this research interesting. However, no research has yet been approached to tag the relationships: between presentation form and information mode moderated by conditions of expertise.

Most research in marketing that examined the issues of consumer's response to advertising was done with just a plain set of attributes (not relating to the effects of numerical versus verbal attribute information). However, some past studies do provide a relatively good benchmark on the evaluation and memory stages of nutritional information that is theoretically classified as numerical information (e.g., USRDA percentage values). However, studies on the numerical aspect in an advertising perspective are still sparse in spite of its gaining popularity. Vividness, for example has been done both in marketing and in a socio-psychological perspective. Although, studies on vividness have only been conducted with respective to case illustrations, base rate, direct versus indirect experience and vividness has not been operationalized as a presentation form in the past studies. Despite the wide use of vividness to create a persuasive effect, there is no generalized framework that links information mode with vividness. An important focal point of this study, when considering the consumers' knowledge level, is that while rich verbal attribute information is likely to be meaningful to all consumers, information in a numerical mode may be less meaningful to novices due to their lower organization of knowledge structures. Experts and novices also differ in their processing goals and functions that may affect evaluation and recall. In brief, experts should be able to integrate new information with previously acquired knowledge more easily than novices.

The effect of knowledge is likely to occur through the superior abilities of experts to encode, elaborate and retrieve new complex information. If the information is to be processed, however, the receiver or recipient of the communication must also have the ability to process the information. The complexity of the information, whether or not any extraneous distractions present – all these things affect one's ability to process (cf. Cacioppo and Petty, 1979; Petty Wells and Brock, 1976). From an advertising perspective, ads containing more numerical information should be harder to remember and should take longer time to decode. This difficulty of comprehension of any form of information and recall may be applicable to novices or a lower knowledge individual. From the literature review it can be noted that, experts are expected to process attribute information in detail and generate more attribute-related thoughts. Novices are expected to process attribute information with limited elaboration and hence attribute related thoughts are expected to be minimal.

Therefore, it is necessary to review all stages of numerical and verbal information process, the different scopes of vividness, and finally the important functional differences between experts and novices. This is essential in understanding the consumer's evaluation and memory processes (including cognitive elaboration, comprehension, encoding and retrieval). In the next chapter, the conceptual framework was developed to test the hypothesis derived for these variables based on the literature review.

CHAPTER III

3 FRAMEWORK AND HYPOTHESES DEVELOPMENT

3.1 Overview

A synthesis of the three main section reviewed in the literature review is a basis for a conceptual framework and hypotheses development. In this chapter a conceptual framework developed explains impact of knowledge, information mode and presentation form has on memory and judgment. The importance of the moderating variable is stressed because of its ability to influence the direction and/or strength of the relationship between information mode and vividness on recall and attitudinal judgment in an advertisement context. Accordingly, a moderator also specifies the conditions under which a given effect is likely versus unlikely to occur. In explaining the effects of these variables, the primary goal of this chapter is to develop and examine the theoretical framework for this research leading to research hypotheses. The nature of consumer behavior and the link between persuasion and attitude change is discussed first. The organization of this chapter starts with a brief highlights of the variables in the conceptual model followed by discussions on the availability theory and rationale for the derivation of the hypotheses.

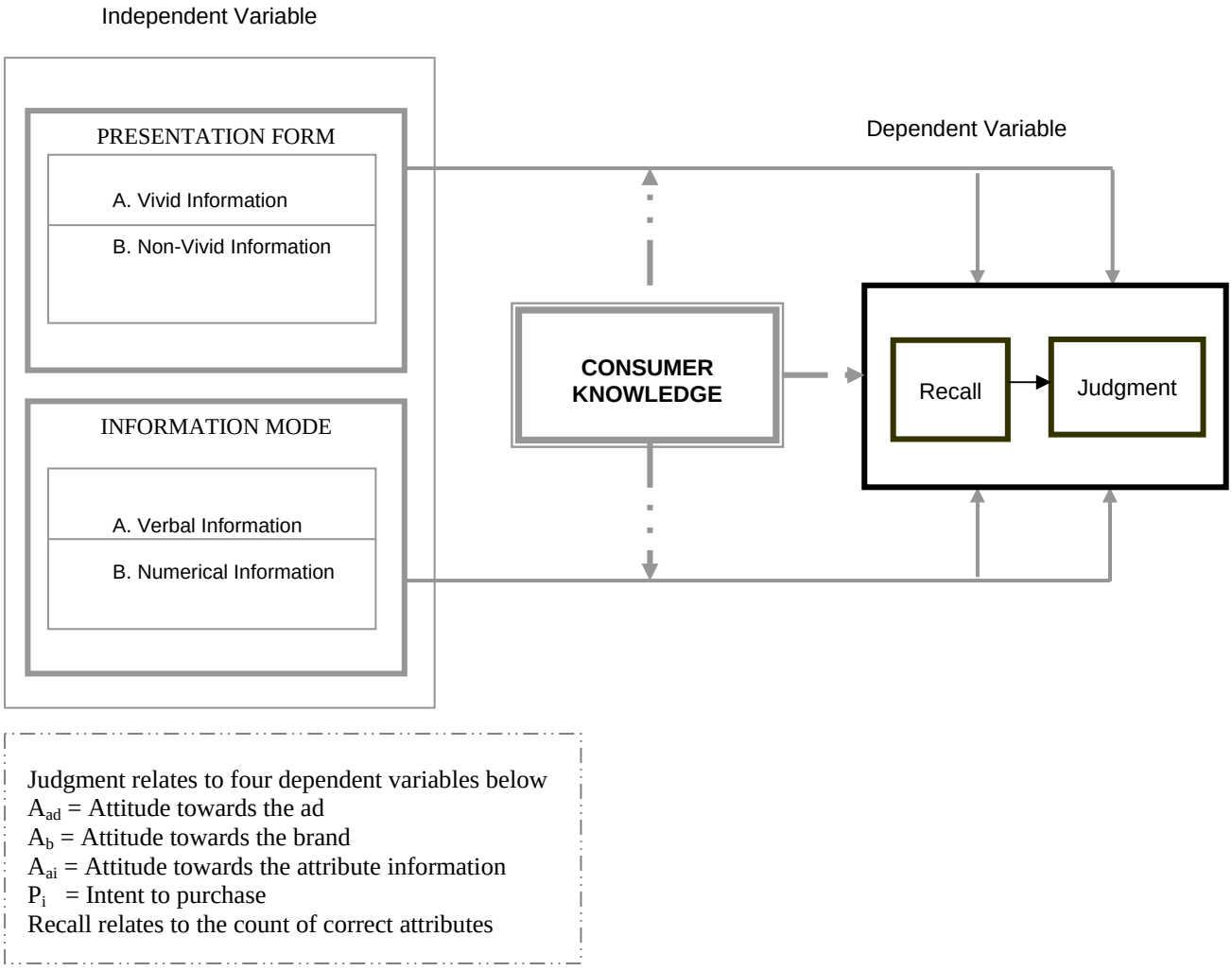
Consumers usually go through information search process very actively and acquire relevant information necessary for the purchase process. They also in general base their decision making on a learning task, a process that is continuously evolving and changing based on acquired knowledge or real-time experiences. According to Wilke (1991) “a consumer is defined as an intelligent, rational thinking and problem-solving individual who stores and evaluates sensory stimuli to make a rational decision”. For instance, consumers tend to or in most cases attempt to evaluate and analyze the stimulus according to their ability, and then they store the information either for future evaluation or an immediate decision. The extent to which consumers evaluate and analyze stimuli depends on their intensity of involvement with the stimuli, and how much information they are able to retrieve. Information is subsequently stored in memory and then recalled with other similar episodes or when h/she wants to remember. The inevitable response is then developed by the consumer to a particular stimuli or situation depending on the episodes----- termed as consumer behavior. It is also noted that a consumer is able to produce a behavior based on a set of activity or set of different activities, such as those involving multiple information processing, or just a simple product evaluation (Wilke, 1991).

There are many models that explain the concept of persuasion and the attitude change theory. It appears that the persuasion concept and the attitude change theory are linked with each other. Examples of these models that explain these aspects of persuasion and/or attitude change are: Fishbein’s Attitude-Behavior Model (Fishbein, 1967); ELM (Petty and Cacioppo, 1981); A_{ad} Model (Mitchell and Olson 1981); Message Learning Model (McGuire 1968); Cognitive Response Model (Greenwald, 1968); Dissonance Theory (Festinger, 1957), Persuasion-Knowledge Model (Friestad and Wright, 1994). The literature on persuasion is vast to be discussed in detail, hence our choice and emphasis for this research is based on the *Availability Valence Theory* (see Kisilieus and Sternthal, 1984 & 1986). The Availability theory is applied in the development of a conceptual framework for this research.

3.2 Summary of Effects Tested in the Conceptual Model

The model in figure 9 has three independent variables that include consumer knowledge as a measured moderating variable. Concepts from availability-valence theory are applied for the derivation of the hypotheses. Operationalization of presentation variable is based on color, font size, and picture size.

Figure 9: Conceptual Model



3.3 Vivid-Verbal and Vivid-Numerical Information

Vivid-verbal information is defined in this study as those that contain concrete, colorful, pictorials that are imagery evoking language along with message that are evaluative descriptors, for example, nouns, adjectives, and active voice (cf. Collins, Taylor, Wood and Thompson, 1988). On the other hand, vivid-numerical information is defined here as those containing similar characteristics as above (e.g., colorful, pictorials etc.) but with specific mathematical units of measurements, percentage values, and quantitative notations attached to the attributes. The non-vivid version of information mode does not contain the characteristics as the vivid version.

3.4 Knowledge

The ability to process product attribute information, and their comprehension and interpretation of information viewed in the ad is viewed as an indication of a knowledgeable consumer. In this study consumer knowledge is classified as a measured independent variable and is defined as product related expertise in relation to terminologies, facts, identifying the differences between different competing attributes, conventions, judgment criteria, generalizations, and theories (Brucks, 1985). An expert is a person who is extremely skilled or knowledgeable in a specific field (domain-specific). Two general remarks about expertise are worth noting: (a) the notion of all-purpose-expert has little merit as expertise is relative to some domain and one that is reasonably broad, nevertheless has clear limits; (b) experts acquire their exemplary knowledge and skills through substantial amounts of study and practice over a period of time. Although expertise is acquired, it is reasonable to suppose that features of expertise would only gradually emerge as a person's relevant knowledge and experience grow[41]. Real expertise requires extensive experience in specific domains. Experts in comparison to novices develop repertoires of efficient strategies for accomplishing tasks within their field of expertise. The individuals' level of knowledge plays an important part in the processing of the stimulus material.

3.5 Recall

To affect recall a stimulus must receive attention. Since this is a limited resource, consumers must focus on some stimuli and specific aspects of the stimulus (e.g., attributes or other cues embedded in the ad). If the particular aspect of the ad presentation receives a lot of attention, it may be easily recalled (Taylor and Fiske, 1978; Peter and Olson, 1996; Stephen and Simonson, 1997). Some theories relate attention to better recall and others suggest that the depth of processing to the information acquired and stored (Craik and Lockhart, 1972). Given the theory of depth of processing, product information encoded under strict processing goals (choice, judgment or learning oriented goals) should enable the consumer to easily access the information from the memory (cf. Biehal and Chakravarti, 1982).

3.6 Judgment

Any information acquired by attending to an external stimulus is subject to pre-dispositions. These pre-dispositions may be due to the effects of vividness of the attribute information, effects of processing and due to the effects of consumers' knowledge level. To reiterate the formation of judgment through attention, we can suggest that vividness may direct our attention to a particular stimulus or to a particular aspect of a stimulus. Researchers have suggested that vivid stimuli may affect evaluations by directing processing, under some circumstances (Babin, Burns, and Biswas, 1992). Findings from studies also illustrate that vivid presentations are persuasive and that they enhance recall, thus suggesting cognitive elaboration is positively related to information availability, and subsequent attitudinal judgment (Kelley, 1989; Kisilieus and Sternthal 1986).

[41] Full-blown expertise is the product of an enormous amount of learning. By definition, experts are very good at problem solving within a particular domain of problems.

3.7 Relationship between Memory and Judgment

In the consumer behavior literature, there is a general consensus that there is a strong relationship between memory for the information presented in the ad and decision-making based on the evaluation derived (Lichtenstein and Srull, 1985; Ambrose, 1986; Allan and Tangen, 2004 & 2005). Memory tests are the most common method of testing the effectiveness of an ad. Therefore, given the crucial goal of advertising to create a positive evaluative judgment of a brand, the advertisement implication related to this evaluation is critical. Intuitively, an individual should be able to generate more arguments and information in support of a favored position than against it, and those evaluations of individuals should be related to the amounts of positive and negative information we have about them (Hastie and Parks, 1986). In addition, it is argued that when an individual is able to remember many arguments against a belief or to cite many good characteristics, it is surprising if he/she endorses or is willing to endorse those beliefs. Therefore, in support of these arguments, a rationale has emerged that memory and judgment/evaluation has a simple direct relationship, or termed as 'availability' (Hastie and Park, 1986). The ease of retrieval hypothesis postulates that consumers use the ease to which information is available as a heuristic during information evaluation (Menon and Raghubir, 2003). Several theories regarding this relationship between recall and evaluation have been reviewed in the past. The basic assumptions by these theories are that a direct association between information that is recalled and the resulting judgment exists (Buehner and May, 2002; Bettman, 1979).

Despite the different views and explanation of the memory and judgment relationship by several theorists, they all agree that the implications of the information recalled directly influences the evaluative nature of the judgment (Lichtenstein and Srull, 1985). For example, the memory judgment model developed by Lichtenstein and Srull (1985) examined the memory-evaluation link to the model[42]. When the attribute information in the ad is encoded with the objective of making a brand evaluation, the brand evaluation will be stored separately from the information contained in the ad. On the other hand, when there is no specific objective to process the acquired information, then, there will no evaluation of the brand. Hence, during a decision-making scenario, the consumer must basically rely on h/her memory of the information presented in the ad and subsequently bases the evaluation on recall.

In this research the assumption underlying the information mode-vividness effect is that a relationship exists between memory and judgment. In the information mode context, an example that seems to support the expectation of a direct relationship between memory and judgment was a study by Tversky and Kahneman (1973). It was demonstrated that many judgments of numerosity (or termed as numerical information/probabilities) were directly correlated with the "the ease with which instances or associations could be brought to mind" (p. 208). Similar demonstrations have been provided in research studying memory-judgment relationships for more complex naturally occurring events (e.g., Lichtenstein, Slovic, Fischhoff, Layman, and Combs, 1978; Reyes Thompson, and Bower, 1980). The conceptual model in Figure 9 addresses in particular, the moderating role of consumers' domain specific product knowledge. It details the importance of consumer knowledge in understanding and in the usage of vividly and non-vividly presented numerical/verbal product information upon exposure affecting recall and attitude toward the ad, brand, attribute information and the intent to purchase. In the sections to

[42] In their model, processing objectives are a critical mediating variable that determines how recall of information influences evaluation leading to decision-making. However, during a choice process, the decision will be based on the previously formed brand evaluation rather than the information remembered from the ad. This is because of the ease in the retrieval to assess the stored evaluation.

follow, rationales for the hypotheses are stated based on the past literature and conceptual framework.

3.8 Underlying Theory: The Availability Model

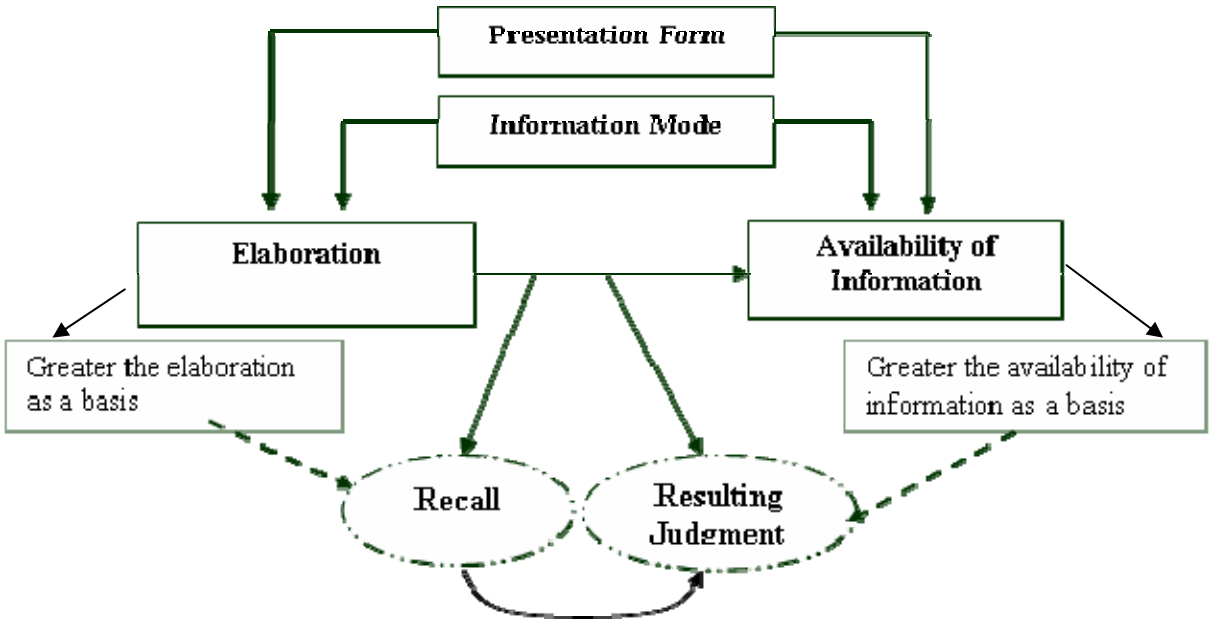
The availability valence model suggests that memory availability causes judgment. During the time when the information is available, the individual encodes that information in the working memory. When a judgment is called for, the individual initiates the judgment process and retrieves the information from long-term memory to be used. For this research, in order to explain the effects of vividness and information mode, the availability-valence model is preferred to other models. A primary reason is that this model provides a strong base for explaining information acquisition, encoding and availability in the memory and judgment process.

This model indicates that when an attitude is formed, it is based on the most available information and the information's valence in memory at that time (Kisielius and Sternthal, 1986). Furthermore, the term availability refers to the ease with which an association can be accessed from the memory (see Anderson and Bower 1980; Nisbett and Ross, 1980). The difference between this definition and the availability heuristics model (Tversky and Kahenman, 1972) is that the latter refers to the readiness of the information when it is more available in memory, and the information will be utilized more in making the evaluation than information that is not readily available. With reference to presentation form, an important factor affecting the availability of information for accounting the vividness effect is the cognitive elaboration. Cognitive elaboration by definition refers to the "number of associative pathways in the memory that imply a particular concept" (Anderson and Bower, 1980). Further, consistent with the prediction of the availability valence hypothesis, the formation of attitudinal judgment is based on the most recent and strongly activated highly available perceptual and emotional structures (Miller and Marks, 1997). Their findings showed that, the favorableness of the resulting attitude toward the ad was related to the valence of the perceptual, emotional, and elaborative structures.

The elaborations make the information more available because they can be activated through many different associative links specifically, the higher the elaboration of the information, the higher is its availability for rendering favorable or unfavorable judgments (judgments depend on the positive or negative valence associated with the available information). Thus, an ad conveying information either in a numerical or verbal mode with a stimulus that is vivid or non-vivid should be encoded with highly available perceptions. Therefore, such information should very easily come to mind (recall based) and influence attitude formation, establishing a link between cognitive elaboration and the availability of the information (refer to Figure 11). Many factors have an impact on persuasion by influencing the extent of argument elaboration cognitively[43]. (cf. Petty, Unnava and Strathman, 1991; Wheeler, Petty, and Bizer, 2005).

[43] For example, the extent to which the person is motivated and able to evaluate the merits of the issue-relevant information presented) and the direction of elaboration (i.e., whether the thoughts elicited are relatively favorable or unfavorable).

Figure 10: Availability of Information in a Presentation Form



According to Kisielius and Sternthal (1984), the cognitive elaboration does not allow anticipation of the direction of the effect. Elaboration results in the development of more storage locations and sensory pathways that render information easier to access or retrieve (Kisielius and Roedder, 1982; Petty and Cacioppo, 1981). This is in comparison to the notion that cognitive elaboration is useful in predicting a treatment effect on judgment. However, in this study the directionality of the attitudinal judgment is predicted since the individual knowledge differences govern the elaboration process (e.g., experts use higher elaboration and novices use a lower elaboration).

Similarly, addressing this model to numerical and verbal information mode, the availability of magnitude representation in individuals has been argued to be based on the amount of numerical ability h/she possesses, including comparison and approximations (see Dehaene, 1992). However, numerical ability during recall and judgment does require access to the available numerical representation, which is acquired via cognitive elaboration. This coincides with the general architectures for information mode processing. Petty and Cacioppo (1986) suggested two distinct routes of processing for attitude formation. The central route relies on the cognitive elaboration to assimilate the available information. This central route allows for the systematic use of remembered information while forming judgment. On the other hand peripheral route depends less on in-depth cognitive elaboration of information and relies more on contextual cues in the message environment (e.g., physical properties of the ad). For example, judgments can be influenced by affective reactions elicited by cues in the message context, and by the vividness of the information that may not be related to the informational content.

3.8.1 Contribution of the Availability Model to this Research

A general conviction in literature is that that vividness and its persuasive effects are questionable, wherein it may either undermine the effect on memory and judgment or may have no effect at all (cf. Kiselius and Sternthal, 1984). This model is based on the premise that vividness of the information presented affects the cognitive elaboration of the individual (Kisielius and Sternthal, 1986). When judgment is made, a substantial number of routes would be available by which message relevant information could be retrieved. We use the “availability

valence hypothesis" (extension of memory model by Anders & Bower, 1980; Tversky and Kahneman, l973) by Kiselius and Sternthal (1984 &1986) to understand presentation form and information mode on memory and judgment. We extend this theory by using two groups of individuals as moderators to test vividness and information on memory and attitudinal judgment. The underlying theory is that favorableness or valence of the available information is a determining factor for .attitudinal judgment (e.g., attitude toward the ad, brand, and intent to purchase).

The availability model is empirically supported in different studies and its contribution to this research is both theoretical and practical. From a theoretical viewpoint, the availability model extends the information processing perspective for analyzing information mode combined with presentation form. Furthermore, because of the availability model's ability to explain pictorial processing, it provides insight into strategies concerned with developing effective presentation of information (e.g., usage of fractals that include pictorials, color-contrast, and information size). In terms of its practical contribution, this theory can contribute to the formulation of public policy decisions concerning advertising by suggesting the inclusion of other forms of information and presentation forms (e.g., visual and/or numerical information).

3.9 Information Mode

3.9.1 Effects of Information Mode on Memory

With reference to the literature review, numerical versus verbal information may be subject to various degrees of interference during encoding and retrieval of information. Interference during comparison of two types of numerical information is considerably less and hence, numerical information may be easier to encode and/or retrieve than verbal information. This may be particularly true when the processing goal at exposure to brand information is to learn or memorize it, especially when the goal is to encode the information in its exact form. Memory tasks have been used to assess the nature of storage of information in long-term memory (Biehal and Chakravarti, 1982) and the recall tasks also requires the reconstruction of the stimulus (Bettman, 1979). Because numerical information is expected to be easier to encode and/or retrieve in an exact form than verbal information, it is likely that the numerical information will be reconstructed and recalled in its original mode (cf. Viswanathan and Childers, 2000). The advantages of the information in a numerical mode can be extended to the recall of information that may or may not be identical to its original mode of presentation, but it captures the underlying meaning conveyed by it. However, this may only be possible when the individual has the ability to comprehend and process the information in a meaningful manner. Because verbal information may be subject to greater interference than numerical information, the accuracy recall of the meaning may be lower for verbal information, although the recall of attributes may be exact. Therefore, the availability of information in the memory eases the way for better encoding and retrieval. However, a superior encoding is contingent upon deciphering the meaning of the information conveyed moderated by domain specific knowledge.

3.9.2 Effects of Information Mode on Judgment

The relationship between memory and judgment is important in this study as it offers a test of proposition that information stored in the memory has characteristics that facilitate decision-making (information stored at the primary level facilitates higher recall of that information). The distinction between primary level and secondary levels of storage of information is that the information at the primary level serves as a principal means of storing numerical information. It is hence argued to consist of information that is specifically linked to an attribute, brands, and

other magnitudes to facilitate their use during decision-making. On other hand, information at the secondary level is argued to be relatively isolated and lacks these linkages. Consequently, numerical information, which does not convey meaning readily, may be processed in a different manner in judgment tasks, leading to a disadvantage when compared to verbal information (cf. Viswanathan and Childers, 1996). However, to the extent that some degree of exact encoding occurs during judgment and choice tasks, it outweighs any disadvantage that numerical information may have due to processing in terms of its meaning.
In a judgment task, whether the outcome is favorable or unfavorable depends on the meaning given to the numbers encoded.

Since numerical information is encoded precisely, specifically linked to an attribute, and has less interference than verbal information, we can then assume that judgment should be favorable toward the ad, brand, attribute information and intent to purchase for information in a numerical mode. Overall, studies on the processing, utilization and encoding differences between numerical versus verbal information points in the favor of numerical information for its advantages during attribute recall and evaluation. There may also be potential disadvantages for numerical interference and confusion arising from digits, but these are offset by the advantages, wherein, numerical magnitudes are specifically linked to the attribute. The unit specific links to the attribute imparts precision to the attribute itself. If the advantages for numerical information were due to the degree to which each type of information is specifically linked to a particular attribute, these should lead to lesser interference for numerical information and higher interference for verbal information (Viswanathan and Childers, 1997).

3.10 Presentation Form

3.10.1 Effects of Presentation Form on Recall

In general, information that is more available in memory has greater influence on judgment than information that is less available. For instance, when the information is available, it is first encoded in the working memory and then transferred into long-term memory (Hastie and Park, 1986). Vividness may affect evaluation because of its influence on retrievability of information at the time of recall, and its enhancement of the encoding process resulting in the subsequent effect on memory. The availability model is also supported by the consistent findings of larger vividness effects in conditions of recall and decision-making. Thus, when consumers make an evaluation, the vivid information is available more in the memory than the non-vivid information. In other words, when individuals are presented with numerous stimuli at the same time, they tend to focus on vivid stimuli and evaluate these more extremely (Taylor and Fiske, 1978). Therefore, any information that is perceived as vivid compared to a non-vivid one should be better recalled. However, under conditions of immediate recall or judgment there is not as much of a difference between vivid and non-vivid information, because one does not lose as much information in that shorter period of time (Reyes et al., 1980). Thus, vividly presented information in an ad is more likely to be thought about longer and may prompt more rehearsal, more elaboration, and effective encoding processes. In addition, the availability model points in favor of vivid information to be more available than non-vivid information (e.g., strong colorfulness may enhance the availability of the information).

3.10.2 Effects of Presentation Form on Judgment

The relationship between memory and judgment appear to be moderated by knowledge in terms of information processing objectives. If there is no specific evaluation-processing objective prior to information observation, then judgment seems to follow the availability valence model. On the contrary, when a specific information-processing objective is present, judgment is not as likely to be related to recalled information. Furthermore, under condition of low processing (e.g., numerical information for novices) a main factor determining the impact of information on attitude is the encoded information and its accessibility in the memory (see Chaiken Wood and Eagly, 1996). The vividness studies have failed to draw this distinction when trying to discover how and if vivid information is influential. As noted before, vividness effects are postulated to occur to the extent that vivid information is better recalled and the evaluation may be based on recalled information. If the vividness effect is based on the availability of information in memory then we should expect to find vividness effects only on memory based judgments. It is also suggested that we can get vividness in both immediate and memory based judgment tasks (Shedler and Manis, 1986).

In a review of over 50 studies on vividness effects, Taylor and Thompson (1982) found that most show superior recall of the vivid material compared to non-vivid material. However, in terms of judgments, these studies show little evidence for a vivid bias on immediate judgments[44] (see Borgida 1979; Gottlieb, Taylor and Ruderman, 1977). Numerous researches in the vividness have shown that the resulting effects are attitudes and communication responses, which is most frequently the type of judgments made. According to Taylor and Thompson (1982), the type of dependent measure is not relevant and does not appear to be an important factor in assessing the qualities of vividness effects. Other measures have also been used (e.g., recall, frequency estimations etc.). In this study some or these dependent variables have been pooled together and measured as 'total judgment'

In summary, vivid information is predicted to be more persuasive than non-vivid information of equal or greater validity. Revisiting some of the reasons touched based in the literature review to provide a basis for this prediction: vivid presentation form should be more readily available for retrieval; it is processed more completely during encoding and therefore it should be more memorable. In this view, judgments and attitudes are based on the information most easily retrieved from the memory[45].

3.10.2.1 Presentation Form: A_{ad}, A_b, A_{ai}, and P_i

The attitude toward the ad, brand, intent to purchase and attribute information literature has found that an affectively valence ad evokes a stronger affective reaction that can neutralize a non-vivid ad. The assumption perhaps is that this affective response is generalized to the advertised brand, particularly where the ad receiver has very little knowledge about the advertised product. Hence, it is predicted that vivid presentations of positive product attribute information may exponentially increase the favorability in comparison to a non-vivid presentation. Simply stated, vivid presentation is more interesting than non-vivid presentation. Therefore, translated to the context of a vividly presented ad (because of its ability to capture

[44] Overall, the vividness literature suggests that the use of vividness to stimulate persuasion is filled with uncertainty. Therefore, to employ vivid stimuli, the researchers and strategists must be able to anticipate the conditions under which a favorable outcome is likely. A suitable approach is the extension of memory views of Tversky and Kahneman (1973), referred to as the availability valence (Kisilieus and Sternthal 1984 &1986).

[45] Vivid information is by definition, highly imageable, that is likely to provoke internal visual representations. According to this argument, visual codes are especially memorable, so vivid information again would come to the forefront in memory based judgments and attitudes.

attention), it may elicit a more extreme positive or negative reaction than its non-vivid counterpart. The extent of consumer processing elicited by a message should also affect the relation between attitude towards the ad and the brand evaluations. Specifically, when consumers are unfamiliar with an advertised brand, they lack the prior knowledge structure on which to base attitudes towards the brand. Thus they are more likely to rely on attitudes towards the ad in forming brand attitudes. Consumers with domain specific knowledge, by contrast, are more likely to draw on their existing brand knowledge, attenuating the influence of attitude toward the specific ad on attitude toward the brand (Machleit, Allen, and Madden, 1993; Machleit and Wilson, 1988).

3.11 Consumer Knowledge

3.11.1 Effects of Knowledge on Recall

Revisiting the knowledge literature briefly, the individual's knowledge determines to a great extent the way in which new information is encoded and retrieved from the memory (Anderson, 1977 &1978; Brewer and Nakamura, 1984; Vosniadou and Brewer, 1987). A large number of studies have shown that prior knowledge activation facilitates subsequent information processing, recall and clear judgments. A number of other studies have illustrated the effect of knowledge on recall (Arkes and Freedman, 1984), information acquisition and retention (Chiesi, Spilich and Voss, 1979), information search (Brucks, 1985; Biehal, 1983; Johnson and Russ,o 1984; Srull, 1983); information processing strategies (Sujan, 1985; Fiske, Kinder and Larter, 1983) and organization of memory and processing (Sujan, 1985; Alba and Hasher, 1983; Fiske et al., 1983; Chi, Feltovich and Glaser, 1981). Research evidence also suggests that experts compared to novices possess a superior memory organization in their knowledge base and thereby perceive problems in large meaningful pattern (Atkin 1980; Egan and Schwartz 1979; and Gentner, 1988). These superior organizations that experts possess can be classified according to factors related to their ability (Batra and Ray 1986; Roberts and Macoby, 1973; Schumalensee, 1983; and Wright, 1981); and cognitive elaboration (Craik and Lockhart 1972; Mitchell 1981). Therefore, when provided with complex information, experts use them with greater processing intensity resulting in better recall when compared to novices.

3.11.2 Effects of Knowledge on Judgment

It is duly noted that consumer's knowledge level influences their reaction to persuasive communication (Mitchell, Henry and Chi, 1983), and it is also suggested that knowledge improves message comprehension and message acceptance by providing consumers with an appropriate framework to evaluate the message (Marks and Olson, 1981). Experts displayed attitudinal judgment towards the advertised brand, and that favorable or unfavorable evaluation depends on the message content and on the amount of information comprehended (Marks and Olson, 1981). This is consistent with Alba and Hutchinson's (1983) argument, suggesting a significant difference in recall and more elaborated thoughts[46]. Although there have been a number of studies in the area of expertise, it is quite difficult to arrive at conclusions when it comes to the influence of knowledge on advertising effectiveness. However, some studies show that varied level of knowledge does affect judgment, recall and message comprehension in ads,

[46] Experts recalled more complex information when tested for comprehension and retention.

and add distinguishing similarities[47]. (Mitchell 1990; Mishra et al., 1993). Empirical evidence in cognitive psychology suggests that expertise assist individuals to distinguish important product attributes and thereby tuning their attention on the most relevant attributes in the ad[48].

The role of attitude toward the ad's effect on attitude toward the brand and attitude toward the product has been studied under a variety of conditions and with a number of different products. Prior knowledge of products has been shown to be related to both attitude and product desirability (Brucks, 1985; Maheshwaran and Sternthal, 1990). Marketers may have as the purpose of their advertisements that the target of the ad should take some action other than purchase (e.g., to seek additional information). In relevance to knowledge and attitudes, greater product knowledge was associated with more favorable brand attitudes in response to ad with attributes only (Maheswaran and Sternthal, 1990). The authors argued that experts should form more favorable attitudes toward a brand when they are provided with attribute information. This way expert consumer can infer the particular benefits that are most important to them. By considering the individual differences in knowledge we were able to understand the meaningful representation of stored information, and comprehension of numerical information. In addition, we can comfortably state that consumers who are experts about domain specific product category will tend to express a more positive attitude toward the ad containing numerical information. Therefore, individuals with greater experience with the advertised product will have more favorable attitudes and are able to recall better when presented with numerical information when compared to novices.

3.12 Research Hypotheses

Several hypotheses are generated for memory and evaluation tasks to investigate the moderating role of knowledge on the impact of vividness and information mode. The primary question in this research is what type of information mode and presentation is likely to be used by what kind of individual in the formation of an attitude toward the ad. Essentially overlooked in previous research are the issues of the effects and influence of knowledge on information mode and presentation form on attitudinal judgment and on recall. This research suggests that the moderating role of consumer knowledge is an indicator of how individuals process information differently, recall, make inference, and then evaluate the specificities of the information.

The relation between an independent variable and a dependent variable may differ at different levels of moderator variable (e.g., processing differences between experts and novices). Background information and different explanations from the area of cognitive psychology have been provided on how and why individuals process the acquired information, affects their ability to retrieve the processed information, and subsequently affecting recall (Mitchell, 1980). Numerous studies have indicated that the type of evaluative processing or the type of cognitive responses generated during exposure of stimuli affects attitude formation (Greenwald, 1968; Wright 1970, 1980). Consequently, many seemingly inconsistent theoretical positions arise when different researchers focus on different levels of a moderator without considering the relation between an independent variable and a dependent variable along the entire range of levels of the moderator (Baron and Kenny 1986). The research hypotheses are derived based on the application of the availability valence model (Kisilieus and Sternthal, 1984), which implies that attitudinal judgment is formed based on the availability of the information that is present in the memory

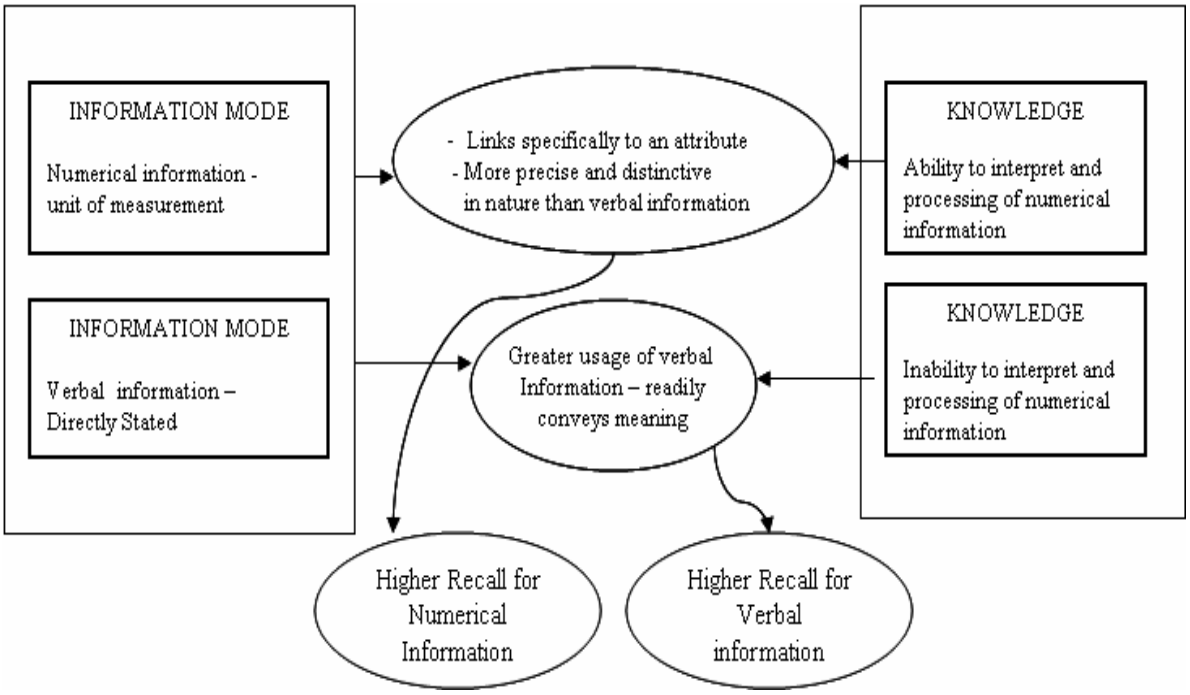
[47] Mishra et al. (1993) and Ratneshwar et al. (1987) stated that in a numerical mode, individuals with greater knowledge are able to distinguish between similarities associated with a particular attribute to another than with a lesser knowledge consumer.

[48] The distinctiveness of the attributes depends on the richness of the cues and the processing capacity of the individual.

Knowledge structures of experts are more dimensional than that of novices (Conover 1982, Kanwar et al., 1981, Hirschman et al., 1981). From the standpoint of information theory, a reason that explains more usage and preference for numerical information to verbal information by experts is that numerical information reduces uncertainty because of its precision and its specific linkage to an attribute, thereby providing more meaning.

3.12.1 Hypotheses: Knowledge and Information Mode on Recall and Judgment

Figure 11: Model Rationale 1 (Recall, Knowledge and Numerical Information)



The key aspect here is that the linkage to the attribute information should be comprehensible to the individual in order to extract the correct meaning. Because experts demand precision, numerical information should be able to produce a positive pre-disposition and greater recall of information presented in the ad. On the contrary, attribute information in a numerical mode may appear more difficult to novices (see Viswanathan, 1995). Most importantly, from past studies, numerical information is likely to be less meaningful to novices because of their reduced ability to retrieve stored knowledge to ascertain the experiential adequacy inherent in numerical information. In other words, numerical information needs some kind of reference information either from prior knowledge or from external information in order to be interpreted in terms of its meaning whereas verbal information readily conveys meaning (Viswanathan & Childers 1996 & 1997; Viswanathan & Narayanan 1994; Mishra et al., 1993; and Ratneshwar et al. (1987).

Therefore, interpretation of numerical information or between brands in terms of its correct meaning would be more difficult for novices'. For novices, numerical information is more likely to lead to lower recall and compromise the accuracy of the attributes during recall. For example, multiple or similar numerical values in different units of measurements would greatly increase the probability for errors[49], hence, the retrieval of information from the memory

[49] For example, in a computer product category, the manufacturer's warranty may be described in 'years' (2 years warranty on the CPU). It is unlikely that it will be recalled in, say, 'weeks', or the unit of measurement for the life of

maybe very unclear. On the other hand, because verbal information imparts meaning directly, it allows novices to retrieve them more easily. It is also conceivable that because verbal information is likely to be confused (cf. Viswanathan and Childers, 1996) with other information on a different attribute or attributes between different brands, it is prone to larger errors during memory related tasks[50]. It can also be argued that preference for certain attributes that matches the significance of a purchase intention may also lead to a better recall and favorable attitude towards the brand. The importance and preference for numerical information has been acknowledged widely by researchers (Viswanathan, 1993; Cockroft, 1982; Wallsten and Budescu, 1993) though, what is lacking is the consumer's attitude towards numerical information when the information is presented in an ad. Therefore, for experts, the neglect of information in a numerical mode may lead to an unfavorable evaluation of the target in question.

It is clear that three factors are required for consumers to understand and use numerical information. Firstly, they must have high product knowledge to make the information meaningful to them. Secondly, the individual must be able to perceive the importance and usefulness of the attribute information and therefore they should be able to make an effort and be motivated to process the information. Thirdly, for reasons as to why the usage of numerical information is better for experts than for novices is that, experts use criteria that are more informative and precise to them as compared to just a plain adjective attribute descriptors that impart meaning approximately and vaguely. Research evidence provides support of the belief that numerical information may reduce attention and motivation to process (e.g., Witt 1974). This line of reasoning is well documented in few studies[51] (Walker et al., 1987; Viswanathan and Narayanan, 1994; Lindberg, Garling and Montgomery, 1991). The probability of recalling numerical information better than verbal information is perhaps habitual which leads to a search for more precise information. Therefore, for novices, it is possible that an ad containing information in a numerical mode will be less likely to be evaluated favorably because the information is not interesting enough to maintain their attention and motivation level. Another interpretation is that novices may also be less willing to think about a piece of information if it is presented using numerical or quantitative expressions (cf. Yalch & Yalch, 1984).

Consumers who may lack the ability to interpret and process numerical information may choose to process the alternative, verbal information, and verbal information that directly conveys meaning may amplify the accuracy of an evaluation and subsequent recall for novices (see Scammon, 1977; Beltrami and Evans, 1985). Because numerical information is precise in nature and verbal information is evaluative in nature, we can predict that high expertise will have a significant favorable effect on attitudes for numerical information. Numerical information is known for imparting precision meaning in comparison to just verbal information and hence, the preference for numerical information by experts may be associated with less tolerance for ambiguity (cf. Norton, 1975). We can further rationalize that when considering an individual's level of expertise, evaluation and recall should have a significant effect in the presence of

---

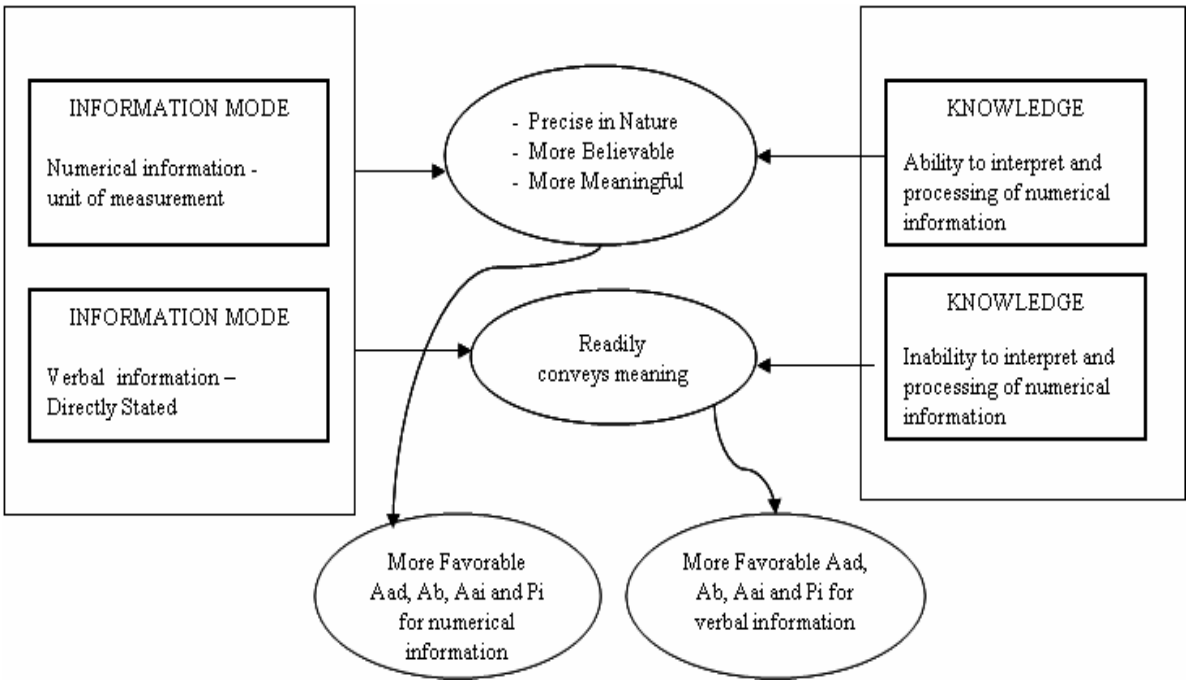
the Li-ion battery in day or even in 'hours'. This is to emphasize the point that numerical information is specifically linked to an attribute through some form of unit of measurement.

[50] For example, the manufacturer's warranty for the computer may be described as 'lengthy' (in comparison to numerical information which is in '2 years'). This may be recalled as 'high' or 'very high', wherein the length of the warranty during the attribute presentation using the verbal anchors, 'lengthy/short', is recalled later using 'high/low' or 'very high/very low' anchors.

[51] Walker et al. (1987) noted that experts have the tendency to use more numerical information, and that they have a tendency to use numerical attribute information more extensively compared to verbal information, and novices use more benefit based information (e.g., low in fat or high in fiber). An expert in the product class influences the intensity of information search used by consumers (Claxton, Fry and Portis 1974; and Newman and Staelin 1972). With a distinct view of individual differences in knowledge along with the meaningful representation and comprehension of numerical information, it is suggested that, experts about a product category will express a more positive attitude toward the ad containing numerical information.

numerical information, this reasoning is based on the *comprehension aspect* (e.g., with respect to levels of difficulty). Along the same lines of reasoning, expertise with a product category has also shown to affect the processing route used in evaluating the content of the ad (Brucks, 1985). The likelihood of making a proper evaluation is low when the information is not retrieved properly from the memory (see the relationship between recall and judgment relationship, p. 147).

Figure 12: Model Rationale 2 (Judgment, Knowledge, and Information Mode)



Although the precise nature of numerical information allows the choice factor to be apparent to experts when compared to novices, it is suggested that experts are capable of making a better sense of the implications deriving the meaning of each attribute in a numerical form for evaluation. Therefore, attribute information in a numerical mode, unlike information in a verbal mode, may make novices more uncertain about their attribute preferences and uncertainty about trying to attach attribute importance weights. On the contrary, the influence of reference information in facilitating the usage of numerical information by consumers in comparison to just the verbal information showed that both verbal and numerical presentation of the information equally led to a greater recall accuracy. This finding reverses the advantages of the numerical information reported in the study by Viswanathan and Childers (1996). In summarizing the information mode literature, the difference in the results between the studies by Viswanathan and Childers (1996) could be explained via the conditions moderated by the subjects' knowledge level about the product category. On the other hand, more emphasis may be given to verbal information during overall judgments, although the accuracy of the overall judgments will only appear to hold when consumers' knowledge about a product category is low. Novices who lack the ability to process and interpret numerical information in terms of its meaningful representation will be motivated to process verbal information.

It is hypothesized:

H_1: *Experts will recall fewer attributes in a verbal mode than in a numerical mode*
H_2: *Novices will recall more attributes in a verbal mode than in a numerical mode*
H_3: *Experts will recall fewer attributes from an ad in a non- vivid form than a vivid form*
H_4: *Novices will recall more attributes form an ad in a vivid form than non-vivid form*
H_5: *Experts attitude towards the ad in a numerical mode is more positive than for an ad in a verbal mode.*
H_6: *Experts attitude towards the brand for an ad in a numerical mode is more positive than for an ad in a verbal mode.*
H_7: *Novices attitude towards the ad in a verbal mode is more positive than for an ad in a numerical mode.*
H_8: *Novices attitude towards the brand for an ad in a verbal mode is more positive than for an ad in a numerical mode.*
H_9: *Experts attitude towards the attribute information is more positive for an ad in a numerical mode than for an ad in a verbal mode.*
H_{10}: *Novices attitude towards the attribute information is less positive for an ad in a numerical mode than for an ad in a verbal mode.*
H_{11}: *The intent to purchase is stronger for experts when the information is in a numerical mode than in a verbal mode.*
H_{12}: *The intent to purchase is weaker for novices when the information is in a numerical mode than in a verbal mode.*

3.12.2 Hypotheses: Knowledge and Presentation Form on Recall and Judgment

There is a general consensus that vividly presented information has a greater impact on judgments than non-vividly presented information. Vivid information, for example, facilitates high elaborative processing, and strong vividness effects are likely when large amounts of information are available and when high elaborative processing is likely to occur (McGill and Anand 1989).

Figure 13: Flow Diagram of Memory Based Tasks

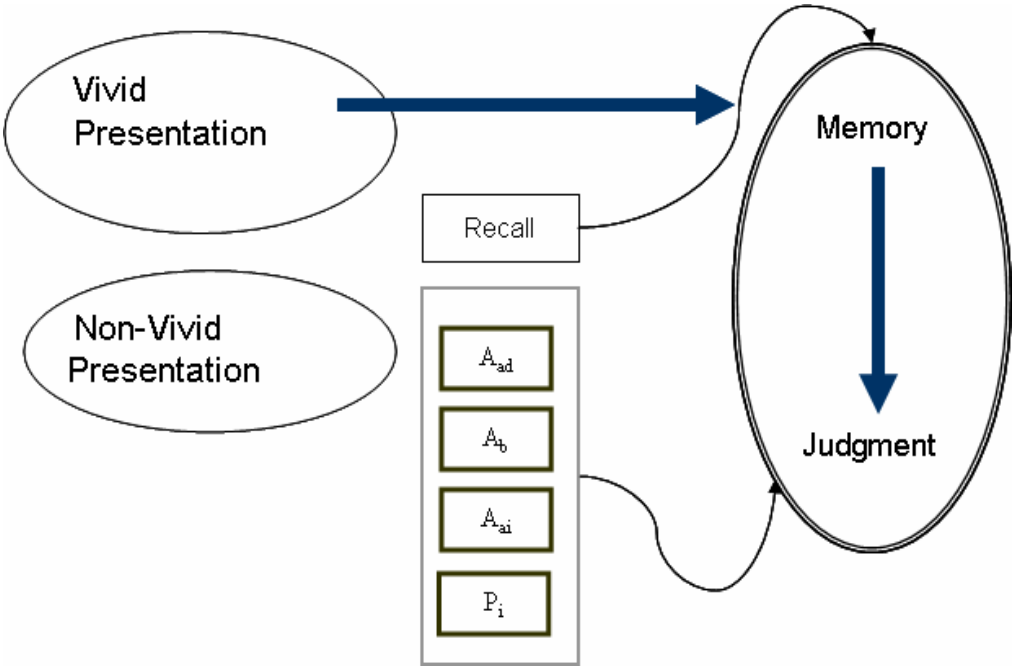
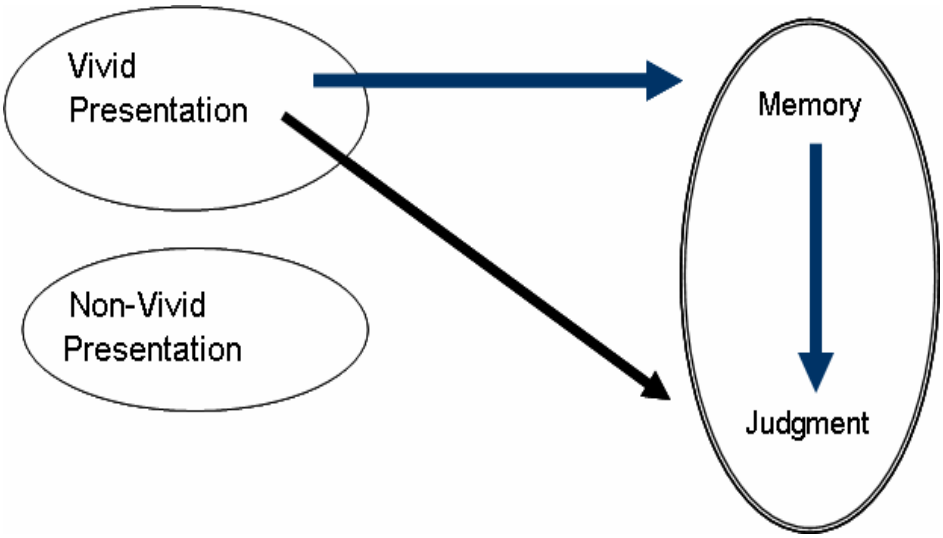


Figure 14: Flow Diagram of Direct Memory and Judgment Based Tasks



The availability model is supported by the consistent findings of larger vividness effects in conditions of recall and decision-making. When information is more available, the information retrieval during recall is easy. Vivid information has its influence during encoding stage and the encoding stage is affected by the attention a subject has available. Therefore the factor that appears to play a role in the effects of vividness or vividly presented information on recall and judgment is cognitive elaboration. The presence of greater cognitive elaboration for a vivid presentation form in comparison to a non-vividly one is because of the associations to the message that will be more available for a vivid presentation (see Kisilieus and Sternthal, 1984). The marketing literature also suggests that product class expertise influences the intensity of information processing used by consumers (see Claxton et al., 1974; and Bettman, 1980). Since high elaboration requires greater attention, and since processing strategies are known to differ between experts and novices, it is simply implied that product class knowledge influences the allocation of attention. This is consistent with the distinctiveness hypothesis (see Jain 1990). However, novices will be more prone to differential attention when vivid information is presented. This is because novices lack of proper structures and resources to process complex attribute information.

Past research studies suggests that individual differences in knowledge about a product category will influence the amount of attention allocated to the ad. In an ad evaluation context, studies on knowledge have also showed that a positive attitude towards the ad depends on whether the information provided is attribute- based or benefit based (Mahewaran and Sternthal, 1990). Therefore, expert consumers who use attribute based processing (central route) should be able to form a more favorable attitude toward the ad when the ad provides brand attribute information. The reason for this prediction is because of the assumption that the greater the extent of message elaboration, the more favorable people's evaluation would be (Schumann, 1983). On the other hand, when there is no elaborate processing (or when there is low processing), the effect will not be as large. The low elaboration may be due to other processing demands or because of low knowledge. However, with expertise the effect of vividness is tempered. Vividness has a more impact and works well with novices in comparison to experts. This is consistent with novices doing peripheral processing and experts doing central processing and the ELM literature on argument strength.

Therefore it is hypothesized that:

H_{13}: *Experts attitude towards the ad for an ad in a non-vivid form is less positive than an ad in vivid form.*

H_{14}: *Experts attitude towards the brand for an ad in a non-vivid form is less positive than an ad in a vivid form.*

H_{15}: *Novices attitude towards the ad for an ad in a vivid form is more positive than an ad in a non-vivid form.*

H_{16}: *Novices attitude towards the brand for an ad in a vivid form is more positive than an ad in a non-vivid form.*

H_{17}: *Experts attitude towards the attribute information is less positive for an ad in a non-vivid form than an ad in a vivid form.*

H_{18}: *Novices attitude towards the attribute information is more positive for an ad in a vivid form than an ad in a non-vivid form.*

H_{19}: *The intent to purchase is weaker for experts when the ad is in a non-vivid form than in a vivid form.*

H_{20}: *The intent to purchase is stronger for novices when the ad is in a vivid form than in a non-vivid form*

3.12.3 Hypotheses: Interaction Effects on Recall and Judgment

It is argued that it is easier to perform unique operations using numerical information as compared to verbal information (Stone and Schadke, 1991). For example, during decision-making or problem solving, the meaning derived from a set of attributes of verbal information of a brand in comparison to a different brand with a set of verbal information is unknown. In this aspect a reasonable amount of attribute based processing can be expected for numerical information. Findings also point to the direction of numerical information with respect to its characteristics of lesser interference (with the help of reference information), greater attribute related processing, easier to distinguish and therefore, easier to encode and/or retrieve than verbal information (see Stone and Schadke, 1991; Viswanathan and Narayanan, 1994; Viswanathan and Childers, 1996; Jaffe–Katz et al., 1989). The availability model refers to superior recall and subsequent evaluation when the information is available and retrievable in a meaningful form, in this aspect, given the reasoning for both information mode and vividness in the literature, we can predict that vivid-numerical information will lead to a better recall and subsequent evaluation for experts[52]. However, taking into consideration the direct meaning imparted by verbal information, we can also expect the opposite for novices (availability of verbal information).

It is suggested that for the interaction effects on recall:

H_{21}: *Experts will recall more attributes from an ad in a vivid-numerical form than in a non-vivid numerical form*

H_{22}: *Experts will recall more attributes from an ad in a vivid-numerical form than in a vivid verbal form.*

H_{23}: *Experts will recall more attributes from an ad in a non-vivid numerical form than in a non-vivid verbal form.*

H_{24}: *Experts will recall fewer attributes from an ad in a vivid verbal form than in a non-vivid verbal form.*

[52] Refer to Baesler and Burgoon's (1994).

H_{25}: *Novices will recall more attributes from an ad in a vivid-verbal form than in a non-vivid verbal form.*

H_{26}: *Novices will recall more attributes from an ad in a vivid-verbal form than in a vivid numerical form.*

H_{27}: *Novices will recall more attributes from an ad in a non-vivid verbal form than in a non-vivid numerical form.*

H_{28}: *Novices will recall more attributes from an ad in a vivid-numerical form than in a non-vivid numerical form.*

However, this vividness effect will have a smaller impact on experts than for novices. Based on model rationale in Figure 11 and 12, experts would recall vivid-numerical information and evaluate this information more favorably, the vividness effect will be marginal when in comparison to non-vivid numerical information (however, the vivid effect will be more pronounced for novices as compared to experts). For novices, verbal information in a vivid form will be recalled better and will react favorably towards the ad, brand and attribute information. Based on the literature review, it is predicted that vivid information is better than non-vivid information since vividly presented information is attention getting, and verbal information is very evaluative that directly conveys meaning, and hence resulting in better recall and subsequent judgments. However, as experts are prone to prefer and use numerical information (basis for precision), the recall and evaluation of a vivid and non-vivid numerical information will still be better than vivid verbal and a non-vivid verbal information (because numerical information requires more elaboration and experts conduct higher elaboration). In addition the recall of vivid-numerical information will be either lesser or greater than non-vivid-numerical information (i.e., the effect of vividness is greater for numerical than for verbal because elaboration helps the processing of numerical information). However, the vivid effect is more for novices compared to experts, since experts elaborate numerical information automatically. Similarly, a non-vivid numerical information will be recalled and have a more favorable attitude than a non-vivid verbal information (given the advantages of numerical information and experts need for higher cognition and tendency for higher elaboration, numerical information will always be preferred compared to other information mode).

It is suggested that for the interaction effects on judgment (A_{ad})

H_{29}: *Experts attitude toward the ad in a vivid numerical form is more positive than a non-vivid numerical form.*

H_{30}: *Novices attitude toward the ad in a non-vivid numerical form is less positive than a vivid numerical form.*

H_{31}: *Experts attitude toward the ad in a non-vivid numerical form is more positive than a non-vivid verbal form.*

H_{32}: *Novices attitude toward the ad in a non-vivid numerical form is less positive than a non-vivid verbal form.*

H_{33}: *Experts attitude toward the ad in a vivid numerical form is more positive than a vivid verbal form.*

H_{34}: *Novices attitude toward the ad in a vivid verbal form is more positive than a vivid numerical form.*

H_{35}: *Experts attitude toward the ad in a vivid verbal form is more positive than a non-vivid verbal form.*

H_{36}: *Novices attitude toward the ad in a vivid verbal form is more positive than a non-vivid verbal form.*

It is suggested that for the interaction effects on judgment (A_{ab})

H_{37}: *Experts attitude toward the brand for an ad in a vivid numerical form is more positive than a non-vivid numerical form.*

H_{38}: *Novices attitude toward the brand for an ad in a vivid numerical form is more positive than a non-vivid numerical form.*

H_{39}: *Experts attitude toward the brand for an ad in non-vivid numerical form is more positive than a non-vivid verbal form.*

H_{40}: *Novices attitude toward the brand for an ad in a non-vivid verbal form is more positive than a non-vivid numerical form.*

H_{41}: *Experts attitude toward the brand for an ad in a vivid numerical form is more positive than a vivid verbal form.*

H_{42}: *Novices attitude toward the brand for an ad in a vivid verbal form is more positive than a vivid numerical form*

H_{43}: *Experts attitude toward the brand for an ad in a non-vivid verbal form is less positive than a vivid verbal form.*

H_{44}: *Novices attitude toward the brand for an ad in a vivid verbal form is more positive than a non-vivid verbal form.*

It is suggested that for the interaction effects on judgment (A_{ai})

H_{45}: *Experts attitude toward the attribute information for an ad in a vivid numerical form is more positive than a non-vivid numerical form.*

H_{46}: *Novices attitude toward the attribute information for an ad in a non-vivid numerical form is less positive than a vivid numerical form*

H_{47}: *Experts attitude toward the attribute information for an ad in a non-vivid numerical form is more positive than for a non-vivid verbal ad.*

H_{48}: *Novices attitude toward the attribute information for an ad in a non-vivid verbal form is more positive than a non-vivid numerical form.*

H_{49}: *Experts attitude toward the attribute information for an ad in a vivid numerical form is more positive than a vivid verbal form.*

H_{50}: *Novices attitude toward the attribute information for an ad in a vivid verbal form is more positive than a vivid numerical ad.*

H_{51}: *Experts attitude toward the attribute information for an ad in a non-vivid verbal form is less positive than a vivid verbal form*

H_{52}: *Novices attitude toward the attribute information brand for an ad in a vivid verbal form is more positive than a non-vivid verbal form.*

It is suggested that for the interaction effects on judgment (P_i)

H_{53}: *Experts intent to purchase is stronger when the ad is in a non-vivid numerical form than in a vivid numerical form.*

H_{54}: *Novices intent to purchase is weaker when the ad is in a non-vivid numerical form than in a vivid numerical form.*

H_{55}: *Experts intent to purchase is stronger when the ad is in a non-vivid numerical form than in a non-vivid verbal form.*

H_{56}: *Novices intent to purchase is weaker when the ad is in a non-vivid numerical form than in a non-vivid verbal form.*

H_{57}: *Experts intent to purchase is stronger when the ad is in a vivid numerical form than in a vivid verbal form*

H_{58}: *Novices intent to purchase is stronger when the ad is in a vivid verbal form than in a vivid numerical form.*

H_{59}: *Experts intent to purchase is weaker when the ad is in a for a non-vivid verbal form than in a vivid verbal form*

H_{60}: *Novices intent to purchase is stronger when the ad is in a vivid verbal form than in a non-vivid verbal form.*

We can note that consumers are likely to gauge the ad and leave a lasting imprint in the memory (see Dahlen and Bergendahl, 2001, Machleit and Wilson, 1988). Should the information be inadequate, missing or misleading then this may either inhibit recall or affect judgment. For example, research on expertise using an advertisement or a similar communication as a context, suggests that knowledge influences the information processing of a message, therefore, it plays an important role in its evaluation. Total recall in general, is attributed to be a function of expert knowledge about a product category (Okechuku, 1992). Cognitive evaluation also can be attributed to prior knowledge, however, the level of the subject's involvement and attention seems to be stronger (Okechuku, 1992). Based on the rationale put forth earlier, experts compared to novices will weigh their judgment based on numerical information, and novices are will impart judgment based on vividly presented verbal information. Although, experts are expected to have a favorable judgment for a vivid presentation, the effects are more pronounced for novices. Hence, we can also expect three way interaction effects between knowledge, information mode and presentation form on recall and judgment.

3.13 Chapter Summary

The information mode (numerical/verbal) and form of presentation (vivid/non-vivid) of a message tend to have a unique influence on experts' and novices' responses. This has served as a basis for the present investigation. From the literature, it is expected that experts and novices would respond differently to the various types of messages. It is also expected that the encoding of information and level of processing by experts will be different from that of novices for different mode of information and presentation form. During an attribute based processing, experts have the knowledge to make an inference as a basis for evaluation because they perceive attribute claims to be highly informative, especially, numerical information which is deemed more convincing. Therefore, it is expected that experts will engage in a detailed message processing taking into account all attributes and at the same time may also disregard the information if it does not contain numerical attribute information. On the other hand, novices may find the advertisements physical features to be meaningless and hence, advertisements are geared towards including easily comprehended verbal information. This indicates that when novices are provided with numerical attribute information, there will be just a random skimmed processing, and the information will be considered to be uninformative.

The processing differences between experts and novices are consistent with other research examined in the past. Furthermore, the amount of elaborated thoughts by experts and novices indicate the extent to which the attribute information is processed. Attribute information normally requires an assessment of the attributes to make a meaningful reference to an evaluation, and experts perform these assessments of attributes meticulously. To be more specific, expert tends to extensively process attribute information and hence makes a thorough assessment of the presented information that leads to an enhanced recall. Therefore, when attribute information alone is presented, the greater is the elaboration of the message processing, and the more favorable consumer attitude would be (Petty, Cacioppo and Shumann, 1983). This can be applied to numerical and verbal information in combination with presentation forms for both experts and novices. Experts render favorable attitude if the message presented attributes in a numerical-vivid mode (attribute related) as compared to novices who will render favorable attitude toward verbal-vivid information (benefits related).

CHAPTER IV

4 METHODOLOGY

In this chapter, an experimental design is developed to test the proposed hypotheses. This chapter consists of five sections. The first two sections describe the research design and address sampling issues. Section three discusses the selection of product categories used in the experiment. In the fourth section, the development of experimental stimuli is examined. Finally, section five describes experimental procedures and provides details of the dependent and independent measurements. Due to the nature of this study, concepts from the field of advertising, consumer behavior, marketing, and cognitive psychology are used to develop the methodology.

4.1 Experimental Design

The purpose of the experimental design in this case is to examine the impact of information mode and presentation form on ad effects with the introduction of a moderating variable, consumer knowledge in print advertisements. An experimental approach is used because of the associated level of explicitness in data collection and experimental control attempts to predict events that will occur in the experimental setting by neutralizing the effects of other factors. We attempt to maintain control over all factors that may affect the result of an experiment, and subsequently determine or predict what may occur. Carefully focused instruments (tests, observations, questionnaires, etc.) that generate precise quantitative data are the norm in our experiments. These data were analyzed using statistical tests of significance in order to accept or reject the hypothesis.

The experimental stimuli were constructed in such a way that the products attribute information in the advertisement varied systematically in terms of information mode and presentation form with real brand information setting. The information was provided and the subjects' responses were collected for recall and judgment measures (e.g., attitude towards the ad, and brand). The product category used was *laptop computer* to collect data. The proposed hypotheses were tested through a 2 (numerical or verbal information) X 2 (vivid or non-vivid presented information) X 2 (experts or novices) between subject designs. A MANCOVA (2 x 2 x 2) design means there are two factors with the first having two categories and the second and third having two, for a total of eight groups. In experimental research equal numbers of subjects are assigned to each group on a random basis. Based on the purpose and practicality of this experimental, factorial design was considered as the best choice.

A between-subject design was used to avoid the potential for practice and/or learning effects, and differential carry-over-effects of independent variables that may occur in a within-subject design (cf. Keppel 1982). Thus a factorial design with more than one independent factor was used to assess the relative importance of various combinations of independents. In this research, all the relevant independent variables are represented as groups in the design. Figure 17 in section 4.3.1 shows the intersection of the categories of the independent variables.

4.1.1 Product Category and Sample Selection

As to selection of product category, a number of criteria were used[53]. First, the product should be representative product category for the target phenomenon of this research. Second, it should be a product category that must possess a reasonable set of relatively important numerical and verbal attribute information. Third, the product category should be relevant to subjects. Several product categories were relevant and appeared to meet the criteria listed above, although computers appeared to be a more suitable product category. A primary reason for the selection of computer product category is because majority of the students own them. In addition, as students use computers during their course of study they hence, should be quite familiar with this category.

Familiarity with computer product category is a necessary condition for the subjects to create a realistic profile of attribute information for brands. Subjects were asked to demonstrate their level of knowledge on specific products with which they are conversant by answering specific questions, in particular, about the specification of the product attributes. Therefore, a ten-item product knowledge inventory was created for this purpose followed by Sujan (1985).

[53] This section of product selection criteria's and the following sections on selection of brands and attributes draw extensively from the study by Viswanathan and Childers (1996).

4.1.2 Brand

A single brand, *Viking Laptop* was used for testing recall and judgment. This study avoided multiple brands for the reasons that a multi-comparison of brands may have information overload implications due to the complex nature of numerical information mode, which is core to this study. In addition, in order to avoid biased opinions on the part of the subjects who may be quite conversant with actual brand names, we used fictitious names, instead. Especially for novices by providing a known brand to them, the pre-disposition to evaluate the brand information in the ad either favorably or unfavorably may be biased. The number of brands to use was an important issue, mainly to avoid any floor or ceiling effects in memory strategies. Research in the past has actually involved the use of one to eight brands (Biehal & Chakravarti 1989; Huber 1980).

4.1.3 Attributes

Given the scope of this research, attributes similar to those used by Biehal & Chakravarti (1983, and 1989) and Viswanathan & Childers (1996) are utilized in this study. Ten specific attribute areas were chosen for this study and are listed in the table below:

Attribute Listing	
1. Speed and type of the processor	2. Computer screen display
3. configuration	4. Weight
5. Mass storage capacity	6. Cache specifications
7. Modem	8. Graphics
9. RAM	10. ROM

4.2 Sampling Procedure

4.2.1 Sample

The subjects in this experiment were recruited from the subject pool of students taking courses in the arts, social sciences and engineering disciplines at a major State University. The two groups were inherently different as the subjects from the computer science department have had extensive training in computers, and the freshman group had only the basic knowledge. The target population of this study is individual consumers. A total of 160 subjects participated in the experiment. Among them 72.5% of the subjects owned a laptop and or a desktop computer, and 27.5% of the subjects used the IT resources and other computing facility. This indicates that computers are common items among student population and so the subjects are quite familiar with them. One of the requirements for the expert classification is that subjects were required to have sufficient knowledge of the attributes of the chosen product category. This is essential for recoding and storing information at the primary level. Therefore, we used subjects from the faculty of engineering (computer science department) who possess both knowledge (in the area of computer hardware and software) and own computers.

The use of students as sample subjects may be justified for the following reasons: The phenomenon that is examined in this study is a consumer cognitive processing behavior and hence, if the task is relevant to the student population then the findings may be generalized to the population (e.g., product categories that are relevant to student). Secondly, to have a homogenous group, the use of student samples becomes relevant and convenient. Finally, recruiting student sample for task specific experiment can be justified from an efficient use of limited resource point-of-view (cf. Sudman, 1976).

4.2.2 Sampling Method

This study uses a student sample randomly selected since the research is experimental oriented that requires subjects to perform tasks in a laboratory setting. It was also necessary to find subjects who would willingly agree to participate in the study. Anticipating time and resource constraints we used a pool of students selected from a major State University.

4.2.3 Sample Size

The determination of sample size is related to the desired power level (power analysis) and desired alpha level (cf., Cohen, 1988). From this we can draw conclusions from general statistical analysis that statistics calculated from large samples are more accurate than those calculated from small samples (Kerlinger 1986). Kerlinger also suggests that large samples are not advocated and that they are only mainly used to give the "principle of randomization" a chance to work. Hence, it is decided that with a sample size of 20 to 30 per cell we can achieve the necessary results. This decision was also consistent with the recommendations provided by Rosenthal and Rosnow (1991) that, when we set the desired alpha level at 0.05 and power level at 0.80, a sample size of 20 to 30 per cell is obtained.

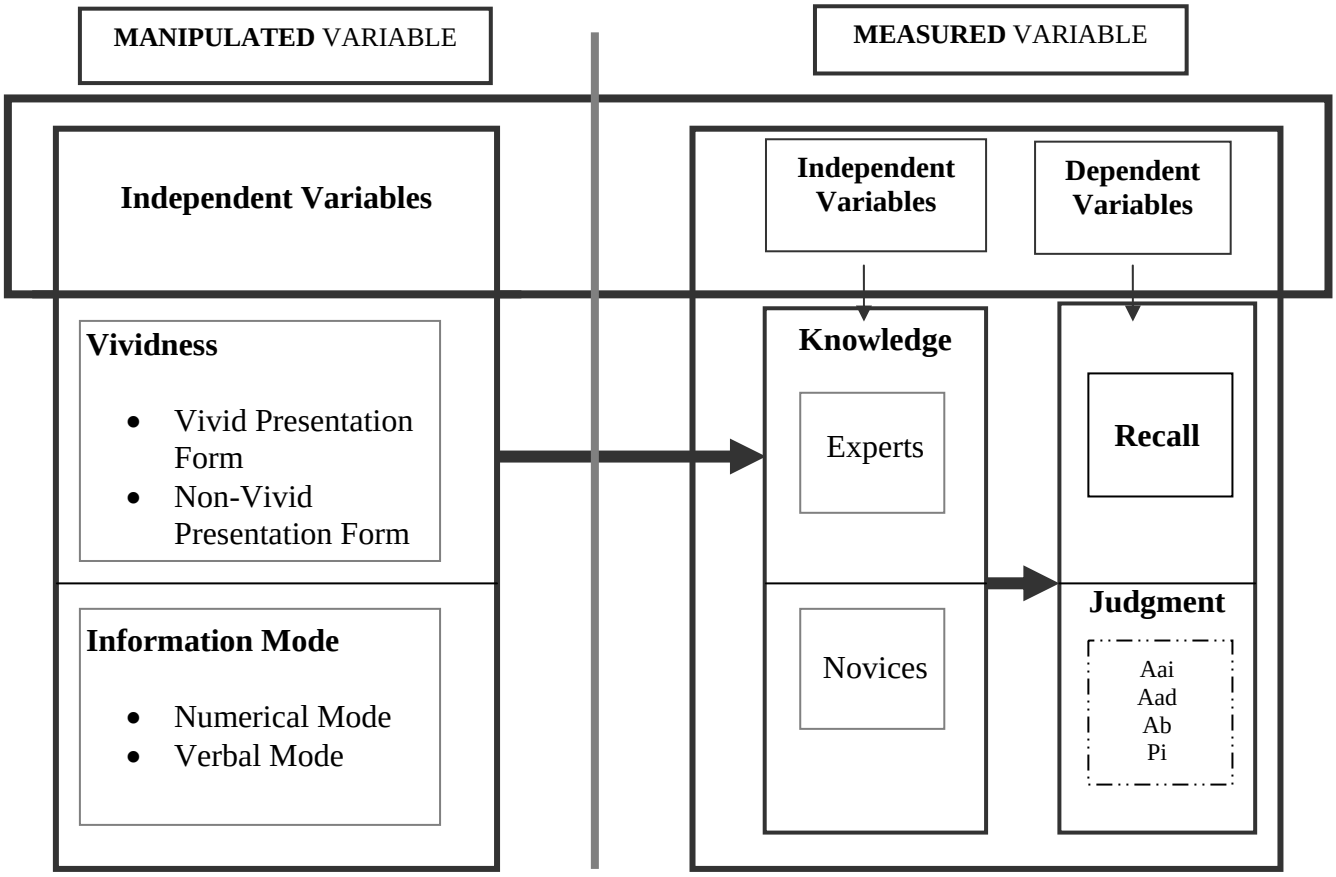
In order to have at least 20 subjects for each cell, a total of 200 sign up spaces were posted fifteen days in advance before the actual experiment. Of 180 subjects who signed up for the experiment, 170 turned up and participated in the experiment. Five subjects had conflicting time tables, three subjects were removed as they were not properly debriefed, and two more subjects by accident aborted the program half way through the experiment. In the end the resulting sample was 20 subjects per cell

4.3 Variables and Measurements

Respondents were subjected to two tasks: (1) Memory task and (2) Judgment task. First, each participant was asked to view a folder containing a print ad for the conditions they were being tested for. After exposure participants were asked to solve a simple mathematical problem and then to view a humorous commercial clip totally unrelated to the product category used in the experiment. This was initiated to remove any short term memory. We then measured the memory by asking the subjects to recall all the relevant attributes they saw in the ad. There were no restrictions in the order of recall of the attributes. After the recall test, subjects were asked to judge the advertisement with respect to attitude toward the ad (A_{ad}), attitude towards the brand (A_b), attitude towards the attribute information (A_{ai}), and their intent to purchase (P_i).

4.3.1 Measures

Figure 15: Measured and Manipulated Variables in the Methodology



4.3.2 Independent Variables

The independent variables for this study are classified into manipulated and measured variables. The measured variable is the consumer's level of knowledge of the products, and the manipulated variables are the information mode (numerical and verbal) and the presentation form (vivid and non-vivid).

4.3.2.1 Measured Independent Variable: Consumer Knowledge

Subjects for this research were categorized as experts or as novices on the basis of their scores on product knowledge inventory patterned after Sujan (1985). Specifically, a ten question, multiple-choice scale to measure objective knowledge about computers was developed and administered to the group of experts and novices. Based on the accuracy of response provided by the subjects, a cutoff mark was set as the criterion measure for expertise. Questions that were asked to determine the individual's domain specific product knowledge are shown in the table below.

Knowledge Inventory **Assessment of Domain Specific Knowledge**
(1) What is a RAM; what is the allocation for a video RAM and how do you measure RAM? (2) How many bits are there in a byte? How many bytes are needed for an operating system? (3) How do you measure the resolution of the TFT display and can you differentiate between DSTN versus a TFT? (4) What is the purpose of a graphic card? How many color combinations are provided? (5) What is the difference between Type IIIx1 and Type IIx2? (6) What is the function of optical drive and what unit measurement defines this drive? (7) What is the difference between EDRAM and an SDRAM? (8) How many RPM does a typical HD run at? (9) How do you evaluate the performance of your system?

4.3.3 Manipulated Independent Variables: Information Mode

Information mode was classified into two categories: numerical and verbal information. Information that is termed as numerical is also generally referred to as quantitative information. Consumer research suggests that people in general associate quantitative information with technical information (Anderson and Jolson, 1980; and Witt, 1974) and verbal information more on an adjective descriptive level.

Studies in the past on differences between numerical and verbal information have typically considered numerical information in the form of ratings on a scale, and scale-value numerical information (Viswanathan and Narayanan, 1992). However, researchers have not completely focused on numerical information associated with a specific unit of measurement. Therefore, numerical information in this research is manipulated as attribute information in the form of a numerical value specified by a unit of measurement (e.g., 2.4 Ghz; 6.33 lbs, and 13.3 cms etc). On the other hand, verbal information is manipulated as adjectives representing the attributes (e.g., 2.4 Ghz may be interpreted as a ‘moderate frequency’ or as ‘very high frequency dosage’; 6.33 lbs as ‘very light’ or ‘light’, etc.) In order to obtain an adjective that closely matches the numerical attribute value, a pretest was done to establish numerical-verbal equivalence.

4.3.4 Manipulated Independent Variables: Presentation Form

Vividness is manipulated as variations in the ad background to isolate attributes through surrounding product related graphics and providing a unique design that embosses the product to create a presentation that is considered as vivid. An example is the size of the product in the picture (size variation between 2 inches to 5 inches), picture type (refers to the actual product pictorial), font size (refers to the size of the attribute claims, i.e., 20 points for big and 10 to 12 points for small), font type (all in capital letters), and background color (warm tones matching the graphic outlay). This form of vivid manipulation has been used in studies related to the information processing of over the counter labels and package design (cf. Sansgiry, 1997). This form of vivid manipulation is used because it has high face validity and seems to have captured what people mean when they refer to as vividness, and it has been employed in vividness manipulations in advertising, applied cognitive, and applied social psychological research (Sansgiry 1997). Overall, three factors were manipulated to assess the effect of the presentation form (vividness), which were picture size, font size, and color.

4.3.5 Manipulation of Picture size, Font size and Color

This research manipulated the size in terms of big and small pictures. The sizes of the product-picture were based on the findings by Sansgiry and Cady (1996). The width and the height of the computer product in the ad picture were adjusted according to fit of the attributes and the available space minus the landscape graphics. The type of font used in the ad is *Arial Bold* and it was manipulated as: (a) font containing normal letters, and (b) font containing capitals or upper case letters. In the normal letter manipulation, only the beginning of each attribute related words was capitalized. Since there will be four sets of ads, each set of attributes with the vivid condition have the bold and capitalized version of font size. The non-vivid version will just have the normal letters. The size of the font of the computer product was also classified into big and small. This method of manipulation was adopted from the ones used by Sansgiry and Cady (1996), where size is based on the font size used on OTC drug labels. They manipulated the font sizes of 8 points as small and sizes from 18 to 20 points considered as big (the size again varies according to the fit of the attribute size in the ad).

Color was manipulated using RGB tones that blend the ad into a colorful presentation. Font colors in either bright neon green, or neon yellowish-green is used for the attributes to create a vivid picture of the ad. This was based on the method used by Tillman and Kirkpatrick's (1972) where combinations of red, orange, yellow, and green were used. These three colors (yellow, red and orange) are warm visible colors that attract attention and orange color was used for capitalized words to promote attention. Also, the contrasts of light-dark colors attract attention (Stern, 1981). All the three manipulations (color, font size and picture size) used to assess the effects of vividness are also known as ad and package design techniques used by manufacturers to increase the product purchase (Stern, 1981). The next section discusses how the presentation was operationalized. Three sections detail the operationalization process: using font size, using color, and using product pictorials (the mock up ads illustrated in the appendix)[54].

[54] Note: The ads are images fit to size for illustration purpose only. The ads shown during actual experiments were a mock up to a real print ad setting adjusted to the specified operationalization in this research.

4.3.6 Operationalization of Presentation Form

Vividness is operationalized using the size of the attribute font, size of the product picture and the use of color. Each of the operationalization is examined in detail. The layout of the picture size and font size are drawn mostly from Sansgiry's (1997). The collective inclusion of varying attribute font size, product pictorial size, and the use of color contrast provide a vivid or a non-vivid presentation form.

4.3.7 Creating a Vivid Effect Using Font Size

Font size is measured in a point system. For example, there are 72 points in a typographer's inch; a half-inch is 36 point; and a quarter inch, 18 points and in an ad the size of the font also depend on the size of the space available (Nelson, 1973). Font type size varies in height of the capital letters, from 2 to 3 points onwards. In advertising, especially for print ads and/or package labels, standard sizes for body types are between 51/2 to 12 points. In terms of attribute display in the ad, the font size varies anywhere between 18 to 72 points. In general, large font sizes are suited for print ads.

Research on font size is mainly based on comparing picture versus written information with respect to size. The significance of font size and its effect on memory and attitude formation in this research starts with the methodology adopted by Kosslyn (1973). The norm is that the larger the font size, the better or more positive is the attitude towards a product. In addition, the judgments of relative size of objects, whether it is verbally, numerically or pictorially designated, were based on the processing of images-like-representations that is on pictorial codes. Furthermore, size plays a basic role in perception, and size alteration impaired memory recognition for verbal stimuli, and size recognition and recall was better for pictures than for words (Robinson and Standing, 1990; Paivio, 1986; and Banks and Flora, 1977). This is also consistent with the study by Rossiter and Percy (1978; 1980) who found that large pictures produced an effect almost twice as favorable on overall brand attitude as compared to an identical smaller picture (Childers and Houston, 1984). This effect is mainly attributed to the *attention factor* where the introduction of a large picture of the product makes the consumer to focus on the product rather than just the ad.

Based on these results it may be predicted that font size of attribute information in different modes may produce a similar favorable effect as picture size[55]. Color and size (Gorn, Chattophadyay, Yi, and Dahl, 1997) showed significant interaction in their study (Percy and Rossiter, 1982), and size showed a significant vivid effect on attitude formation (three picture sizes for a fictitious drink were used along with another factor: *color*). Tillman and Kirkpatrick (1972) noted that fancy fonts (script versus text type) favor attitude formation if the font size was large enough to understand attribute information in the ad. Although, it is known that font size can affect attitude and recall, its effect on understanding of information in either a numerical or verbal mode is not known.

[55] This can be related to Rossiter and Percy's reasoning. According to them there are three factors that need to be considered to achieve a vividness effect. Firstly, a larger picture of a product in an ad may cause consumers to focus on the product rather than the ad termed as the "attention" explanation. Secondly, larger pictures produce larger reported visual images that tend to block out competing images, termed as the "image carryover" (Kossylyn 1973). Thirdly, a larger picture of the product makes it appear more lifelike in size, termed as the "consumption imagery" (Rossiter and Percy 1978; and 1980).

4.3.8 Creating Vivid effect Using Color

Color is a perceptual feature that is absent in black and white prints except during semantic contrast effects, e.g., where the scenarios surrounding the product in question is in black and white and the product information or the product itself is in color. This isolates the information from the background scenario enabling the viewer to pay attention to the colorful aspect of the product or product information itself[56]. An important issue raised from this research is how does color work in attitude formation? A possible answer would be that it acts through the attention-getting mechanism, which can be attributed to the vividness inducing capabilities of color (Gilbert and Schleuder, 1990; Thompson, Palacios, and Varela 1992). According to Wilkie (1991), color is another means of creating contrast in our sensory system (i.e., colorful pictures attract attention). As attention is generated to the information, the information should be processed more rapidly. Since color is an independent factor that affects memory recognition task and recall of items, we can infer that color also affects a person's perception and consumer preferences (see Stefurak and Boynton, 1986; Francis and Davis, 1989 &1990). In addition color has shown to affect consumer's attitude towards a brand (Rossiter and Percy, 1982); images in color are remembered more than black and white (Gilbert and Schleuder, 1990); and colors tend to produce emotional associations (Tillman and Kirkpatrick, 1972). Color has also show to affect emotion and attitude towards an ad (Mitchell, 1983).

We use the silent language of color to impress, motivate, divert and persuade the products prospects for intent to purchase by a consumer. Psychological studies of colors have indicated that colors produce a vivid attention-getting factor (e.g., Wilkie, 1991 - blood pressure increases under red light and decreases under blue light conditions).We can further substantiate the significance of color with reference to creating a vivid effect. For example, in a nutritional study conducted by Peterson (1977), it was found that the color of the product was relatively more important in determining consumer perceptions, than the combination of price and nutritional information. Color is effective in changing one's attitude. Whether it also helps in the understanding of information is not known. However, it may be said that color with its attention-getting capability may induce a vivid effect that enables higher recall and favorable attitude (cf. Sansgiry and Cady, 1996).

4.3.9 Creating a Vivid Effect Using Product Pictorials

Pictures as graphics, symbols, product illustrations, etc., have been used extensively in print and television ads of many products. Pictures can alter the level of vividness (see Kelley, Gaidis, and Reingen, 1989; Taylor and Thompson, 1982). A good phrase that provides reason for this is "a picture is worth a thousand words" (Nelson 1979; Standing, 1973). Compared to words (adjective descriptors), pictures are not only remembered better but also recalled more efficiently (Bower, 1972; Childers and Houston 1984; Kisilieus, 1982; Lutz and Lutz, 1977; Nelson, Reed and McEvoy, 1977; Paivio, 1986; Paivio, Rogers and Smythe, 1968; Starch, 1966).

This picture superiority effect has been theorized and explained in many studies (Childers and Houston, 1984; Nelson et. al 1977; Paivio et al., 1968; Bower 1972). For example, Bower's (1970) relational organization theory states that imaginal processing of paired items allow an

[56] There are three attributes or qualities of color (Tillman and Kirkpatrick 1972). Hue, value and chroma (hue is the quality by which consumer's distinguish one color from another; value is the degree of brightness or darkness of color; and chroma is a matter of intensity that separates strong colors from weak colors) (Gorn, Chattopadhyay, Yi and Dahl (1996).

individual to find a link between the items[57]. The model developed by Nelson (1979) suggests that pictures are encoded differently than words. Pictures provide more distinctive visual representation than words, and the resulting outcome is that pictures produce superior sensory codes and hence are more memorable.

Weldon, Roedinger III and Challis (1989) noted that by using pictorials in a stimulus enables the individual to engage in deeper levels of processing than adjectives. The authors also demonstrated that not only encoding factors were important to the picture superiority effect, but the retrieval processes were more effective as well. These retrieval cues help determines the relative accessibility of pictures. Much earlier studies by Shepard (1967) showed that their subjects more than 600 pictorials and mostly the pictures from vintage ads. The subjects remembered pictorials more accurately compared to verbal information presented during delayed recall and recognition task (also see Lutz and Lutz, 1977).

Similarly, favorable attitude was formed based on the differences in beliefs brought about by the pictorial information as compared to just the verbal information (Mitchell and Olson 1981). By presenting brand information using both verbal and pictorials as compared to just verbal information, Kisilieus (1982) concluded that information presented pictorially generated more cognitive elaborations. Because of this increase in cognitive elaboration, the resulting outcomes are more associative pathways in the memory and hence, better retrievability of information later. The author predicted that the inclusion of pictures along with the ad message increased or reduced the attitude toward the brand (judgment task). This was based on the valence of the information conveyed by the pictures. The information processing and memory assignment for pictures in Kisilieus's (1982) study were supported by results from Edell and Staelin (1983).

In summary, picture superiority contributes to a positive effect on memory (cf. Childers and Houston 1984); more imagery provoking (Smith 1991); they are processed consecutively and encoded as both images and verbal (Stafford 1996. A picture chosen for an advertisement should be subjected to the same principles of ad copy design as the ad itself.

4.3.10 Dependent Variables

Two dependent variables are used for this study: recall and judgment (see Figure 17). Judgment variable was classified in four measures: A_{ad}, A_b, A_{ai}, and P_i. This research uses the same procedure as past studies that has measured attitude in several ways (e.g., Gardner 1985; Lutz, Mackenzie and Belch 1983; Mitchell and Olson 1981). For example, Thornson and Friestad (1984) have used continuous and concurrent self-report devices to measure liking during information exposure.

4.3.10.1 Recall

The usage of attribute information in would naturally result in the encoding of the information and subsequently resulting in different memory trace (cf. Viswanathan and Childers, 1996; Krugman, 2000; Kent and Kellaris, 2003). Therefore, in this research memory recall measures are used to examine the usage of numerical and verbal information presented in a vivid or non-vivid form. After completing the recall test, subjects were asked to judge the product attribute information. The subjects for the recall task were instructed to retrieve information in any form they prefer. During the recall test, no additional cues were provided and the respondents were

[57] This theory suggests that for verbal only information to be learned as well as picture, processing at a semantic level is necessary. Elaborations using semantics has shown to improve the learning of pictures and thus enhance the use of imagery processing.

asked to describe the brand's attribute information remembered from the ad that they saw earlier. The proportion of attributes from the information provided that were correctly retrieved by the respondents provides us with a measure of aggregate recall performance. The absence of cues can make free recall an arduous test of memory (e.g., Singh, Rothschild and Churchill, 1988).

4.3.10.2 Judgment Variables

Attitude toward the ad is defined as a pre-disposition to respond in a favorable or unfavorable manner to a particular advertising stimulus (Mackenzie and Lutz, 1989). Attitude toward the ad (A_{ad}) and attitude toward the brand (A_b) in the past have been measured by using multiple item scales. Similarly, attitude toward the attribute information (A_{ai}) and intent to purchase (P_i) also used multiple item scales similar to the A_{ad} and A_b. Various measures of attitudes in general have been formulated in past studies (Richert, Heckler and Jackson, 2001; Gallagher, Foster, and Parsons, 2001; Chen, Clifford, and Wells, 2002; Lee, Lee and Harell, 2001; Bartos and Dunn, 1974; Bauer and Greyser, 1968; Durand and Lambert, 1985; Haller, 1974; Muehling, 1987; Alpert and Kamins, 1995). However, Bauer and Greyser's measurement have been more frequently used and has been confirmed as a consistent measure of attitude toward the ad (Andrews, 1989).

Originally researchers used a five point Likert scale anchored by strongly agree and strongly disagree (Bauer and Greyser, 1968). Later, researchers used a seven point scale, although, they used a Likert scale to achieve consistency between scales. Previous researchers have frequently and reliably measured attitude A_{ad} and they have measured A_{ad} using similar methodologies, utilizing either a seven point or a nine point semantic differential scales that differed only slightly in terminology. The commonly used scale in the past is the semantic differential scale anchored by good/bad; boring/interesting; like/dislike; and favorable/unfavorable). The usage of these items is consistent with other measures of attitude (e.g., Holbrook and Batra, 1987; Mitchell, 1986; Droge, 1989; Mitchell, 1986; Mittal, 1990; and Sujan and Bettman, 1989). Similarly, a seven item seven point semantic differential scale will measure attitude toward the ad. The seven items measured the participant's opinion of the ad with anchors as good/bad, like/dislike, Interesting/uninteresting, creative/uncreative, favorable/unfavorable, informative/uninformative and positive/negative (Homer, 1990). Mackenzie and Lutz (1989) used the terms good/bad, pleasant/unpleasant, and favorable/unfavorable. Mitchell and Olson (1981) developed a scale using four items (good/bad, like/dislike, irritating/not irritating, and interesting/uninteresting) forming one factor, A_{ad} (Cronbach alpha coefficient = 0.87). This measure has since been used and established as a factor to be considered in evaluating advertisements.

Edell and Staelin (1983) also used similar scales to measure A_{ad}. Biehal, Stephens, and Curlo (1992) used a five item seven point scale (good/bad, like/dislike, interesting/boring, creative/uncreative, and informative/uninformative) to measure A_{ad}. Cronbach alpha reported in their study was 0.85 (Biehal et al., 1992). Following the steps of these researchers in measuring A_{ad}, A_b, A_{ai}, and P_i, this study used a semantic differential scale as based on the discussions made.

Table 4: Reliability Analysis - Judgment

Variables	Cronbach's Alpha	No. of Items
Attitude toward the ad *(A_{ad})	.950	3
Attitude toward the brand (A_b)	.963	3
Attitude toward the attribute information (A_{ai})	.930	3
Intent to purchase iP_i)	.940	3

4.4 Pretest of the Variables

4.4.1 Pretest 1: Selection of Product Attributes

To establish the use of relevant attributes for the product category chosen for this experiment, a pretest was done. Twenty subjects for this pretest were recruited from the Department of Computer Science at a major state university. Subjects were asked to describe the relevant attributes they used or would use for a laptop computer during a purchase decision-making. This was an open-ended question. Subjects were asked to write down the attributes in any order they like. They were also asked to provide the unit of measurement associated with each of the attributes they chose. Results indicated that most of the subjects mentioned the attributes that are consistent and closely matching with the ones described in the ads displayed in the "Mobile Computing Magazine". Subjects also mentioned attributes that were very technical and not commonly used in a real computer ad. These attributes were excluded from this research and in the development of the print ad.

4.4.2 Pretest 2: Equivalence of Attribute Information

The pretest was run in order to obtain an equivalent match between numerical and verbal information used to describe the product attributes. For example, in some experiments, subjects rated individual numbers using verbal category scales with reference to *small, very small, extra small* (see Birnbaum, 1974). In other words, the aim of this pretest is to determine the number levels of magnitudes to use to describe each product attribute and to generate numerical and verbal information that are equivalent in terms of the magnitude conveyed. Therefore it is important to generate a set of equivalent verbal and numerical information for each of the attributes for the laptop computer. The pretest was based on the procedure used by (Viswanathan, Childers and Nagaraj, 1995). Subjects were provided with multiple-choice questions where they were given a numerical value. The subjects were then asked to circle the adjective that they thought closely matched the numerical value. Results from the multiple-choice procedure elicited impressions of magnitudes conveyed by a numerical attribute for a range of adjective descriptors. These adjective descriptors were used in the development of the print ads.

4.4.3 Pretest 3: Reverse Equivalence of Attribute Information

In order to corroborate the numerical to verbal match, a pretest for reverse equivalence was also conducted by providing adjective descriptors obtained from the results of pretest 2. This is to obtain an equivalent numerical value for the attributes in question. Twenty subjects from the Department of Computer Science at the university participated in the pretest. They were provided with an adjective for each of the nine attributes. The subjects were then asked to write down a numerical value that he/she thinks that matches the adjective given. Results indicate a relatively close match between the pretest 2 (numerical to verbal) and pretest 3 (verbal to numerical).

4.4.4 Pretest 4: Presentation Form and Information Mode Scale Reliability

After the development and design of the ad, it was necessary to test the reliability of the scales representing the presentation form and the information mode. Hence, a pretest was conducted to check the reliability of the scales used to manipulate the presentation form and information mode. The reliability of the multidimensional scales was measured by a Cronbach alpha, alpha method. Reliability results indicated that the scales measuring presentation form achieved high alpha values and acceptable without further explanation. The scales measuring vividness had an alpha value of 0.985. Scales measuring information mode had a reliability of 0.943 and 0.965 for PNI. Scale reliabilities for both presentation and information mode are above the acceptable 0.70 for applied research (Nunnally 1978, p. 226). The reliability scores of the scales are summarized below.

Table 5: Scale Reliability Values

Scales	Cronbach Alpha	Number of Items
Vividness of the advertisement	.985	4
Information mode impression	.943	5
Preference for numerical information (PNI)	.965	24

4.4.5 Manipulation Checks

To arrive at reliable and valid measures of the presentation form and information mode in the experiment, multiple measures were used for manipulation checks. In past studies presentation form has been measured in terms of its vividness (Kelley 1989; Miller and Marks 1997). Thus, four measures on a scale of 1 to 7 regarding colorfulness, richness, graphics, and distinctiveness were used to gauge the presentation form. Presentation form was measured by using a 7-point scale for the items colorfulness (1=not at all colorful, 7=very colorful), richness (1=very dull, 7=very rich), graphics (1=very vague, 7=very graphic), and distinctiveness (1=not at all distinctive, 7=very distinctive). Similarly, five measures on a scale of 1 to 7 regarding precision, accuracy, exactness, clarity, and specificity were used to gauge the information mode. Information mode was measured by using 7-point scale items precision (1=very vague, 7=very precise), accuracy (1=not at all accurate, 7=very accurate), exactness (1=inexact, 7= very exact), clarity (1=very unclear, 7=very clear), and specificity (1=not at all specific, 7=very specific).

The t-test results indicated that the results were significant for the presentation form treatment ($\bar{x}_{\text{non-vivid}}$ = 2.25, $\bar{x}_{\text{vivid}}$ = 5.86, t = 23.00, p< .001). Results for the information mode treatment were also significant ($\bar{x}_{\text{numerical}}$ = 5.77, $\bar{x}_{\text{verbal}}$ = 2.72, t = 12.35, p< .001). In general, the effect of presentation form was significant in both conditions of expertise at p< .05. The manipulation checks for consumer knowledge were based on inventory analysis to a series of questions to determine whether the subjects were experts or novices. The median-split was performed on subjects' scores on this inventory, and experts answered more questions correctly, relative to novices (Ms = 8.42 vs. 3.60 out of a possible 9). As a check on the selection of the target attributes, pretest questionnaires asked 60 subjects (experts in mobile computing) to list the attributes they would use to evaluate brands of laptop computers. Of the 13 attributes mentioned, 9 attributes were the target attributes used in the ad. This indicated that the advertisement projected the relevant information needed to evaluate computer brands.

4.5 Experimental Procedure – Summary

This section of experimental procedure provides a comprehensive summary of methodology, operationalization and manipulations and pretests of the study. Subjects were shown an ad with a description of a laptop computer. The description in the ad was based on the pretest results that were consistent with the description condensed in the "Mobile Computing" magazine, and contains a summary of standard features. One set of numerical and a set of verbal information was presented for each condition (e.g., numerical vivid, numerical non-vivid, verbal vivid, and verbal-non-vivid). The ads included nine attributes and a picture of a laptop computer. Attribute claims were confirmed with computer science experts to confirm believability. The ad attribute feature focus was on "speed and type of the processor", "computer screen display configuration", "weight" "mass storage capacity", "cache specifications", "modem", "graphics", "RAM", and "ROM".

The presented ad was in a vivid or a non-vivid form. In contrast to several previous studies (e.g., Kisilieus and Sternthal, 1986, Taylor and Thompson, 1982), the information provided was held constant to avoid confounding vividness with the amount of information. Only the manner of presentation form was varied. Vividness presentation forms were operationalized by use of strong colors, size of the font, and size of the product picture in the ad. In contrast to vividness, non-vivid presentation forms were operationalized by using plain black and white form, font size and picture size. After exposure to the product descriptions in the ad, subjects were given a distracter task to erase any information from their short-term memory. The distracter task involved solving of 5 simple math problems followed by a short unrelated product ad. Following the distracter, subjects were then asked to recall as many specific features in the ad for the laptop computer product. Following the recall test subjects were then asked to answer questions to evaluate the advertisement and rate the product features in the ad. These were done on a computer and then manually transferred to a hard copy version for later coding purposes.

The relative recall of attribute information presented was tested between two groups of individuals, who were classified as experts and novices. The assignment of the nine specific attribute information was such that they were presented to the subjects either numerically (e.g., 350 MHz) or as equivalent adjectives (Fast Micro-Processor) embedded in a print ad. Next the subjects performed a free recall task where they were instructed to write down the attribute information they remembered.

The recall test was given after the subjects performed a simple distracter task. They were then asked to write down the information in any order, but were instructed to write the attributes in a form that they were exposed to. For example, subjects exposed to numerical condition were asked to write down the attribute information providing only the number value along with the unit of measurement describing those attributes they had seen. Such instructions for recall of

information provide a test for hypotheses about the number and/or proportion of attributes recalled numerically versus verbally when the ad was presented in a vivid or a non-vivid presentation form.

4.6 Task Understandability

Without a good understanding of the task, subjects cannot provide good quality data. In order to assess the quality of the data, subjects' understanding of the experimental task was examined using a 9-point scale (1 = "did not understand at all" and 9 = "completely understood"). The average score on the scale was 7.48, and 93% of the subjects gave a rating over 6 on the scale. This indicates that the experimental task was well understood by the subjects.

CHAPTER V

5 ANALYSES AND RESULTS

In this chapter, the proposed hypotheses are tested and the results are presented. Finally, the findings are summarized. Throughout the chapter, references to the below terminologies will be made during the interpretation of the output. The interpretation of the output from focuses on two parts: the table of means and the MANCOVA summary table. The table of means is the primary focus of the analysis while the summary table directs attention to the interesting or statistically significant portions of the table of means and interactions. The hypotheses were tested using MANCOVA models for main and 2-way interaction effects.

A multivariate analysis was chosen as we were typically interested in evaluating mean differences on several criterion (DV) variables rather than a single variable. PNI was collected to statistically control for sources of variation with multiple criterion variables (A_{ad}, A_b, A_{ai}, and P_i). Furthermore, this research has more than two dependent and independent variables and a covariate, MANCOVA was preferred in order to look at the relationships among variables in contrast to a univariate ANOVA where the variables are scrutinized in isolation. The hypotheses were stripped out from the groups to form individual hypothesis for each of the dependent variables in this research. By doing so, we were able to evaluate the mean differences on all the dependent variables simultaneously.

(1) V = Vivid Presentation Form
(2) NV = Non-Vivid Presentation Form
(3) Ver = Verbal Information
(4) Num = Numerical Information
(5) V-Ver = Vivid Verbal
(6) V-Num = Vivid Numerical
(7) NV-Ver = Non-Vivid Verbal
(8) NV-Num = Non-Vivid Numerical
(9) A_{ad} = Attitude towards the advertising
(10) A_b = Attitude towards the brand
(11) A_{ai} = Attitude towards the attribute information
(12) P_i = Purchase intention
(13) Hypotheses 1x = Main effects
(14) Hypotheses 2x = Two-way interaction
(15) CK = Consumer knowledge
(16) IM = Information mode
(17) PF = Presentation Form
(18) CK x IM = Interaction between Consumer Knowledge and Information Mode
(19) CK x PF = Interaction between Consumer Knowledge and Presentation Form
(20) IM x PF = Interaction between Information Mode and Presentation Form
(21) PNI = Preference for Numerical Information

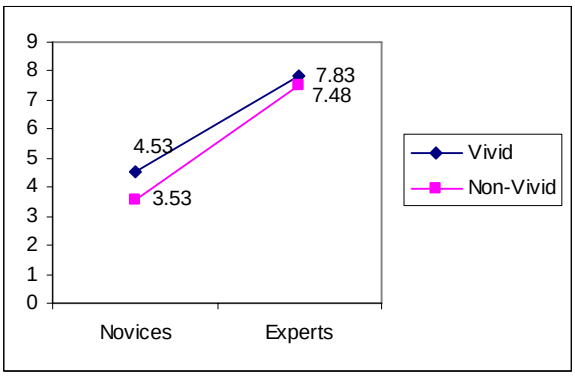
5.1 Results from Hypotheses Testing 1

5.1.1 Influence of information mode and presentation form on recall

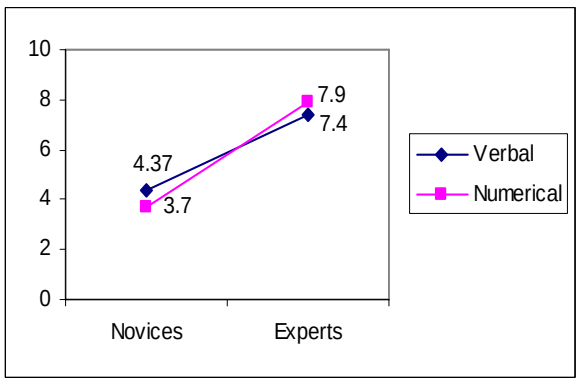
Hypothesis 1 to 4 predicted the main effects for information mode and presentation form on recall. Reporting of the results from the hypotheses is based on MANCOVA tests. As noted earlier, consumer knowledge was measured by the subjects' ability to correctly answer from a list of computer related questions. The correctness of the answer was used to divide respondents into two groups, experts and novices. All recall effects between information mode reported high means values for novices ($\bar{x}_{Ver}$ = 4.37; $\bar{x}_{Num}$ = 3.70) and for experts ($\bar{x}_{Ver}$ = 7.40; $\bar{x}_{Num}$ = 7.90). The proportion of accurately recalled attributes was computed for each subject. Accuracy of recall refers to recall of the exact digits (e.g. 300 or 13.1) and the corresponding unit of measurement, which was necessary for numerical information (e.g., speed associated with Mhz and display width associated with inches etc.,) and recall of the exact adjectives for verbal information.

Chart 1: Recall - Means

Presentation Form - Main Effects



Information Mode – Main Effects



Consistent with the hypotheses above, novices were able to recall more attribute information in a vivid presentation compared to non-vivid presentation form, although, for experts, the recall of attributes in both vivid and non-vivid presentation forms by experts was significantly greater as compared to novices. The means scores show significant difference in recall of attributes for novices between vivid ($\bar{x}_V$ = 4.53) and non-vivid presentation form ($\bar{x}_{NV}$ = 3.53) and for experts ($\bar{x}_V$ = 7.83) and ($\bar{x}_{NV}$ = 7.48) respectively. However, as expected the mean difference was small for experts as compared to novices. The results of the MANCOVA between subject tests shows significant main effects for information mode on recall for novices (F = 15.93, p< .001) and for experts (F = 11.47, p < .01).

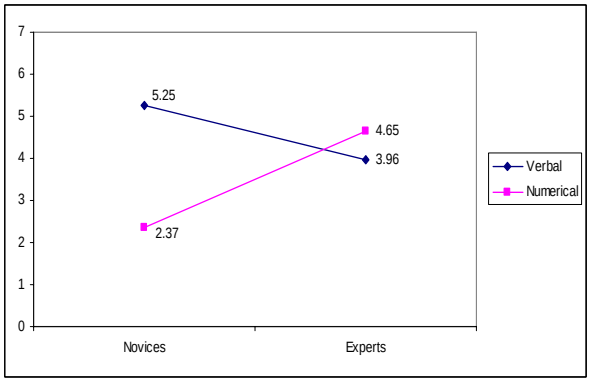
5.1.2 Influence of information mode and presentation form on judgment

Starting with the hypothesized (H_5 to H_{12}), main effects, information mode had a significant effect on all the judgment related dependent variable as shown in the table below. Novices did show more favorable reaction to the stimulus containing verbal information and experts the opposite ($\bar{x}_{Ver}$ = 5.25; $\bar{x}_{Num}$ = 2.35) and for experts ($\bar{x}_{Ver}$ = 3.96; $\bar{x}_{Num}$ = 4.65). Similar favorable traits were displayed (H_{13} to H_{20}) by both experts and novices in their attitudes towards vivid presentation form. As expected the impact of vivid presentation was higher than for novices. The results of the MANCOVA tests for information mode show significant main effects on both recall and judgment for novices (F = 159, p< .001, Wilks's Lambda = .082) and experts (F = 101, p < .001, Wilks's Lambda = .123). A brief overview of the tabulation below indicates

statistical significance for influence of presentation form on judgment. The means scores show significant difference in A_{ad} of attributes for novices between the two presentation forms ($\bar{x}_V$ = 4.53; $\bar{x}_{NV}$ = 3.09) and for experts ($\bar{x}_V$ = 4.45; $\bar{x}_{NV}$ = 4.16). However, as expected the mean difference was marginal for experts as compared to novices.

Chart 2: A_{ad}

Information Mode – Main Effects



Presentation Form – Main Effects

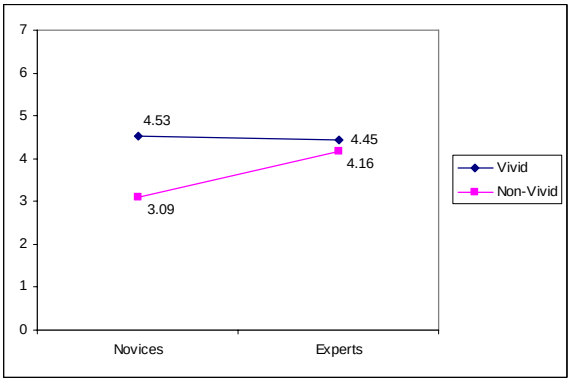


Table 6: Judgment - IM

Test of Between Subjects Effects

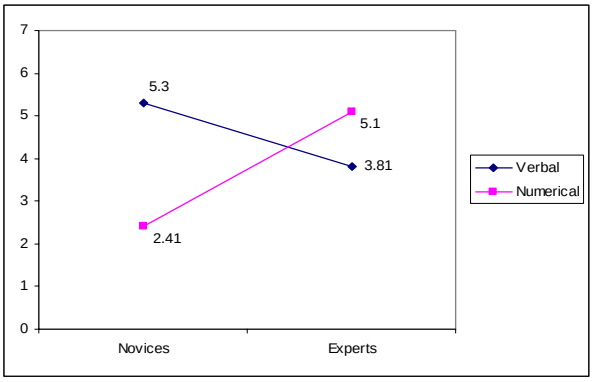
Knowledge	Independent Variable	Dependent Variable	Df	MS	F	Sig.	Eta Squared
Novices	IM	A_{ai}	1	113	448	p<.001	.857
		P_i	1	66.9	328	p<.001	.814
		Ab	1	95.4	330	p<.001	.815
		A_{ad}	1	91.7	440	p<.001	.855
Experts	IM	A_{ai}	1	12.90	46.76	p<.001	.384
		P_i	1	27.42	208	p<.001	.735
		Ab	1	31.53	153	p<.001	.672
		A_{ad}	1	9.24	97.99	p<.001	.566

A_{ad} = Attitude toward the ad; A_b= Attitude toward the brand; A_{ai}= Attitude toward the attribute information
P_i = Intent to purchase

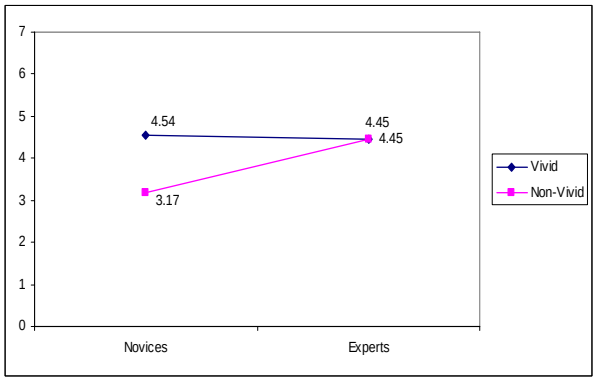
Similar pattern in result were found for A_b, A_{ai}, and P_i (table 7). The results of the MANCOVA tests for presentation form show significant main effects for novices (F = 52.7, p< .001, Wilks's Lambda = .212) and experts (F = 5.30, p < .001, Wilks's Lambda = .728).

Chart 3: A_b

Information Mode – Main Effects



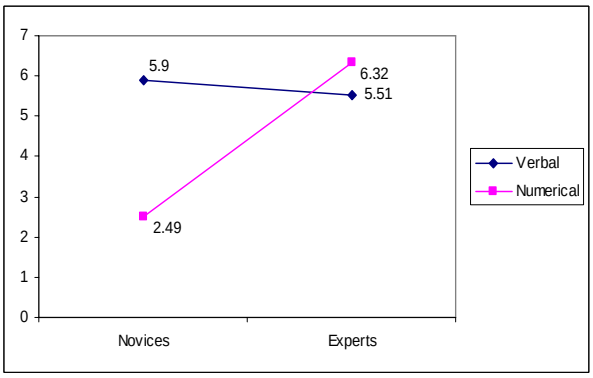
Presentation Form – Main Effects



As expected, for experts the effects were small for presentation form on attitudes. We found statistical significance only for A_{ad} ($F = 15.16$, $p < .001$) and P_i ($F = 4.32$, $p < .05$) for experts and not significant for A_b and $A_{ai.}$ ($p < .05$). The mean values for P_i were higher for novices ($\bar{x}_V = 4.20$) and ($\bar{x}_{NV} = 3.50$) in comparison to experts where the difference was quite marginal ($\bar{x}_V = 4.68$) and ($\bar{x}_{NV} = 4.80$). Test of between subject group show significant main effects for presentation form on all judgment variables (P_i for novices was higher for novices in comparison to experts, $F = 60.05$, $p < .001$)

Chart 4: A_{ai}

Information Mode – Main Effects



Presentation Form – Main Effects

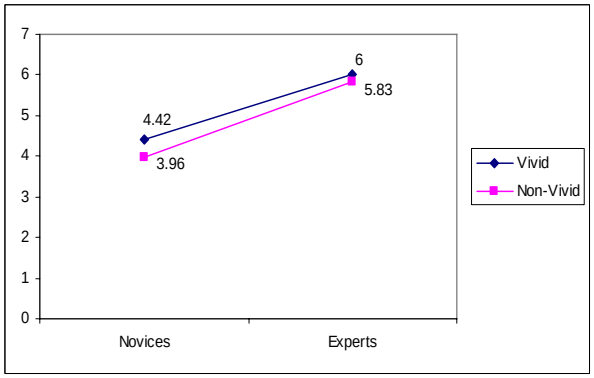
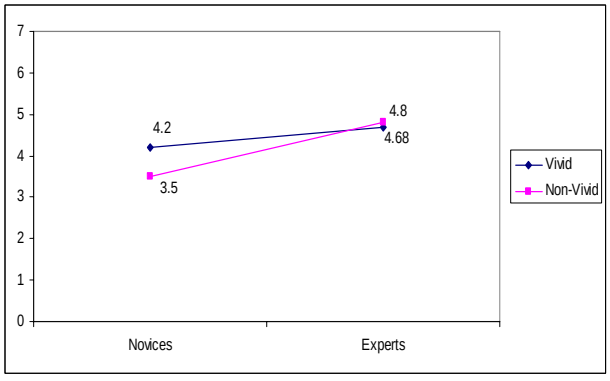


Chart 5: P_i

Presentation Form – Main Effects



Information Mode – Main Effects

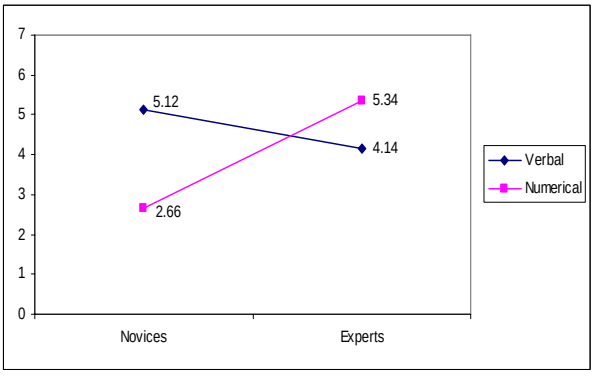


Table 7: Judgment -PF

Knowledge	Source	Dependent Variable	Df	MS	F	Sig.	Eta Squared
Novices	PF	A_{ai}	1	4.39	17.36	p<.001	.188
		P_i	1	12.25	60.05	P<.001	.445
		Ab	1	36.40	126	P<.001	.627
		A_{ad}	1	40.83	196	P<.001	.723
Experts	PF	A_{ai}	1	.594	2.14	.148	.028
		P_i	1	.570	4.32	.041	.054
		A_b	1	.060	.294	.589	.004
		A_{ad}	1	1.432	15.16	p<.001	.168

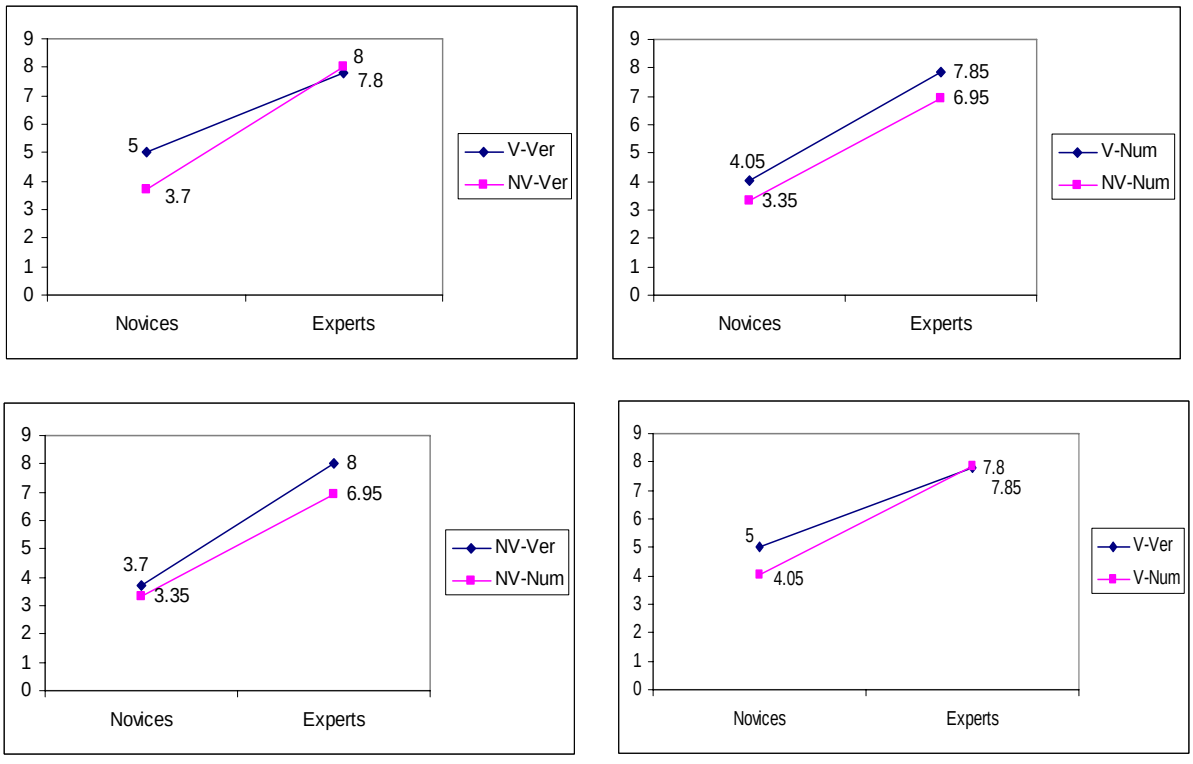
Novice: Aad: Adjusted R Squared = .937; Ab: Adjusted R Squared = .918; Pi: Adjusted R Squared = .898; Experts: Pi: Adjusted R Squared = .756; Ab: Adjusted R Squared = .668); Aad: Adjusted R Squared = .589

5.2 Results from Test of Hypothesis 2

5.2.1 Two-Way Interaction: Recall

The interaction effects for H_{21} to H_{28} were performed to assess the effects of message recipients (expert, novice) and the type of comparison presented in the advertising message they were exposed to (numerical, verbal; vivid, non-vivid) on the evaluation of the target product. The presence of interactions between information mode and presentation form on recall are shown in the tabulation below and the mean differences are illustrated in the multi-comparison chart below.

Chart 6: Recall – Multi Comparison Chart – 2 Way Interaction

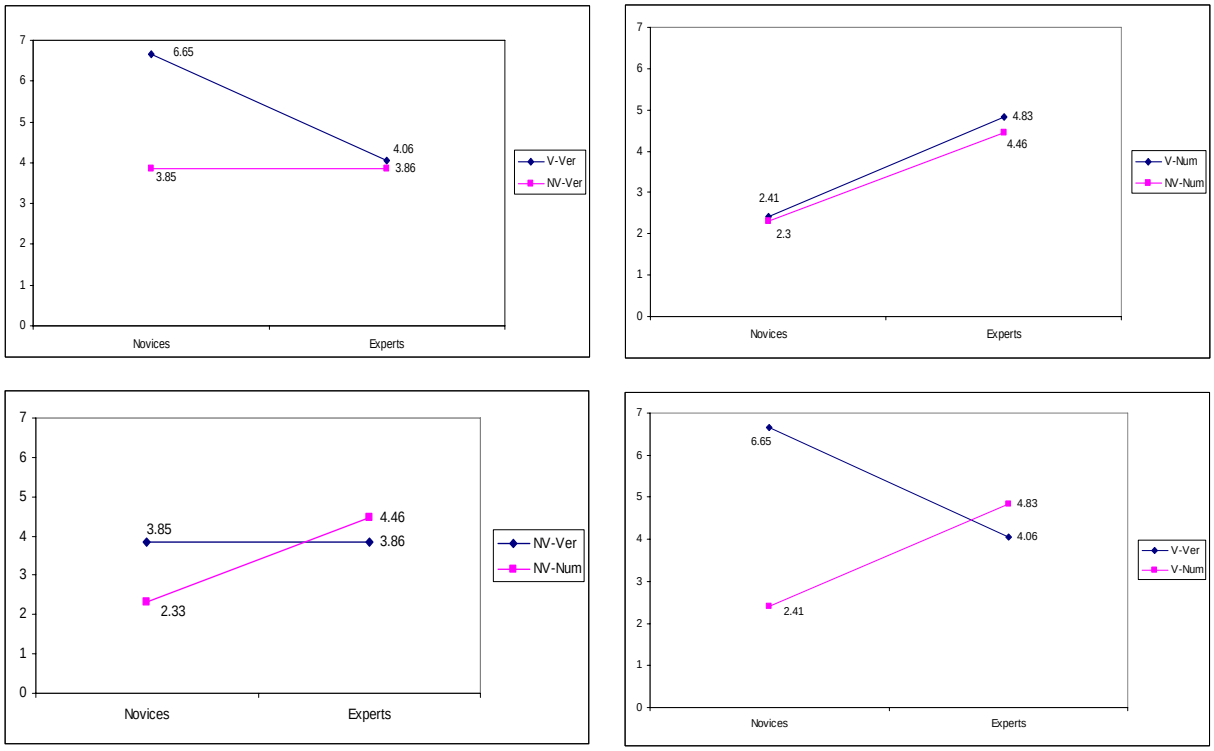


More specifically, for novices, mean score results indicate significant differences ($\bar{x}_{V\text{-}Ver}$ = 5.01; $\bar{x}_{V\text{-}Num}$ = 4.05) and ($\bar{x}_{NV\text{-}Ver}$ = 3.70; $\bar{x}_{NV\text{-}Num}$ = 3.35) in comparison to experts. As expected related difference for experts were quite marginal ($\bar{x}_{V\text{-}Num}$ = 7.85; $\bar{x}_{V\text{-}Ver}$ = 7.80) and ($\bar{x}_{NV\text{-}Num}$ = 6.95; $\bar{x}_{NV\text{-}Ver}$ = 8.00). Next, test of between subject effects showed significant effects for both novices (F = 6.21 p< .05) and experts (F = 11.41 p< .01). From this we can infer that experts were still able to recall both numerical and verbal information much better than novices. Even though novices were able to recall verbal information better, the effect was attenuated due to the absence of vividness. We can also note that when numerical information was not available, experts were able to elaborate and extrapolate information from numerical equivalent to verbal and add the relevant information to the missing numerical values associated with attribute information. Irrespective of the presentation form, experts were still able to elaborate on their domain specific available information and recall better than novices.

5.2.2 Two-Way Interaction: Judgment (A_{ad}, A_{ai}, A_b, and P_i)

Multivariate tests (MANCOVA) were also used for simultaneously testing each factor effect on the judgment variable (A_{ad}) for hypotheses H_{29} to H_{36}. Each of the factor effect (Information mode, presentation form) split by experts and novices and the covariate (PNI) provided us with a main effect, along with the interactions tested for (IM x PF). Wilks' Lambda test was used as we had more than two groups. The results of the MANCOVA between subject tests shows significant interaction effects for both recall and judgment for novices (F = 58.6, p< .001, Wilks's Lambda = .195) and experts (F = 9.13, p < .001, Wilks's Lambda = .609).

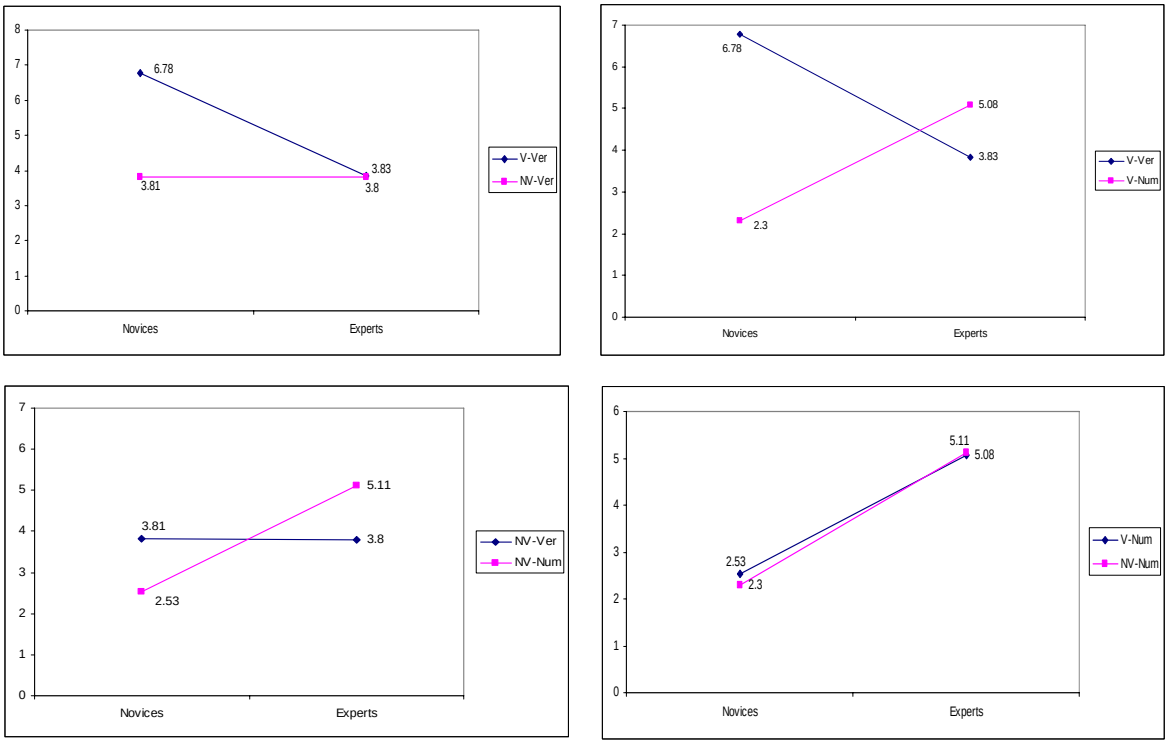
Chart 7 – A_{ad} – 2 Way Interactions



The significance of the F tests show that the effect was consistent as hypothesized. The Eta-squared for the interaction between IM and PF for novices was .805 and .391 for experts. The basis for this is the proportion of the total variability in all our judgment variable is accounted for by the variation in the three independent variables (information mode, presentation form and consumer knowledge). The preference for numerical information as covariate served as a control. The results of test of between subjects effect for each judgment variable are reported in the sections to follow. For A_{ad} results point out significant difference in means ($\bar{x}_{NV\text{-}Ver}$ = 3.85) and ($\bar{x}_{V\text{-}Ver}$ = 6.65), for novices, although less than expected for the interaction between presentation form and numerical mode ($\bar{x}_{NV\text{-}Num}$ = 4.46) and ($\bar{x}_{V\text{-}Num}$ = 4.83). For experts the results indicated only marginal difference in means for vividness and verbal mode ($\bar{x}_{NV\text{-}Ver}$ = 3.86) ($\bar{x}_{V\text{-}Ver}$ = 4.06). Similarly, we found marginal differences in means for both novices ($\bar{x}_{NV\text{-}Num}$) = 2.33; $\bar{x}_{V\text{-}Num}$ = 2.41) and ($\bar{x}_{NV\text{-}Num}$ = 4.46; $\bar{x}_{V\text{-}Num}$ = 4.83) for experts. The reason for small differences in means is perhaps the inability to comprehend numerical information may have inhibited the retrieval of information even though it was combined with a vivid presentation form. Turning to F results, the IM x PF interaction effects was significant for novices (F = 177, p< .001).and not significant for experts (F = 1.50, p>.05).

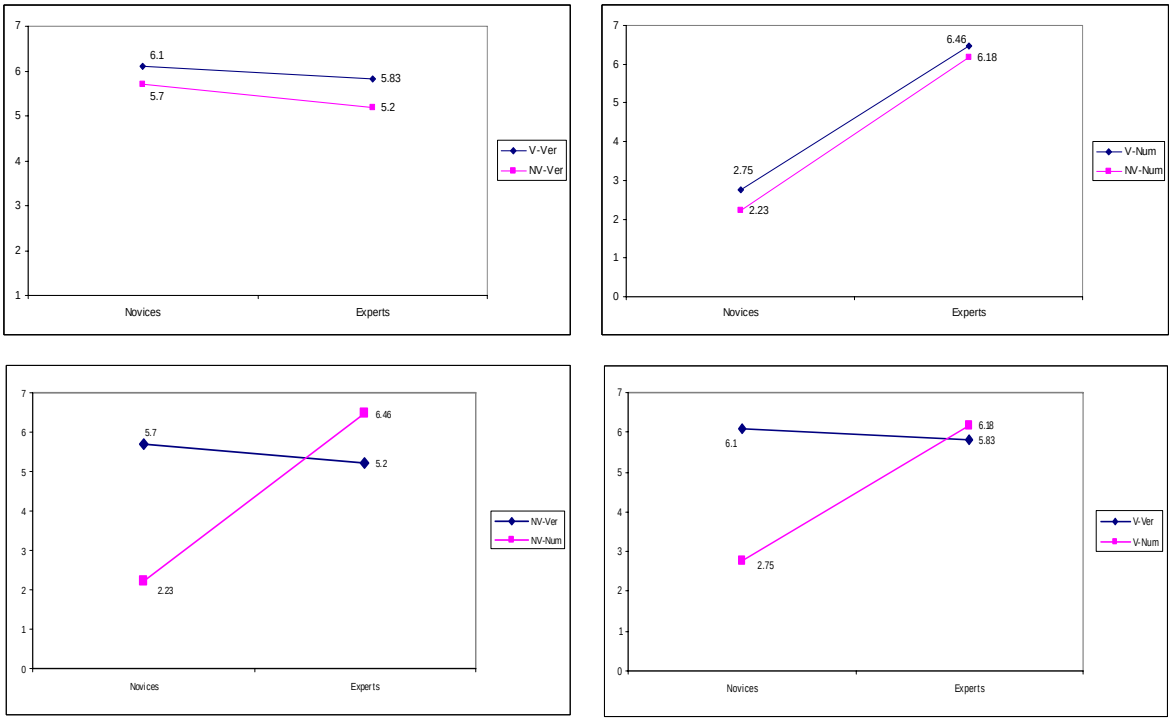
Results for A_b also revealed significant differences in means for novices ($\bar{x}_{NV\text{-}Ver}$ = 3.81; $\bar{x}_{V\text{-}Ver}$ = 6.78). Despite the indication from the main effects that novices are impacted more by vividness, the inclusion of numerical information seem to attenuate the interaction effects significantly. Hence, the effects were quite small for novices when comparing vivid-numerical to vivid-verbal presentation ($\bar{x}_{NV\text{-}Num}$ = 2.53; $\bar{x}_{V\text{-}Num}$ = 2.30). Marginal differences were also found for experts for a vividly presented verbal and numerical information ($\bar{x}_{NV\text{-}Ver}$ = 3.80; $\bar{x}_{V\text{-}Ver}$ = 3.83) and ($\bar{x}_{NV\text{-}Num}$ = 5.11; $\bar{x}_{V\text{-}Num}$ = 5.08). The reason for this small difference is perhaps that experts retrieved information consistently and equally irrespective of information mode and presentation form. Turning to F results, the IM x PF interaction effects was significant for novices (F = 177, p< .001).and not significant for experts (F = .173, p>.05).

Chart 8 – A_b - Two-Way Interactions



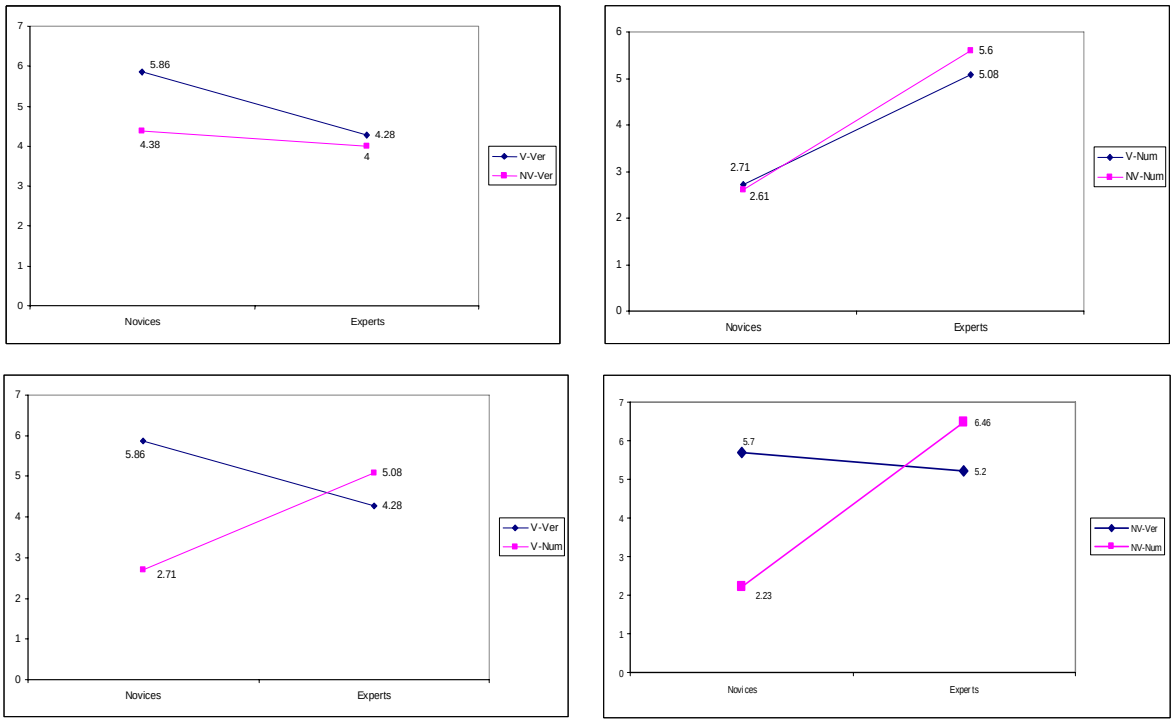
The means for two way interaction on A_{ai} (H_{45} to H_{52}) between presentation form and information mode show differences although not to a large extent for novices ($\bar{x}_{NV\text{-}Ver}$ = 5.70; $\bar{x}_{V\text{-}Ver}$ = 6.1); ($\bar{x}_{V\text{-}Num}$ = 2.75; $\bar{x}_{NV\text{-}Num}$ = 2.23). Similar trends followed suit when comparing means for experts ($\bar{x}_{V\text{-}Ver}$ = 5.83; $\bar{x}_{NV\text{-}Ver}$ =5.20) and ($\bar{x}_{V\text{-}Num}$ = 6.46; $\bar{x}_{NV\text{-}Num}$ = 6.18). The test of between subjects effect between IM and PF was not significant for novices (F = .259 p> .05).and the opposite for experts (F = 14.9, p<.001). Although there were differences in the means, it was large enough to capture the significance at .05 for novices. However, the directionality of the mean values supports the hypotheses for A_{ai}.

Chart 9 – A_{ai} – Two-Way Interactions



For hypotheses related to P_i (H_{53} to H_{60}), in contrast to novices, the differences in means for experts were quite small for vividness for experts in the verbal condition ($\bar{x}_{NV\text{-}Ver}$ = 4.00; $\bar{x}_{V\text{-}Ver}$ = 4.28).and in the numerical condition ($\bar{x}_{NV\text{-}Num}$ = 5.08; $\bar{x}_{V\text{-}Num}$ = 5.60) for experts. The differences in means for experts were very quite marginal and the two way interaction was significant at p< .001. Results support the concept that vividness is more persuasive to novices and has an impact on P_i when the information is in a verbal mode in comparison to the same information in a numerical mode ($\bar{x}_{NV\text{-}Ver}$ = 4.38; $\bar{x}_{V\text{-}Ver}$= 5.86); ($\bar{x}_{NV\text{-}Num}$ = 2.61; $\bar{x}_{V\text{-}Num}$ = 2.71).

Chart 10 – P_i - Two-Way Interactions



The test of between subjects on the P_i judgment variable also revealed a significant interaction between information mode and presentation form for experts ($F = 25.3$, $p < .001$), and novices ($F = 46.8$, $p < .001$). Findings suggest subject's intent to purchase is motivated by the mode of information and presentation form. The test of between subjects for experts and novices in a split model for individual variables in the judgment category was consistent with the hypotheses tested. Paralleling the findings of those variables for the whole sample, MANCOVA test revealed significant interaction effect between information mode and presentation form ($F = 42.2$, $p < .001$, Wilks'Lambda = .410) and supports the overall model

In addition, MANCOVA tests of between subjects for recall and judgment measures also revealed three way interaction effects between knowledge, information mode and presentation form as shown in table 11. The effects were relevant for all of the dependent variables related to judgment ($F = 36.4$, $p < .001$, Wilks' Lambda = .447. As predicted the number of attributes recalled in a numerical mode in combination with a vivid presentation proved to have an impact on recall for experts. Also as expected, the opposite outcome emerged for novices. With reference to the hypothesized effects, Information Mode x Presentation Form X and Consumer Knowledge had significant effects on recall ($F = 17.89$, $p < .001$).

Table 8: Descriptive Statistics – Judgment (A_{ai} and A_b)

Knowledge	Source Variable IM and PF	MEAN	SD
Novices (A_{ai})	Non-Vivid Verbal	5.70	. 357
	Vivid-Verbal	6.10	.420
	Non-Vivid-Numerical	2.23	. 622
	Vivid-Numerical	2.75	. 570
Experts (A_{ai})	Non-Vivid-Verbal	5.20	. 167
	Vivid-Verbal	5.83	.805
	Non-Vivid-Numerical	6.18	.556
	Vivid-Numerical	6.46	.331
Novice (A_b)	Non vivid-Verbal	3.81	.501
	Vivid-Verbal	6.78	.408
	Non vivid-Numerical	2.53	.760
	Vivid- Numerical	2.30	.403
Experts (A_b)	Non-Vivid-Verbal	3.80	.294
	Vivid-Verbal	4.06	.255
	Non-Vivid-Numerical	4.46	.331
	Vivid-Numerical	4.83	.411

Table 9: Descriptive Statistics – Judgment (P_i and A_{ad})

Knowledge	Source Variable IM and PF	MEAN	SD
Novices (P_l)	Non vivid-Verbal	4.38	.270
	Vivid-verbal	5.86	.380
	Non-Vivid-Numerical	2.61	.498
	Vivid-Numerical	2.71	.585
Experts (P_l)	Non vivid-Verbal	4.00	.220
	Vivid-verbal	4.28	.394
	Non-Vivid-Numerical	5.08	.482
	Vivid-Numerical	5.60	.398
Novices (A_{ad})	Non vivid-Verbal	3.85	.275
	Vivid-verbal	6.65	.381
	Non-Vivid-Numerical	2.33	.432
	Vivid-Numerical	2.41	.647
Experts (A_{ad})	Non vivid-Verbal	3.86	.167
	Vivid-verbal	4.06	.255
	Non-Vivid-Numerical	4.46	.331
	Vivid-Numerical	4.83	.411

Table 10: Multivariate Statistics

Knowledge	Effect	Wilks' Lambda Value	F	Sig.	Partial Eta Squared
Novice	IM	.082	159	p<.001	.918
	PF	.212	52.7	p<.001	.788
	IM x PF	.195	58.6	p<.001	.805
Experts	IM	.123	101	p<.001	.877
	PF	.728	530	p<.001	.272
	IM x PF	.609	9.13	p<.001	.391

Table 11: Three-Way Interactions

Source	Dependent Variable	df	MS	F	Sig.	Eta Squared
CK x IM x PF	Recall	1	7.07	17.89	p<.001	.106
CK x IM x PF	A_{ai}	1	2.61	9.88	.002	.061
	P_i	1	.811	4.83	.029	.031
	A_{ab}	1	24.2	98.81	p<.001	.396
	A_{ad}	1	20.6	137	p<.001	.476

A_{ai}: Adjusted R Squared = .899; P_i: Adjusted R Squared = .884; A_{ab}: Adjusted R Squared = .885; A_{ad}: Adjusted R Squared = .917; Recall: Adjusted R Squared = .900

5.3 Summary of Results

Before we summarize the results, it is necessary for us to provide an observation on the basic assumptions for using a multivariate analysis. These checkpoints were used as a basis of using MANCOVA and conform to the statistical analysis:

1. *Normal Distribution*: All the four dependent variables (A_{ad}, A_b, A_{ai}, and P_i) should be normally distributed within groups. Overall, the *F* test is robust to non-normality if normality is caused by skewness rather than by outliers. However we did find three outliers (2 for A_{ai} and 1 for A_b) out of 32 different conditions (8 per dependent variable). However, the outlier observation does not lie in an abnormal distance from other values in the random sample from population. In a sense, this led us to decide that the normality was caused by skewness rather than outliers. Furthermore, to manage these outliers we detected, we hence used multivariate analysis, robust statistical methods (e.g., Wilk's Lamda) as these methods are minimally effected.

2. *Linearity:* MANOVA assumes that there are linear relationships among all pairs of dependent variables, all pairs of covariates, and all dependent variable-covariate pairs in each cell. Therefore, when the relationship deviates from linearity, the power of the analysis will be compromised.

3. *Homogeneity of Variances and Covariance*: In our multivariate designs, with multiple dependent measures (A_{ad}, A_b, A_{ai}, and P_i), the homogeneity of variances assumption described earlier also applied[58].

For example, in this study, instead of using a univariate *F* value, via MANCOVA we obtained a multivariate *F* value -Wilks' *lambd*a (based on a comparison of the error variance/covariance matrix and the effect variance/covariance matrix). The "covariance" we used in this research is PNI (preference for numerical information). PNI was included because this will make adjustments for the effects of one variable on another .We also note that the overall multivariate test was significant, and hence we can conclude that the respective main effects and the interaction effect between information mode and presentation form was also significant. Subsequently, after obtaining a significant multivariate test for main effect for information mode (IM) and presentation form (PF), or the interaction effect between IM and PF, we also examined the univariate *F* tests variable to interpret the respective effect. In other words, the specific dependent variables (A_{ad}, A_b, A_{ai}, and P_i) did contribute to the significant overall effect.

The summary of results is tabulated in table 12 to 20. The summary of results is classified into split sample and whole sample. Recall measures that compared both experts and novices for both vivid and non-vivid presentation form, and numerical and verbal information mode shows the level of support for main and two way interaction effects. The two way interaction effect between information mode and presentation form for A_{ad} and A_b was not supported for experts and A_{ai} was not supported for novices. For novices, this can be attributed to the lack of elaboration of the attribute information. Specifically, the numerical message may have not been informative to them, hence the less positive in attitudinal judgment despite the influence of vividness. Hence we can note that the knowledge determines whether the consumer engages in message elaboration that has an impact on recall and judgment. We can also note that novices will elaborate on attribute information only if it is presented in a vivid form for better recall although, the overall impact is attenuated due to the presence of numerical information. Since the availability of the information is based on elaboration, results suggest that novices do not elaborate on attribute information in comparison to experts.

In closing, the memory advantages of vividness and readiness of meaning conveyed by verbal information is likely to retain the original form as it is encoded during judgment task. On the contrary non-vivid presentation form lack the persuasiveness and numerical information the loss of encoding of the exact meaning by numerical information. This adversely affected the recall and judgment for novices and positively for experts.

[58] George H. Dunteman (1984): Introduction to Multivariate Analysis. Thousand Oaks, CA: Sage Publications.

Table 12: Summary of Hypotheses

Hypotheses Listing	Itemized Dependent Variable
H_1 to H_{20}	Main Effects – Knowledge, information mode and presentation form on recall and judgment
H_{21} to H_{28}	2-way interaction effects – Recall
H_{29} to H_{36}	2-way interaction effects – Judgment (A_{ad})
H_{37} to H_{44}	2-way interaction effects – Judgment (A_b)
H_{45} to H_{52}	2-way interaction effects – Judgment (Aai)
H_{53} to H_{60}	2-way interaction effects – Judgment (Pi)

Table 13: Multi-Comparison Response – Recall

Means: Knowledge Split Model

	Experts	*Novices*
Vivid Numerical	7.85	4.05
Non Vivid Numerical	6.95	3.35
Vivid Verbal	7.8	5.0
Non Vivid Verbal	8.0	3.7

Notes: Experts recall information better than novices regardless of presentation form

Means: Presentation Form Split Model

	Vivid	*Non Vivid*
Expert Numerical	7.85	6.95
Expert Verbal	7.80	8.00
Novice Numerical	4.05	3.35
Novice Verbal	5.00	3.70

Notes: Vivid information is recalled better in most cases regardless of knowledge and information mode.

Means: Information Mode Split Model

	Numerical	*Verbal*
Expert Vivid	7.85	7.80
Expert Non Vivid	6.95	8.00
Novice Vivid	4.05	5.00
Novice Non Vivid	3.35	3.70

Notes: Verbal information is generally recalled better by novices than numerical information regardless of knowledge and presentation. However, in comparison to novices, the difference in recall was marginal.

Table 14: Multi-Comparison Response – A_{ad}

Split for Experts and Novices

	Experts	*Novices*
Vivid Numerical	4.83	2.41
Non Vivid Numerical	4.46	2.33
Vivid Verbal	4.06	6.65
Non Vivid Verbal	3.86	3.85

Split for Presentation Form

	Vivid	*Non Vivid*
Expert Numerical	4.83	4.46
Expert Verbal	4.06	3.86
Novice Numerical	2.41	2.33
Novice Verbal	6.65	3.85

Split for Information mode

	Numerical	*Verbal*
Expert Vivid	4.83	4.06
Expert Non Vivid	4.46	3.86
Novice Vivid	2.42	6.65
Novice Non Vivid	2.33	3.85

We can make infer that experts generally have a more positive attitude towards the advertisements than novices, and are most significant when using a numerical information mode. We also note that vividly presented verbal information significantly increases attitude towards the ad in novices, but otherwise, presentation form in general by itself show a smaller effect. We also found that the use of verbal information significantly increased the attitude towards the ad for novices and the opposite for experts where numerical information had a positive effect on A_{ad}.

Table 15: Multi-Comparison Mean Responses - A_b

Split for Experts and Novices

	Experts	*Novices*
Vivid Numerical	5.11	2.30
Non Vivid Numerical	5.08	2.53
Vivid Verbal	3.83	6.78
Non Vivid Verbal	3.8	3.81

Split for Presentation Form

	Vivid	*Non Vivid*
Expert Numerical	5.11	5.08
Expert Verbal	3.83	3.80
Novice Numerical	2.30	2.53
Novice Verbal	6.78	3.81

Split for Information mode

	Numerical	*Verbal*
Expert Vivid	5.11	3.83
Expert Non Vivid	5.08	3.80
Novice Vivid	2.30	6.78
Novice Non Vivid	2.53	3.81

We can note that experts have more positive A_b using numerical information in comparison to novices who are less positive to numerical information and more in favor of verbal information. With reference to presentation form, vividly presented verbal information increases brand attitude in novices. However the effect of vividness was attenuated for novices when it was numerically presented. Overall we can say that for expert's numerical information increase brand attitude significantly compared to same condition for verbal information and with novices.

Table 16: Multi-Comparison Mean Responses for A_{ai}

Split for Experts and Novices

	Experts	*Novices*
Vivid Numerical	6.18	2.75
Non Vivid Numerical	6.46	2.23
Vivid Verbal	5.83	6.10
Non Vivid Verbal	5.20	5.70

Split for Presentation technique

	Vivid	*Non Vivid*
Expert Numerical	6.18	6.46
Expert Verbal	5.83	5.20
Novice Numerical	2.75	2.23
Novice Verbal	6.10	5.70

Split for Information mode

	Numerical	*Verbal*
Expert Vivid	6.18	5.83
Expert Non Vivid	6.46	5.20
Novice Vivid	2.75	6.10
Novice Non Vivid	2.23	5.70

The pattern follows suit to A_{ad} and A_b for $A_{ai.}$ Experts exhibit a positive attitude towards attribute numerical information compared to vividly presented information verbally. Although, form a theoretical stand point (encoding and stored knowledge structure) we did expect the difference to be negligible between vividly presented numerical vs. verbal information (0.35). Comparing the difference with between vividly presented numerical and verbal, the impact was more profound compared to experts (3.35).

Table 17: Multi-Comparison Mean Responses- P_i

Split for Experts and Novices

	Experts	*Novices*
Vivid Numerical	5.60	2.71
Non Vivid Numerical	5.08	2.61
Vivid Verbal	4.28	5.86
Non Vivid Verbal	4.00	4.38

Split for Presentation technique

	Vivid	*Non Vivid*
Expert Numerical	5.60	5.08
Expert Verbal	4.28	4.00
Novice Numerical	2.71	2.61
Novice Verbal	5.86	4.38

Split for Information mode

	Numerical	*Verbal*
Expert Vivid	5.60	4.28
Expert Non Vivid	5.08	4.00
Novice Vivid	2.71	5.86
Novice Non Vivid	2.61	4.38

Expert's exhibit a positive intent to purchase for numerical information mode irrespective of presentation form compared to novices whose intent to purchase was inhibited by numerical information. Although, vividly presented numerical information was still positive compared to non-vivid numerical information, but marginal (0.10). Expert's intent to purchase was still more positive for vividly presented numerical information in comparison to vivid verbal information. We do have indication that vividness does have an impact on experts' intent to purchase.

Table 18: Summary of Results – Main Effects – Split Model

2-Way Interaction Source	Dependent Variable	Qualifiers Split Sample
IM x PF (experts)		
	Recall	Supported
	Aad	Not Supported
	Ab	Not Supported
	Aai	Supported
	Pi	Supported
IM x PF (novices)	Recall	Supported
	Aad	Supported
	Ab	Supported
	Aai	Not Supported
	Pi	Supported

Table 19: Summary of Results – 2-Way Interaction – Whole Model

2-Way Interaction Source	Dependent Variable	Qualifiers Whole Model
IM x PF		
	Recall	Supported
	Aad	Supported
	Ab	Supported
	Aai	Supported
	Pi	Supported
IM x CK	Recall	Supported
	Aad	Supported
	Ab	Supported
	Aai	Supported
	Pi	Supported
PF x CK	Recall	Supported
	Aad	Supported
	Ab	Supported
	Aai	Supported
	Pi	Supported

Table 20: Summary of Results – 3-Way Interaction – Whole Model

2-Way Interaction Source	Dependent Variable	Qualifiers Whole Model
IM x PF x CK		
	Recall	Supported
	Aad	Supported
	Ab	Supported
	Aai	Supported
	Pi	Supported

CHAPTER VI

6 DISCUSSION & SUMMARY

The purpose of the present study is to examine the advertising effects of information mode and presentation form on memory and judgment. In addition to information mode and presentation form a third variable, consumer knowledge, was used as a moderator. Knowledge was assumed to facilitate the understanding of the processing objectives and improve the total advertising effects with regards to what was remembered and subsequent judgments about the advertised brand. The effects were examined using a 2x2x2 design.
The results of the data analyses supported majority of the hypothesized relationships, and a few did not generate support. In the following, the findings of the analyses are discussed to assess the overall appropriateness of the proposed framework. We first start with a short brief of the whole research topic followed by specific process in the framework.

A number of studies have examined the effects of print, and television advertisement on judgment and memory tasks. However, the combined effects of information mode and presentation form in advertising have not been empirically investigated, at the same time it is now an area of growing importance to both marketers and public policy makers. Our investigation provides new insights on the importance of consumer knowledge, both physical and attributes aspects of the product, and the effects of advertisement through specific information mode and presentation form. This study has also illustrated operational ways to test the ad effects. For example, we operationalized the presentation form through the size of the font, picture and rich colors to provide a vivid effect. A more refined approach was taken to illustrate information mode, i.e. the significance of numerical information and its verbal equivalence for computer product category. Throughout the discussion it was suggested that individual characteristics and knowledge structures have a great influence on the information processing and the resulting information retrieval toward recall and judgment may have utility value and yield useful insights for different market segments. This provides added advantage during the development of advertising campaigns and attributes information focusing on the information requirements of specific consumer segments, i.e., information specifically catered for experts and novices.

With regards to presentation form, the focus has been on the degree of persuasiveness. Hence, we suggested that consumers' availability of information in memory and subsequent judgment of the ad and brand is determined by consumer's knowledge. The conceptualization was formulated on the premise that a vivid presentation form would be more available in memory and facilitate better recall than its non-vivid counterpart. Furthermore, we also found that the mode of information also inhibited the persuasiveness of vividness. Despite the results from past studies that a vivid presentation does not have greater effect on memory than non-vivid presentation form, our empirical research shows support for vividness effect on memory followed by judgment (judgment in our study points to A_{ad}, A_b, A_{ai} and P_i). Having identified the differences in processing and knowledge structures among consumers, most subjects in this study were able to recall more attribute information presented vividly in comparison to non-vivid presentation form. A possible explanation for the finding is that due to the attention getting characteristics of vivid presentation, it is more memorable and available than non-vivid presentation even if it is not more influential (i.e., numerical-vivid information for novices). Our findings support these conjectures having taken into consideration the moderating role of consumer's knowledge for all interactions stated in the hypotheses.

Researchers have repeatedly argued that a message would be considered as memorable only when a vivid presentation form is included (e.g. Kisielius and Sternthal, 1984; Dickson, 1982).

Although the main effects of recall of information mode were substantial for novices, the effects were more marginal for experts. This recall of attribute information of the brand was also inherently different between verbal and numerical information, due to the difference in knowledge. In general terms, vividness effects were favorable for both experts and novices when information mode was included. The result from this study does demonstrate the existence of vividness effect on recall and judgment and in line with our hypotheses. For instance, the attribute claims for the brand is a part that generally requires more processing effort in order for the information to be properly assimilated and interpreted. Consistent with previous findings, we concluded that a specific level of knowledge does in fact reduce the processing effort considerably (cf., Alba and Hutchinson, 1987; Janiszewski, 1993).

Results of this study also support the information processing and availability model wherein vividness has strong influence on recall and judgment as compared to a non-vivid presentation form. If the availability model provides explanation for the occurrence of vividness effects, then a subsequent effect should be displaced on judgment, since the model stipulates that a judgment is based on availability of the relevant information in memory.

6.1 Consumer Knowledge and Information Mode

The results of this study are the basis for discussion of the effects during memory task and its association with the judgment of the brand information presented in the ad. For the ad presented with numerical information to experts, the recall, and judgment was higher and more positive than for verbal information, in comparison with responses from novices. In testing the relationship between consumer knowledge and information mode we found that there was more attribute based recall of numerical information by experts in comparison to novices.

We were able to show that experts' choice of information mode were more numerical oriented during judgment of the brand. In addition, expert's recall of attributes in a numerical mode was greater than the attributes recalled in a verbal mode. As suggested in our conceptual framework, comprehension of attribute information played a big part in the choice of information mode for processing. Judgment measures on the attribute information also provided indication that experts seek more appropriate comparisons with respect to attribute information. All hypotheses for the main effects took into account each of the dependent variables to form the judgment category. Analysis on A_{ad} indicated that experts were more predisposed to numerical information than to verbal information. On the other hand, novices are more favorable to verbal information than numerical. As with A_{ad}, the results for the A_{ai} group showed that experts and novices exhibit strong inclinations towards numerical and verbal information respectively. Furthermore, we found that novices A_{ad} when exposed to vivid presentation form and when the mode of information was verbal and more favorable than when they were exposed to a vivid presentation and numerical information mode. For both vivid verbal and non-vivid verbal ad exposures, novices were more favorable to verbal information as compared to numerical information mode

Several interesting conclusions were drawn from the results about the interaction between knowledge and information mode. First, the relationships with specific interest, individual temperaments, and cognitive elaborations and styles are linked to preference for numerical information as identified in past research. Secondly, quantitative educational backgrounds and settings seem to be vital to a specific choice of information used during intent to purchase. We can also make inference from the analysis that unlike novices, experts

were less prone to interference and more certain to assess the attribute information. For instance, if novices have a low preference for using numerical information, then such information could negatively affect the attitude toward the ad and the brand in focus. Information guides, and teaching efforts can contribute towards reinforcing the importance of numerical information during purchase decision. Given the results from the memory task and the accuracy of recalling the attribute information we can mention that experts are subjected to process numerical information differently and with considerable more ease than novices.

6.2 Consumer Knowledge and Presentation Form

We can generally state that vividness did have an impact on both expert and novices. In comparison to experts, novices had more favorable reaction to towards vivid presentation form, and their attitudes were more pronounced than those of the experts as they were relied more on the physical attributes portrayed in the presentation form. We can also infer that the dimensions of product knowledge direct the different kinds of attribute information for encoding and retrieved in order for it to become a part of consumer memory and thereby affecting consumer response towards the ad, brand, attribute information and the intent to purchase.

In accordance with the hypotheses, the persuasiveness of a vivid presentation showed positive effect on all the related variables pointing to judgment. However for experts, the brand attitude and attitude toward attribute information failed to provide support. However, we found overall support for intention to purchase, since the notion of an ad is to instigate a purchase intention. One can also note that given the well established knowledge structure and product related expertise, experts rely more on information mode, hence vividness had very little impact on them. The general convictions were consistent with the logic that both recall and judgment are biased in favor of vividness, more profound for novices in comparison to experts. Overall, we were able to substantiate that consumers prefer informative advertising (Abernathy and Franke, 1996); more rich and larger ads than smaller ads (Jackson and Parasuraman, 1986) and support results from other studies on color and information mode (Fernandez and Rosen, 2000).

6.3 Presentation Form and Information Mode

For the relationship between presentation form and information mode, both recall and judgment measures support majority of the proposed hypotheses in the process defined in our conceptual framework. First, we established that consumer knowledge moderate the availability of information. Secondly, availability of information influences recall and subsequent judgment for decision-making. Thirdly, the pattern of evaluations from the results for A_{ad} and A_b showed that judgments were imparted based on central processing. Even though we did not find support for A_{ab} and A_{ad}, we found strong interaction for A_{ai} for the interaction effects between information mode and presentation form for experts. Although the influence of presentation form dictating the evaluation was clearly evident in the judgment measures, the attribute evaluation results suggest that the form of presentation and the mode of information were primary influencing factors on the evaluation of the brand. The ads presented to novices in a vivid form along with verbal information were able to provide more positive evaluation towards the ad and the brand. This is consistent with previous research on label design, picture only and picture-verbal only information by Sangiry and Cady (1997).

It’s a known fact that ads differ to the degree with which they are informational, for example, ads for products such as computers often contain extensive product information. In contrast some computer ads also have images at a cosmetic level and little attribute

information. Hence, we predicted that knowledge about the product attribute information will differentially influence judgments of more and less informative ads. This may serve as a somewhat ambiguous message to both expert and novice consumer, wherein, it contains both informational and persuasive components. Therefore, it was also expected that knowledge about the product would cause subjects to attend more to the informational part of the ad, and thus to positively influence the intent to purchase. During memory task, experts recalled attributes more accurately and precisely for vivid-numerical ads as compared to novices, who were able to recall vivid-verbal ads better. Mean scores comparing verbal and numerical information also indicated that novices recall was toned down when numerical information was included in the presentation form. However, differences between experts and novices when it comes to evaluating a product offer were more based on the impact of experience on evaluations.

Differences in evaluation between experts and novices are such that experts are more likely to compare a specific unit of measurement more intensely and impart judgment to a value of an attribute irrespective of the presentation form. Therefore, we note that experts evaluate ads containing numerical information and use this information to distinguish the attributes of competing brands. We showed in this study the effects of knowledge on the analysis of ads for computers, that with increased expertise people associate more attributes to the object. We also found that experts use a greater number of distinct attributes to differentiate between different brands of computers attributes than novices do. The direction of our arguments was supported, although results indicated opposite result for novices for A_{ai} for the interaction effects between information mode and presentation form.

In summary, we were able to indicate that advertising works differently for consumers with varying degrees of knowledge that he or she may have in that product area. The nature of elaboration, whether it is ad-evoked or attribute-evoked, may depend on the availability of information and proper retrieval. To add clarity to vividness effects, presentation form in this study was operationalized by varying color contrasts, font size, and picture size to which to date has not been a focus in previous research on vividness (Taylor, Crocker, Fiske, Sprinzen & Winkler, 1976; Taylor and Fiske, 1978; Taylor and Thompson, 1982). On a general note, research has also indicated that ad attitude has little or no effect on brand attitude (see Machleit and Wilson, 1988). In this research, $A_{ad,}$ A_b, A_{ai}, and P_i were higher for ads presented with numerical information and in a vivid presentation form for experts. This is because experts already have the required knowledge about the attribute information and hence the vividness did not have the intended effect in comparison to novices.

6.4 Implications for Research and Practice

6.4.1 Theoretical Implications

This research attempts to contribute to the enhancement of the existing knowledge in the area of information mode and presentation form by extending past research in several aspects. Three main possible contributions of this research are: (1) active consideration of the information mode in ads, (2) operationalization of presentation form to create a vivid effect and (3) consumer knowledge as a moderator

The theoretical model in this research has been proposed to explain how recall and judgment effects might be manifested, for example, from domain specific product knowledge, cognitive elaboration and consistency. First of all, we research attempts to integrate the moderating role of consumer knowledge to understand the tenets of information processing for numerical and verbal mode in combination with vividness. The processing of information

is clearly influenced by consumer knowledge which is a mitigating factor for comprehension and interpretation of the information during decision-making.

Secondly, we point to the importance of these two types of information modes in media campaigns. For example, customers can benefit from the potential of numerical information by obtaining precise information. Although, this precision can not be deemed as useful if a specific unit of measurement is not provided. When information is provided along with a unit of measurement, only under domain specific knowledge levels can the information be understood fully for its meaning. This in particular contributes significantly to existing literature in advertising research.

Thirdly, in an effort to reconcile with mixed findings for vividness (e.g., Taylor and Thompson, 1982), we have included information mode as an important variable along with vividness in our theoretical model. We were able to provide empirical support that reconciles the mixed results on the persuasiveness of vividness by Taylor and Thompson. We on the other hand, tested the model by introducing a moderator in the form of, consumer knowledge. In doing so we were able to establish that despite the knowledge orientation that individuals may have, elaboration will occur to a greater extent for a vividly presented ad as compared to a non-vivid presentation form. Our theory is based on the premise that experts have a favorable attitude towards numerical information in a vivid presentation form as compared to the same information in a non-vivid form. Similarly for novices, a disproportionate degree of elaboration occurred with vivid presentation compared to a non-vivid presentation form.

The total amount of brand attribute information during memory task appears to be a function of the processing task, moderated by the subjects' level of expertise. For instance, subjects tested for ad and brand evaluation seem to direct their attention to all available attribute information (see Gardner, Mitchell, and Russo, 1982). This study has extended the processing and memory research to persuasion and choice of information through presentation form. The specific attributes that are recalled appear to be strongly influenced by the vivid format of the ad for novices, as compared to a non-vivid presentation form. In general, we can observe that a vivid presentation form seems likely to direct the subjects' attention to the target attributes as compared to the non-vivid form.

Relating to our theoretical framework that vividness in an advertisement affect recall of attribute information, our findings indicate that attribute information is likely to be used by more by novices when the information in the ad is presented in a vivid form. Although, experts may also more readily interpret and integrate new information under the conditions of vividness. While judgment requires an explicit evaluation of each attribute alternative, typically using numerical or verbal information, the choice, in contrast, requires that only one alternative be selected and the rest rejected. We showed that the acceptance and rejection is wholly based on knowledge wherein there are differences in the processing level, cognitive structures, ability to synthesize and comprehend, and finally preference. Therefore, we note from a theoretical front that memory related judgment lead to more information search, inter-dimensional search (Billings & Scherer, 1988), and connectivity to the availability model. In terms of decision-making strategies, response mode can be predicted to have effects on the use of compensatory versus non-compensatory decision processes.

Lastly, this research also provides alternative ways of manipulating presentation form through color contrast, font size, and picture size. It is therefore our conviction that consumer knowledge as a moderator plays an important role in our theoretical framework for understanding the processing of information mode and presentation form. The implication is that in modeling A_{ad} based on the mode of information and type of presentation form, the consumers' knowledge or experience with the advertised product should be measured and considered in any evaluation. In examining the recall and judgment stages of new product evaluation, this research attempts to integrate the framework of knowledge as a moderator for

the split and whole models. Although both frameworks have been applied to the explanation of the same phenomenon (i.e., recall and judgment), it seems that the framework for the whole model was able to provide a stronger explanation of the effects in comparison to the split model via multivariate analysis technique.

6.4.2 Practical Implications

Brand and marketing managers are under constant pressure to deliver successful products and the necessary product information - a requirement made all the more difficult against a background of significant change in the market place. They have also long assumed that consumer's reaction towards an advertisement has an impact on their evaluation of an advertised brand and on subsequent decision to purchase.

The explanations provided in this research on processing of information have important implications for research in consumer behavior. One such implication come from comparing two different modes of information and presentation form by two different groups of individual's classified into novices and experts (USRDA value). In broad terms, the two characteristics of information mode suggested by this research should be considered for use in practice, for instance in all forms of advertising, hence, an interest in the implications for marketing communication.

From a public policy standpoint, numerical representation of attributes in advertisements may be helpful in alerting consumers to (e.g., consideration in order to improve their dietary habits). Furthermore, it may have a positive effect on awareness of the relationship between diet and health (also see Ipolitos and Mathias, 1990; Padberg, 1992; Jensen and Kesaven, 1993). However, from the marketers' standpoint the benefits from numerical information are reaped only when consumers are able to understand the meaning conveyed by it. Hence, marketers will have to abide by the norms set by public policy makers and provide the information necessary for consumers. Under the circumstances where the average consumer does not comprehend this information, then necessary propaganda and education need to be imparted by advertisers and public policy makers.

For example, by exposing consumers to numerical information and providing equivalent verbal information via different media, we can induce a learning environment for them to understand the information necessary for decision-making. Furthermore, by complementing numerical and verbal information with a vivid presentation form, the attitude toward the ad and brand attitude can be enhanced. However, when a familiar brand is presented to the consumer there could a pre-judgment bias during evaluation. Hence, the notion that learning conditions be evoked so novice consumers can attain the knowledge for understanding complex product attribute information.

Possible ways of designing public policy or marketing communication to facilitate meaningful processing should include the provision of reference information and proper definition of the unit specific information associated with the attributes. Although numerical information has memory advantages, these benefits may come at the cost of comprehending the meaning behind the information. For example, a consumer may learn and recall that two brands have different numerical values, for instance, 310 MHz and 322 MHz processing speed. The consumer may then choose the brand with 310 MHz speed, believing that the speed is "slow", when in fact 310 MHz may actually be above average and perhaps even be rated as quite "fast" for the computer product category. It is conceivable that novices could be quite susceptible to making these erroneous conclusions because numerical information imparts meaning directly. In this regard, public policy could aim to develop norms for the use of specific verbal information that they deem to be important and benefiting novices (e.g.,

Food product-fat content, authentication of nutrition value by the American Heart Association; and Mobile computing- processor speed, screen width, battery life etc.).

Research concerning the presence or absence of expertise with a product class has also significant implications for industrial marketers. For example, insight into how the expertise affects the choice process can help in determining the mode of information most effective for buyers with differing levels of expertise. Sales presentations could easily be geared for the different levels of expertise as well. The nature of presentation form also influences a consumer to pay attention to specific attributes. For clarity of presentation marketers should be able to isolate key attributes in an ad for consumers to make a decision. This way the attributes may be used more effectively during decision-making. This research uses multiple operationalizations to create a vivid presentation form. For marketing practitioners the implication is that those who have knowledge of the specific product category are more likely to like the advertisement.

In general, our findings for recall may also have public policy implications. They imply not only that an advertiser may be able to make consumers more likely to remember a particular attribute, but also distract them to the extent that they may not be able to recall other predominant attributes needed for making well informed decision. Hence, prior knowledge, whether through exposure to previous ads or other experience with the product on part of the consumer should be created in order to improve the A_{ad} and impact P_i note that advertising must work through consumers' memories, however messages for competing brands may disrupt recall of advertisement information.

6.5 Limitations of the Study

As in any experimental research, this study also has its limitations. First, is it applicable to the general environment? According to Mcgrath (1982), designing a study that optimizes of all validity issues is virtually impossible. The validity of study may be limited as this study used a student sample gathered conveniently from a major college as this limits the generalizability of the study to other consumer segments.

Secondly, although, the study is intended to mimic natural processes, we can note that there is always the bias of artificial experimental manipulation that may affect interpretation of the results. This study uses an artificial experimental setting, since this setting was necessary to examine the cognitive processing differences between experts and novices during recall and evaluation of an ad presented in numerical and/or verbal and in a vivid and/or non-vivid presentation form. Exact simulation in which consumers evaluate product information may not be possible. Hence, this suggests a decrease in the external validity. In realistic settings, information may not be available to consumers in such a convenient form. On the other hand, every effort was taken in designing the stimuli for this research to make it look as realistic as possible. The stimuli were comparable to the ones in the 'Mobile Computing' magazine. The attribute information presented in the ads were pre-tested among experts and verified with the information listed in the "Mobile Computing" magazine. This gives the ad a realistic outlook, since the attribute information is not fictitious in nature. However, the brand name was fictitious and this was done to avoid any bias in their evaluations. Overall, this study tries to capture the cognitive aspects of the subjects, and given the fact that students are also potential consumers the findings may actually be generalizable to other segments of consumers.

Thirdly, the present study focused on a single brand setting. Results might have been different should we have accounted for multiple brand setting and for brands that are well positioned in real-market place. We chose to use single brand in order to dilute the interference of information mode. Familiar and known brands could also have induced

stronger recall and attitude toward the brand. Lastly, the analysis was restricted to recall and judgment only in which attribute information of a brand were retrieved from the memory. The experiment did not use choice or learning situations. For instance, we could have highlighted the options by individuals to choose a specific mode of information that could have influenced the evaluation of the ad and the brand. With reference to the persuasiveness of vividness, the operationalization of vividness in the advertisement was done with the introduction of strong colors, picture size, and font size of attributes. This created a persuasive ad effect however, a balanced competitive brand could neutralize the substantive effects of vividness that may impact indecisiveness and subsequently the intent to purchase. For instance, marketers are also beginning to demand that of advertisers to use state of the art technologies to induce richness in the advertisement. For example, the demand focus could be extended to web content providers to use rich media technologies which can enable both banners and bigger ads to include motions and animations in product placements (Hansell, 1995). These rich media via web could be utilized to develop vividness to support purchase decision making for all online related sales.

In spite of these limitations, the results make contributions to research on persuasiveness of vividness, consumer knowledge, cognitive elaboration, and information mode in an advertising context. In closing, research on numerical and verbal information and vividness in combination offers important insight into consumer decision-making and interesting avenues for future research.

6.6 Suggestions for Future Research

Situational and procedural factors might limit the generalization of our findings, yet suggests direction for further research. In an attempt to increase our understanding of the impact of consumer knowledge, information mode and presentation form on ad effects, an exploratory study was carried out. Useful results that can facilitate future research in this area have been presented. However, caution need to be observed when interpreting the outcome from this study. Although a statistical power analysis indicates that the sample size used in this study is sufficient, caution should be exercised in generalizing the results to the population.

The first avenue for future research is to focus on the moderating conditions involved during the processing of magnitude information. For example, measurements of and individual differences in and the importance they attach to magnitude information in numerical processing. The second avenue is to examine the influence of consumer knowledge when provided with reference information. Practical implications of this research relate to the potential use of reference information by public policy makers in order to facilitate the interpretation of numerical information by consumers. We have noted frequently in this research that numerical information without the necessary reference information would be meaningless. In addition, attitudinal judgments from experts and novices novice consumers can be examined further.

Finally, the effects of the nature of presentation form along with magnitude information can be represented either graphically or pictorially. Furthermore, a majority of the households today has personal computers with internet access and these have been adopted widely. Media reports have also indicated that internet users are more attentive to targeted advertisements generated from a thematic or keyword search because of its affinity with their subject of interest. Hence, users are more inclined to seek additional information about the product shown on the targeted picture ad. Thus as an avenue for future research, we can extend this study to web and media rich advertisement with animations to induce vividness and enhancing persuasiveness as it captures the subject's attention. In addition comparison of numerical information (ratings on a scale versus unit specific measurement and/or percentage

information) and verbal information (descriptive verbal information versus evaluative verbal information) should be compared. Furthermore, the impacts of information overload needs to be examined, specifically, the number of attributes and brands absorbed and retrieved during processing of the information from an advertisement.

Each subject group was only exposed once to each set of ad. We must exercise the option to consider testing the same group to other ads. Therefore, it would be interesting to find the perceived recall and judgment in a within subject experimental design. The conceptual model could also extend the study towards investigating the impact of information mode and vividness in a cross-cultural setting. Consumer behavior involves multi-dimensional concepts with many variables that can affect the process or behavior under investigation. It is beyond the scope of this research to measure all relevant variables that affect a process. Due to limited research on the topic evaluated in this study, future research should attempt to validate findings using other variables. Various behavioral variables can affect a process. Studying the effect of such variables can greatly enhance understanding of the evaluation process. For example, future research should examine two other main components of information processing: motivation and involvement to process numerical information.

An area that was not discussed that is not important for the internal validity of this study is issue of the fit or correspondence between the amount of an attribute and the numbers and words used to describe it. This may be useful to consider for positioning this research and even leading to new directions for study in the future. This might require some theoretical development on the conceptualization of the notion of "amount" and how it relates to different kinds of attributes. Some effort is needed to give the research perspective to different categories of product attributes and the formal mapping into quantitative and qualitative descriptors. Doing so may open up opportunities for further study. It is possible, for example, that student subjects may be more cognitive and thus more likely to use persuasion knowledge than non-student subjects. Future research may also examine the generalizability of the phenomenon to other situations and other subject populations. Additionally, future research could improve upon some of the measures used here. For example, memory measures (e.g., response latencies) could be more accurate measures of accessibility than the self-statements used here. Likewise, further direct measures of cognitive busy-efforts and persuasion-knowledge usage would be useful.

Future research can also investigate how advertising works through consumers' memories specifically for messages from competing brands. Critical comparisons can be made on the disruption of recall of advertisement information for the target brand. "Preference was defined as a proclivity toward using numerical information and engaging in thinking involving numerical information" (Viswanathan, 1993). Additional measures for preference for numerical information could be undertaken in conjunction with other variables of importance such as presentation form, typically used in advertising. Future studies could also focus on the effects of ad attitude on choice behavior for information mode and presentation form.

In addition, industry professionals have discounted specific design tools like animation, deeming it ineffective in banner advertising (Albright, 2000; Fairfurn, 1999). Although banner advertising has received a great amount of attention, it is important to keep in mind that the role of animation, audio, and video in a banner ad is to be intrusive and distract page visitors from their tasks. On a web site, animation is considered a way to enhance a company's site (O'Connor, 1997). A web site can employ animation, audio, and video to create a more virtually reality experience, which can lead to stronger, more enduring attitudes toward the site.

6.7 Summary

Globally, marketers and advertisers are facing a number of challenges that are forcing them to reevaluate their advertising strategies. Meaningful evaluation of the information in the ad requires multiple measures, and useful interpretation depends in part on knowledgeable judgment. The objective of this study was to examine and understand the effects of prior knowledge on the impact of information mode and presentation form. The focus of the study has been to determine under which conditions consumers were likely to recall, and form a judgment of product attribute information as well studying the impact on intention to buy. This was done with an experiment using print advertisements. Information mode, either verbal or numeric, is two widely used modes of conveying magnitude information in different communication contexts. Presentation form added to the attribute component in an advertisement. The experiment conducted in this research addressed many issues of presentation form in advertising. The vividness was operationalized by the size of the font, and picture and the use of bright colors and their acting as attentional cues was an essential part of making the information vivid. Each of the operationalizations was considered necessary to stimulate cognitive elaboration, which is assumed to invoke higher comprehension.

In essence we note that advertising must work through consumers' memories and a preponderance of evidence points to presentation form as an important factor. Used in conjunction with appropriate measures such as information mode, it adds substantial value to the assessment and optimization of ad effectiveness by different knowledge groups. Hence, domain specific knowledge is essential to comprehension of complex product attribute information and makes a difference in decision-making. In this study, comprehension is reflected on the accuracy of recalling attribute information.

From a methodological perspective an ad containing a vivid presentation form was found to be more effective than a non-vivid presentation form. This research also pointed out that vividness in a presentation form alone is not sufficient enough to cause cognitive elaboration. Findings in this study showed that product knowledge and the ability to comprehend and encode product attribute information moderates the manner in which the information is recalled and evaluated. For example, a vivid presentation form would direct attention and cognitive elaboration to particular aspects of the ad and so affect recall about the advertised brand. As noted in the previous sections, the moderating roles of knowledge, along with the mediating roles of attention getting devices such as presentation form, and processing, must remain tentative (processing was not measured). The specific attributes that are recalled appear to be strongly influenced by the presentation form, although information mode dictated the elaboration of the processing for accurate recalling of attribute information. The results of the data analyses supported all of the hypothesized relationships, and generated some new findings. The findings of the analyses were discussed to assess the overall appropriateness of the proposed framework for each of the hypotheses.

Results show that vivid presentation form reflects a positive response towards A_{ad} and A_b and make inference that a vivid presentation form may be driven by many different elements of the commercial. All of this underscores the importance of knowing not just whether people like the commercial or even know how much they like, but knowing what they like and why. Beyond this general caveat, our results support the belief that the mode of information along with a form of presentation can contribute to more effectiveness in more than one way. Advertisements that are vivid and favored better are more likely to be noticed and remembered. It is clear that vividness in conjunction with a mode of information is associated with favorable attitudes towards the brand, and more favorable ads show persuasive impact. Vivid information is also most likely to be used in these cognitive

processes and also seems to satisfy most requirements for advertisers. Advertising practice systematically selects for vivid information, and important attribute information enhances the credibility of such vividness. It can be argued, however, that vivid information alone may not be the best for use in decision making and inference drawing and that over reliance on it can lead to errors of perception and judgment. However, a combination of vividness with the mode of information that the attributes are specified will add immeasurably to decision making for consumers and should contribute to efficient delivery of the message, leveraging the advertiser's media investment.

The present research shows that ability to process, comprehend and activate the attribute related cognitive structures can have a significant effect on how consumers respond to messages. From a marketers view point, the results suggest that as simple as the claims in the ad are arranged can influence consumer response. Marketing managers could use the findings in this research to chart a strategy by developing messages using presentation forms and information mode to increase the recall and judgment needed for decision making. For example, managers may group product attribute information in an advertisement using either vivid-verbal or vivid-numerical. These specific combinations of ads could be targeted towards different consumer segments, e.g., one set of ads for novices and the other for experts. This would assist in the recall of information and potentially improving the attitude toward the advertisement. Advertisers and marketers might also consider how the attribute information content and the ad in the degree of vividness interact, so they can accordingly decide which ads with specific presentation form are placed.

REFERENCES

Abernathy, Avery, M. and George, R., Franke, (1996). “The Information Content of Advertising: A Meta Analysis.” Journal of Advertising, 25(2), pp. 2-17.

Abernathy, B., Neal, R. J., and Koning, P. (1994). “Visual, Perceptual and Cognitive Differences Between Expert, Intermediate, and Novice Snooker Players.” Applied Cognitive Psychology. Vol. 8, pp. 185-211.

Adelson, B., (1984). “When Novices Surpass Experts: The Difficulty of a Task May Increase with Expertise.” Journal of Experimental Psychology: Learning, Memory, and Cognition, Vol. 10, pp. 483-495.

Agrawal, M. (1995). “Warning Labels: Role of Expertise and Perceived Risk in Pharmaceutical Purchase Behavior.” Health Marketing Quarterly, Vol. 13, Iss. 2, pp. 99-115.

Alba, J. W., (1983). “ The Effects of Product Knowledge on the Comprehension, Retention, and Evaluation of Product Information.” Advances in Consumer Research, ACR, Vol. 10, pp. 577-580.

_____, and Hasher, L., (1983). “Is Memory Schematic.” Psychological Bulletin, Vol. 93, No. 2, pp. 203-221.

_____, and Hutchinson, J. W., (1987). “Dimensions of Consumer Expertise.” Journal of Consumer Research, Vol. 13, pp. 411-53.

_____, (1982). "Cognitive Processes Initiated by Exposure to Advertising," In Information Processing Research in Advertising, ed. R. Harris (Hillsdale, N.J.: LEA).

Allan, L.G., and Tangen, J. M., (2004). “Cue Interaction and Judgment Causality: Contribution of Causal and Associative Processes.” Memory and Cognition, Vol. 32, pp. 107-124.

_____, (2005). “Judging Relationships between Events: How Do We Do It? Canadian Journal of Experimental Psychology, Vol. 59-1, pp. 22-27

Alpert, F.H., and Kamins, M.A., (1995). “An Empirical Investigation of Consumer Memory, Attitude and Perceptions Toward Pioneer and Follower Brands.” Journal of Marketing, Vol. 59, Vol.4, pp. 34-45.

Ambrose, M. L., (1986). “An Examination of the Memory-Judgment Relation in a Performance Appraisal Context.” Unpublished Doctoral Dissertation, University of Illinois.

Anderson, J. R., (1987). "Skill Acquisition: Compilation of Weak-Method Problem Solutions." Psychological Review, Vol. 94, pp. 192-210.

_____, (1983). "Retrieval of Information from Long Term Memory, Science, Vol. 220, pp. 25-30.

_____, and Bower, G. H., 1972. “Recognition and Retrieval Process in Free Recall.” Psychology Review, Vol. 79, pp. 97-123.

_____, Norman H., and Stephen, H., (1963). “Effects of Concomitant Verbal Recall on Order Effects in Personality Impression Formation.” Journal of Verbal Learning and Verbal Behavior, Vol. 2, pp. 379-91.

Anderson, R. C., and Pitchert, J. W., (1978). “Recall of Previously Unrecallable Information Following a Shift in Perspective.” Journal of Verbal Learning Behavior, Vol. 17, pp. 1-12.

Anderson, R. L., (1970). “Rhetoric and Science Journalisms.” Quarterly Journal of Speech, Vol. 56, pp. 358-368.

Anderson, R. E., and Jolson, M. A., (1980). “Technical Wording in Advertising: Implications for Market Segmentation.” Journal of Marketing, Vol. 44, pp. 57-66.

Andrews, J. C., (1989). “Dimensionality of Beliefs toward Advertising in General.” Journal of Advertising, Vol. 18, No. 1, pp. 26-35.

Appel, V., (1971). “On Advertising Wearout.” Journal of Advertising Research, Vol. 11, pp. 11-13.

_____, Weinstein, S., & Weinstein, C., (1979). “Brain Activity and Recall of TV Advertising. “Journal of Advertising Research, Vol. 19, Vol. 4, pp. 7-15.

Appleton-Knapp, S.L, Bjork, R.A.; and Wickens, T.D., (2005). “Examining the Spacing Effect in Advertising: Encoding Variability, Retrieval Processes, and their Interaction.” Journal of Consumer Research, Vol. 32, No.2, pp. 266-276.

Arkes, H. R., and Freedman, M. R., (1984). “A Demonstration of the Costs and Benefits of Expertise in Recognition Memory.” Memory and Cognition, Vol. 12, No. 1, pp. 84-89.

Ashcraft, M. H., (1992). “Cognitive Arithmetic: A Review of Date and Theory.” Cognition, Vol. 44, pp. 75-106.

Assael, H., 1981. “Consumer Behavior and Marketing Action.” Boston: Kent Publishing Co.

Atkinson, R. C., and Shiffrin, R. M., (1968). “Human Memory: A Proposed System and its Control Processes.” In K. W., Spence and J. T., Spence (Eds.), The psychology of Learning and Motivation. Advances in Theory and Research, Vol. 2, New York: Academic Press, pp. 89-195.

Atkin, O., (1980). “Models of Architectural Knowledge.” London: Dion Books.

Ausubel, D. P., (1963). “The Use of Advance Organizers in Learning and Retention of Meaningful Verbal Information.” Journal of Educational Psychology, Vol. 51, No. 3, pp. 267-272.

Babin, L., Burns, A. C., and Biswas, A., (1992). "A Framework Providing Direction for Research on Communication Effects of Mental Imagery-Evoking Advertising Strategies", Advances in Consumer Research, Vol. 19, pp. 621-628.

Baesler, E. J., and Burgoon, J. K., (1994). "The temporal effects of story and statistical evidence on belief change." Communication Research. Vol. 21, No. 5, pp. 582-602.

Bagozzi, R. P., and Dhabolkar, P.A., (1984). "Consumer recycling goals and their effect on decisions to recycle: A means –End Chain Analysis. Psychology and Marketing, Vol. 11, pp 313-340

Banks, A. (1987). "Mediology: Clutter in the ERA of Control." Marketing and Media Decisions, January, pp. 51-52.

Banks, W. P., and Flora J., (1977). "Semantic and Perceptual Processes in Symbolic Comparisons." Journal of Experimental Psychology: Human Perceptions and Performance, Vol. 3, pp. 278-290.

Baron, R. M., and Kenny, D. A., (1986). "The Moderator-Mediator Distinction in Social Psychological Research: Conceptual Strategic and Statistical Consideration." Journal of Personality and Social Psychology, Vol. 51, pp. 1173-1182.

Barry, S., and Alejandro, A. L., (1995). "Embedded Clause Effects On Recall: Does High Prior Knowledge of Content Domain Overcome Syntactic Complexity in Students of Spanish." Modern Language Journal, Vol. 79, pp. 491-504.

Bartos, R., and Dunn, T., (1974). The Consumer View of Advertising. New York: American Association of Advertising Agencies.

Bass, B. M., Cascio, W. F., and O'Connor, E. J., (1974). "Magnitude Estimation of Expressions of Frequency and Amount." Journal of Applied Psychology, Vol. 59, pp. 313-320.

Bass, V. F., (1991). "Food Labeling and Consumer Satisfaction." Journal of Home Economics, Vol. 83, pp. 2-5.

Batra, R., and Ray, M. L., (1986). "Situational Effects of Advertisement Repetition: The Moderating Influence of Motivation, Ability and Opportunity to Respond." Journal of Consumer Research, Vol. 12, pp. 432-445.

_____, and Ray, M. L., (1985). "How Ad Works at Contact". In Psychological Processes and Ad Effects: Theory, Research and Application. LEA, NJ, 1985.

Bauer, R. A., and Greyser, S. A., (1968). Advertising in America: The Consumer View. Boston: Harvard University Press.

Beatty, S. E., and Smith, S. M., (1987). "External Search Effort: An Investigation Across Several Product Categories." Journal of Consumer Research, Vol. 14, pp. 83-95.

Beattie, A. E., and Mitchell, A. A., (1985). The Relationship Between Advertising, Recall and Persuasion, in (eds,) Linda, F. A., and Mitchell, A. A., An Experimental Investigation in Psychological Process and Ad Effects: Theory Research and Applications., LEA: pp. 129-155.

Bedard, J., (1989). “Expertise in Auditing: Myth or Reality? Accounting, Organizations and Society, Vol. 14, pp. 113-131.

Behn, R. D., and Vaupel, J. W., (1982). “Quick Analysis for Busy Decision Makers.” New York: Basic Books.

Belch, G. E., Villareal, A., and Belch, M., (1985). “A Review of Research Concerning the Effects of Advertising Communication.” Manuscript from San Diego State University, Department of Marketing, CA.

Bellizzi, C. P., Crowley, A. E., and Hasty, R. W., (1983). “The Effects of Color in Store Design.” Journal of Retailing, pp. 21-43.

_____ and Hite, R. E., (1992). “Environmental Color, Consumer Feelings, and Purchase Likelihood.” Psychology and Marketing, Vol. 9, No. 5, pp. 347-363.

Beltrami, R. F., and Evans, K. R., (1985). “Perceived Believability of Research Results Information in Advertising.” Journal of Advertising, Vol. 14, No. 3, pp. 18-31.

Berdie, Douglas, R., (1992). “The yellow pages guide to comprehensive study for advertisers”, 2nd edition, Mound, MN: Consumer Review Systems.

Berger, D., 1981. “A Retrospective FCB Recall Study.” Advertising Age, October 26.

Biocca, F., Daugherty, T., and Li, H. (2202). “Imapct of 3D Advertising on Product Knowledge, Bradn Attitude, and Purchase Intention: The Mediating Role of Presence. Journal of Advertising, Vol. 31, pp. 1-16.

Brengman, M., Guens, M., and De Pelsmacker, P., (2001). “The impact of consumer characteristics and campaign related factors on brand confusion in print advertising.” Free University of Brussels, Belgium

Bettman, J. R., Capon, N. and Lutz, R. J., (1975). “Multiattribute Measurement Models and Multiattribute Attitude Theory: A Test of Construct Validity.” Journal of Consumer Research, Vol. 1 pp. 1-15.

_____, and Kakkar, P., (1977). "Effects of Information Presentation Formats on Consumer Information Acquisition Strategies." Journal of Consumer Research, Vol. 3, pp. 233-240.

_____, (1979). “An Information Processing Theory of Consumer Choice.” Reading, Massachusetts: Addison-Wesley.

_____, (1979), "Memory Factors in Consumer Choice: A Review." Journal of Marketing, Vol. 43, pp. 37-53.

_____, and Park, W., (1980). "Implications of a Constructive View of Choice for Analysis of Protocol Data: A Scheme for Elements of Choice Processes." Advances in Consumer Research, ACR, Vol. 7, pp. 148-153.

Beyth-Marom, R., (1982). “How Probable is Probable? A Numerical Translation of Verbal Probability expressions.” Journal of Forecasting, Vol. 1, pp. 257-69.

Bhatia, S. A., (1990). “The Influence of Fictional, Factual, and Vivid Video Presentations On Immediate and Delayed Recall and Judgment.” Dissertation Abstracts International, Vol. A51/03.

Biehal , G., and Chakravarti (1983). “Information Accessibility as a Moderator of Consumer Choice.” Journal of Consumer Research, Vol. 10, pp. 1-14.

_____, Stephens, D., and Curlo, E., (1992). “Attitude Toward the Ad and Brand Choice.” Journal of Advertising, Vol. 21, No. 3, pp. 19-36.

Billings, R. S. & Scherer, L. L. (1988). The effects of response mode and importance on decision-making strategies: Judgment versus choice. *Organizational Behavior and Human Performance, 41*, 1-19.

Birnbaum, M. H., (1974). “Using Contextual Effects to Derive Psychophysical Laws.” Perception and Psychophysics, Vol. 15, pp. 89-96.

Bogart, L., and Lehman, C., (1983). "The Case of the 30-second commercial." Journal of Advertising Research, Vol. 23, pp. 11-19.

Bouman, M. J., (1980). “Application of Information-Processing and Decision-Making Research.” In G. R. Ungson and D. N. Braunstein (Eds.), Decision Making: An Interdisciplinary Inquiry (pp. 129-167). Boston: Kent Publishing.

Bower, G. H., (1970). “Imagery as a Relational Organizer in Associative Learning.” Journal of Verbal Learning and Verbal Behavior, Vol. 9, pp. 529-533.

_____, (1972). Cognition in Learning Memory. New York: John Wiley.

Bransford, J. D., (1979). "Human Cognition: Learning, Understanding and Remembering.” Belmont, Wadsworth Publishing.

_____, and Johnson, M. K., (1972). “Contextual Pre-requisites for Understanding: Some Investigations of Comprehension and Recall.” Journal of Verbal Learning and Verbal behavior, Vol. 11, pp. 717-726.

Brewer, W. F., and Nakamura, G. V., (1984). “The Nature and Functions of Schema.” In R. S. Wyer, Sr. and T. K. Srull (Eds.), Handbook of Social Cognition, pp. 119-160, Hillsdale, NJ: Erlbaum.

Britton, B. K., Westbrook, R. D., and Holdredge, T. S., (1978). “Reading and Cognitive Capacity Usage: Effects of Text Difficulty.” Journal of Experimental Psychology: Human Learning and Memory, Vol. 4, pp. 582-591.

Bross, I. D., Shapiro, P. A., and Anderson, B. B., (1972). “How Information is Carried in Scientific Sub Languages.” Science, Vol. 176, pp. 1303-1307.

Brucks, M., Mitchell, A. A., and Staelin, R., (1984). “The Effects Nutritional Disclosure in Advertising: An Information Processing Approach.” Journal of Public Policy and Marketing, Vol. 3, pp. 1-25.

_____, (1985). “The effects of Product Class Knowledge on Information Search Behavior.” Journal of Consumer Behavior, Vol. 12, (June), pp. 1-16.

_____, (1986). "A typology of consumer knowledge Content." Advances in Consumer Research, ACR, Vol. 13, pp. 58-63.

Brun, W., and Teigen, K. H., (1988). “Verbal Probabilities: Ambiguous, Context-Dependent, or Both?” Organizational Behavior and Human Decision Processes, Vol. 41, pp. 390-404.

Buchanan, D. I., (1964). “How Interest in the Product Affects Recall: Print Ads Vs. Commercials.” Journal of Advertising Research, Vol. 4, pp. 9-14.

Budescu, D. V., Wallsten, T. S., and Weinberg, S., (1988). “Decisions Based on Numerically and Verbally Expressed Uncertainties.” Journal of Experimental Psychology: Human Perception and Performance, Vol. 14, pp. 281-294.

_____, Wallsten, T. S., (1987). “Subjective Estimation of Vague and Precise Uncertainties.” In G. Wright and Payton (Eds.), Judgmental Forecasting, pp. 63-82, New York: John Wiley Press.

_____, Wallsten, T. S., (1985). “Consistency in Interpretation of Probability Phrases.” Organizational Behavior and Human Decision Processes, Vol. 36, pp. 391-405.

_____, Wallsten, T. S., (1990). “Dyadic Decisions With Numerical and Verbal Probabilities.” Organizational Behavior and Human Decision Processes, Vol. 46, pp. 240-263.

Buehner, M.J., and May, J., (2002). “Knowledge Mediates the Timeframe of Co-variation Assessment in Human Causal Induction.” Thinking and Reasoning, Vol.8, pp. 269-295.

Burton, S., and Biswas, A., (1993). “Preliminary Assessment of Changes in Labels Required by NLEA of 1990.” Journal of Consumer Affairs, Vol. 27, (Summer), pp. 127-45.

Byeth-Marom, R., (1982). “How Probable Is Probable? Numerical Translation of Verbal Probability Expressions.” Journal of Forecasting, Vol. 1, pp. 642-650.

Cacioppo, J. T., and Petty, R. E., (1979). “Attitudes and Cognitive Responses: An Electrophysiological Approach.” Journal of Personality and Social Psychology, Vol. 37, pp. 2181-1199.

Campbell, D. T., and Stanley, J. C., (1969). “Experimental and Quasi-experimental Designs for Research.” Chicago: Rand Mcnally and Company.

Campbell, J. I. D., and Clark, J. M., (1994). “Architectures for Numerical Cognition.” Cognition, Vol.53, pp. 1-44.

Celsi, R. L., and Olson, J. C., (1988). “The Role of Involvement in Attention and Comprehension Processes”. Journal of Consumer behavior, Vol. 15, pp. 210-224.

Chase, W. G., and Ericsson, K. A., (1982). "Skill and Working Memory." In G. H. Bower (Eds), The psychology of Learning and Motivation, Vol. 16. New York: Academic Press.

Chi, M. T. H., Feltovich, P. J. and Glaser, R., (1981). “ Categorization and Representation of physics Problems by Experts and Novices.” Cognitive Science, Vol. 5, pp 121-152.

_____, (1981). "Categorization and Representation of Physics Problem by Experts and Novices". Learning Research Development Center, University of Pittsburgh, 18 May, Technical Report No. 4.

_____, Glaser, R., and Rees, E., (1981). “Expertise in problem Solving
‘ in Sternberg, (eds.), Advances in Psychology of Human Intelligence. Hillsdale, NJ: LEA.

_____, Glaser, R., and Farr, M. J. (1988). The Nature of Expertise. Hillsdale: LEA.

Chiesl, H. L., Splich, G. L., and Voss, J. F., (1979). “Acquisition of Domain Related Information in Relation to High and Low Domain Knowledge.” Journal of Verbal Learning and Verbal Behavior, Vol. 18, pp. 257-273.

Cho (2003). “The effectiveness of banner advertisements: involvement and click-through”. Journalism and Mass Communication Quarterly. Vol. 80, No.3, pp. 623-645.

Clancy, Kevin J., and Kweskin, David M. (1971), "TV Commercial Recall Correlates." Journal of Advertising Research, Vol. 11, No. 2, pp. 18-20.

Claxton, J. D., Fry, J. D., and Portis, B., (1974). “A Taxonomy of Pre-purchase Information Gathering Patterns.” Journal of Consumer Research, Vol. 1, pp. 35-42.

Cockroft, W. H., (1982). “Mathematics Counts.” London: Her Majesty’s Stationery Office.

Cohen, J. B., (1996). “Smokers' knowledge and understanding of advertised tar numbers: Health policy implications.” American Journal of Public Health, Vol. 86(1), pp. 18-24.

_____ and Basu (1987). “Alternative Models of Categorization: Toward a Contingent Processing Framework.” Journal of Consumer Research, Vol. 13, pp. 455-472.

Cole, W. G., and Loftus, E. F. (1979). “Incorporating Information in to the Memory.” American Journal of Psychology, Vol. 92, No. 3, pp. 413-425.

Collins, R. L., Taylor, S. E., Wood, J. V., and Thompson, S. C., (1988). “The Vividness Effect: Elusive or Illusory?” Journal of Experimental and Social Psychology, Vol. 24, pp. 1-18.

Consumer Information Remedies (1979). “United States Government Printing Office.” Washington, D.C.

Consumer Reports (1990), Vol. 55, No. 12, 1991 Buying Guide Issue.

Conzezio, J., and Haber, R. N., 1970. "Perception and memory Pictures: Single-Trial Learning of 2500 Visual Stimuli." Psychonomic Science, Vol. 19, No. 2, pp. 73-74.

Cornoldi, C., Rossana, B., Mazzoni, C. A., and Giulian, M., (1992). “How can a vivid image be described? Characteristics influencing vividness judgments and the relationship between vividness and memory.” Journal of Mental Imagery, Vol. 16(3-4), pp. 89-107.

Coyle, J.R., and Thorson, E., (2001). “The Effects of Progressibe Levels of Interactivity and Vividness in Web Marketing Sites.” Journal of Advertising, Vol. 30, No.3, pp. 65-77.

Cowburn, G, and Stockley, L., (2004). “Consumer understanding and use of nutrition labelling: a systematic review.” Article 1: British Heart Foundation Health Promotion Research Group, Department of Public Health, University of Oxford.

Craik, F. and R. Lockhart, (1972). "Levels of Processing: A Framework for Memory Research." Journal of Verbal Learning and Verbal Behavior, Vol. 11, pp. 671-684.

_____, and Tulving, E., (1975). “Depth of Processing and Retention of Words in Episodic Memory.” Journal of Experimental Psychology, Vol. 104, pp. 268-94.

_____, (1983). "On the Transfer of information from Temporary to Permanent Memory." Philosophical Transactions of the Royal Society of London, Series B, 302, pp. 341-359.

_____, and Lockhart, R. S., (1972). “A Framework for Memory Research.” Journal of Verbal Learning and Verbal Behavior, Vol. 1, No. 6, pp. 671-654.

Culross, R. R., & Davis, J. K., (1989). “Strategy and Development as a Function of the Amount of Relevant Information.” Psychological Reports, Vol. 65, pp. 787-791.

Dahlen, M., and BergenDahl, J. (2001).”Informing and Transforming on the Web: An Empirica Study of Response to Banner ads for Functional and Expressive Products.” International Journal of Advertising, Vol. 20, pp. 189-205.

Dahlen, M., Ekborn, Y., and Morner, N., (2000). “ To Click or not to Click: An Empirical Study of Response to Banner Ads for high and Low Involvement Products.” Consumption, Markets and Culture, Vol. 41, No.1, pp. 57-76.

Day, G. S., (1976). “Assessing the Effects of Information Disclosure Requirements “. Journal of Marketing, Vol. 40, pp. 42-52.

Daly, P. A., (1976). “The Response of Consumers to Nutritional Labeling.” Journal of Consumer Affairs, Vol. 10, pp. 170-178.

Debevec, K., and Romeo, J. B., (1992). “Self-referent processing in perceptions of verbal and visual commercial information. Journal of Consumer Psychology, Vol. 1, pp. 83-102.

Debont, C. J. P. M., and Shoorman, J. P. L., (1995). "The Effects of Product Expertise on Consumer Evaluations of New Product Concepts". Journal of Economic Psychology, Vol. 16, pp. 599-615.

Degroot, A., (1965). “Thought and Choice in Chess.” The Hague: Monton Books.

Dehaene, S., (1992). “Varieties of Numerical Abilities.” Cognition, Vol. 44, pp. 1-42.

_____, and Akhavein, R., (1995). “Attention, Automaticity, and Levels or Representations in Number Processing.” Journal of Experimental Psychology: General Vol.21, pp. 314-326.

_____, Bossini, S., and Giraux, P., (1993). “The Mental Representation of Parity and Number Magnitude.” Journal of Experimental Psychology: General, Vol. 122, pp. 371-396.

Dejong, T., and Ferguson-Hessler, M. G. M., (1986). “Cognitive Structure s of Good and Poor Novice Problem Solvers in Physics.” Journal of Educational Psychology, Vol. 78, pp. 279-288.

Deloche, G., and Seron, X., (1987). “Numerical Transcoding: A General Production Model.” In G., Deloche and X., Seron, (Eds.), Mathematical Disabilities: A Cognitive Neuropsychological Perspective (pp. 137-170). Hillsdale, NJ:Erlbaum.

Dhar, R., and Glazer, R., (1996). “Similarity in Context: Cognitive Representation and Violation of preference and Perceptual Invariance in Consumer Choice.” Organizational Behavior and Human Decision Processes, Vol. 67, pp. 280-293.

Droge, C., (1989). “Shaping the Route to Attitude Change: Central Versus Peripheral Processing Through Comparative and Non-Comparative Advertising.” Journal of Marketing Research, Vol. 26, pp. 193-204.

Duncan, E., Whitney, P., and Kunen, S., (1982). “Visual and Verbal Information in Children.” Child Development, Vol. 53, pp. 1215-1223.

Durand, R. M., and Lambert, Z., (1985). “Alienation and Criticisms.” Journal of Advertising, Vol. 14, No. 3, pp. 9-17.

Eagle, Morris, and Leiter, E., (1964). "Recall and Recognition in Intentional and Incidental Learning." Journal of Experimental Psychology, Vol. 68, No. 2, pp 58-63.

Eagly, A. H., and Chaiken, S., (1994). “The Psychology of Attitudes.” Fortworth: TX, Hartcourt Brace Jovonovich.

Edell, J. A., and Mitchell, A. A., (1978). “An Information Processing Approach to Cognitive Responses.” Research Frontiers in Marketing: Dialogues and Directions, S. C. Jain (ed.), Chicago: American Marketing Association.

_____, and Burke, M. C., (1986). “The Relative Impact of Prior Brand Attitude and Attitude Toward the Ad on Brand Attitude After Ad Exposure.” [Chapter] Olson, Jerry Corrie (Eds.), Sentis, Keith (Eds.), et al. In Advertising and Consumer Psychology, Vol. 3, pp. 93-107.

_____, and Staelin, R. J., (1983). “The Information Processing of Pictures in Print Ads.” Journal of Consumer Research, Vol. 10, pp. 45-61.

Egan, D. E., and Schwartz, B. J., (1979). “Chunking in Recall of Symbolic Drawings.” Memory and Cognition, Vol. 7, pp. 149-158.

Ehrenberg, A. S. C., (1974). "Repetitive Advertising and the Consumer." Journal of Advertising Research, Vol. 14, No. 2, pp. 25-34.

Einhorn, H. J., (1974). “Expert Judgment: Some Necessary Conditions and Examples.” Journal of Applied Psychology, Vol. 59, pp. 562-571.

_____ and Hogarth, R. M., (1975). “Unit Weighing Schemas for Decision Making.” Organization Behavior and Human Performance, Vol. 13, pp. 171-192.

Elmer-Dewitt, P., (1986). “Extra Years for Extra Effort.” Time, Vol. 127, pp. 66.

Elstein, A. S., Shulman, A. S., and Sprafka, S. A., (1978). Medical Problem Solving: An Analysis of Clinical Reasoning. Cambridge, MA: Harvard University Press.

Engel, J. F., Blackwell, R. D., and Miniard, P. W. (1993). Consumer Behavior- 7th Edition. The Dryden Press, Chicago, pp. 298-316.

Erev, I., and Cohen, B. L., (1990). "Verbal Versus Numerical Probabilities: Efficiency, biases, and the Preference Paradox." Organizational Behavior and Human Decision Processes, Vol. 45, No. 1, (Feb), pp. 1-18.

_____, Wallsten, T. S., and Neal, M. M., (1991). “Vagueness, Ambiguity, and the Cost of Mutual Understanding.” Psychological Science, Vol. 2, pp. 321-324.

Ericsson, K. A., Chase, W. G., and Faloon, S., (1980). "Acquisition of a Memory Skill." Science, Vol. 208, pp. 1181-1182.

_____, (1988). “Analysis of Memory Performance in Terms of Memory Skill.” In R. J. Sternberg (Eds), Advances in Psychology of Human Intelligence, Vol. 5, pp. 137-179, Hillsdale: LEA.

_____ and Polson, D. G., (1988). “A Cognitive Analysis of Exceptional Memory for Restaurant Orders.” In M. T. H. Chi, R. Glaser, and M. J. Farr (Eds.), The Nature of Expertise, pp. 23-70. Hillsdale, NJ: LEA.

FDA, (1990). Food Labeling: Mandatory Status of Nutrition Labeling and Nutrient Content Revision, Food and Drug Administration, Fed. Reg. 55: 29476.

_____, (1990a). Food Labeling: Reference Daily Intakes and Daily Reference Values, Food and Drug Administration, Fed. Reg. 55: 294676

Festinger, L. and W. Macoby, J., (1964). "On Resistance to Persuasive Communications." Journal of Abnormal and Social Psychology, Vol. 68, November, pp. 359-66.

Fishbein, M., 1963. “An Investigation of the Relationship Between Beliefs About an Object and the Attitude Toward the Object.” Human Relations, Vol. 16, pp. 233-40.

_____, and Ajzen, I., 1975. “Belief, Attitude, Intention, and Behavior: An Introduction to theory and Research.” Reading, Massachusetts: Addison-Wesley.

Fiske, S. T. and Kinder, D. R., (1981). "Involvement, Expertise and Schema Use: Evidence from Political Cognition", In Personality, Cognition and Social Interaction, Nancy Cantor and John F. Kihistrom (Eds), Hillsdale, NJ: LEA.

_____, Kinder, D. R., and Larter, W. M., (1983). “The Novice and the expert: Knowledge Based Strategies in Political Cognition.” Journal of Experimental Social Psychology, Vol. 19, pp. 381-400.

_____, and Taylor, S. E., (1984). “Social Cognition.” Reading, MA: Addison-Wesley.

Flynn, L. R., and Goldsmith, R. E., (1993). “Models of Enduring Involvement and Opinion Leadership.” Proceedings, Association of Marketing Theory and Practice, pp. 378-386.

Fogarty, D. J., (1995). “The Impact of Vivid Advertising on the Persuasiveness of Television and Print Ads.” Unpublished paper, Southern Connecticut University, CT.

Folkes, V. S., (1988). “The Availability Heuristic and Perceived Risk.” Journal of Consumer Research, Vol. 15, pp. 13-23.

Fountas, A., (1985). "Commercial Audience: Measuring what we're buying." Marketing and Media Decisions, January, pp. 75-76.

Francis, S. L., and Davis, L. L., (1989). “Effect of Consumer Socialization on Clothing Satisfaction.” Journal of Consumer Satisfaction, Dissatisfaction and Complaining Behavior, Vol. 2, pp. 63-66

Frandsen, K. D., (1963). “Effects of Threat Appeals and Media of Transmission.” Speech Monograph, Vol. 30, pp. 101-104.

Frey, K. P., and Eagly, A. H., (1993). “Vividness can undermine the Persuasiveness of messages.” Journal of Personality and Social Psychology, Vol. 65.

Funkhouser, G. R., and Macoby, N., (1971). “Communicating Specialized Science Information to a Lay Audience.” Journal of Communication, Vol. 21, pp. 58-71.

Futures, M., 1985. "Attitudes towards Ads: Some change their minds. Others change their habits." Marketing Media Decisions, pp. 8.

Gallistel, C. R., and Gelman, R., (1978). The Childs Understanding of Number. Cambridge, Vol. 13, pp. 343-359.

Gardner, M. P., (1983). "Criteria Recalled and Those Used For Brand Evaluations". Journal of Consumer Research, December.

Gaultney, J. F., Bjorklund, D. F., and Schnieder, W., (1992). " The Role of Children's Expertise in a Strategic Memory Task." Contemporary Educational Psychology, Vol. 17, pp. 244-257.

Gentner, D. R., (1988). "Expertise in Typewriting". In J. H. Chi, R. Glaser and M. J. Farr, (eds.), The Nature of Expertise, Hillsdale, LEA, pp. 1-21.

Gibson, E. J., (1969). "Principles of Perceptual Learning and Development." New York: Prentice Hall.

Gibson, L. D., (1983). " Not Recall." Journal of Advertising Research 23, Vol. 1, pp. 39-46.

Gilbert, K., and Schleuder, J., (1990). "Effects of Color and Complexity Still Photographs on Mental Effort and Memory." Journalism Quarterly, Vol. 67, No. 4, pp. 749-756.

Gilovich, T., (1981). "Seeing the past in the Present: The effect of Associations to Familiar Events on Judgments and Decisions." Journal of Personality and Social Psychology, Vol. , pp. 797-808.

Ginosar, Z., and Trope, Y., (1980). "The Effects of Base Rates and Individuating Information on Judgments about Another Person." Journal of Experimental Social Psychology, Vol. 16, pp. 228-242.

Goldberg, L. R., (1968). "Simple Models or Simple Processes? Some Research on Clinical Judgments." American Psychologist, Vol. 23, pp. 483-496.

Gorn, G. J., Chattopadhyay, A., Yi, T., and Dahl, Darren, W. (1996). "Effects of Color as an Executional Cue in Advertising: They are in the Shade." Unpublished Manuscript-Working Paper Series 96.078, pp. 1-34.

Gottlieb, D. E., Taylor, S. E., and Ruderman, A., (1977). "Cognitive Bases of Children's Moral Judgments." Developmental Psychology, Vol. 13, pp. 547-566.

Graefe, T. M., and Watkins, M. J., (1980). "Picture Rehearsal: An Effect of Selectively Attending to Pictures no Longer in View." Journal of Experimental Psychology: Human Learning and Memory, Vol. 6, pp. 156-162.

Graeffe, T. R., (1995). "Product Comprehension and Promotional Strategies." Journal of Consumer Marketing, Vol. 12, pp. 28-39.

Graeffe, T. R., and Olson, J. C., (1993). "Consumer Inference as Part of Product Comprehension, Advances in Consumer Research, ACR, Vol. 21, pp 201-207.

Grass, R. C., and Wallace, H., (1970). "Satiation Effects of TV Commercials". Journal of Advertising Research, Vol. 9, September, pp. 3-8.

Green, J., (1980). “Trends in the Theory of Knowledge for Problem Solving.” In D. Tuma & R. Reif (eds.) Problem Solving and Education: Issues in Teaching and Research. Hillsdale, NJ: LEA.

Green, P. E., Wind, Y., (1975). “New Way to Measure Consumers’ Judgments.” Harvard Business Review, (July-August), pp. 107-117.

Greenwald, A. G., and Leavitt, C., (1984). “Audience Involvement in Advertising: Four Levels.” Journal of Consumer Research, Vol. 11, pp. 581-592.

Greenwald, A.G., (1968). “Cognitive Learning, Cognitive Responses to Persuasion and Attitude Change.” In A. G. Greenwald, T. C. Brock & T. M. Ostrom (eds.), Psychological Foundations of Attitude, pp. 147-70. New York: Academic Press.

Haber, 1970. "How we remember what we see." Scientific American, May, pp. 104-112.

Haller, T. F., (1974). “What Students Think of Advertising.” Journal of Advertising Research, Vol. 14, pp. 33-38.

Hamill, R., Wilson, T. D., and Nisbett, R. E., (1980). “Insensitivity to Sample Bias: Generalizing From Atypical Cases.” Journal of Personality and Social Psychology, Vol. 39, pp. 578-589.

Hansen, F., (1981), "Hemispheral Lateralization: Implications for Understanding Consumer Behavior." Journal of Consumer Research, Vol. 8, (June), pp. 23-36.

Harris, R. J., R. E., Sturm, M. L., Klassen, and J. I. Bechtold (1986). “Language in Advertising: A Psycholinguistic Approach”. Current Issues and Research in Advertising Vol. 1, 1, No. 1, pp. 1-26.

Hastie, R., (1986). "Consumers Memory for Product Knowledge." Advances in Consumer Research (ACR), Vol. 9, pp. 72-73.

_____ and Parks, B., (1986). “The Relationship Between Memory and Judgment Depends on Whether the Judgment Task is Memory-Base or On-Line”. Psychological Review, Vol. 93, pp. 258-268.

Hayes-Roth, B., (1977). "Evaluation of Cognitive Structures and Processes." Psychological Review, Vol. 84, pp. 260-278.

Heath, T. B., McCarthy, M. S., and Mothersbough, D. L., (1994). “Spokesperson Fame and Vividness Effects in Context of Issue Relevant Thinking.” Journal of Consumer Research, Vol. 20, pp. 520-534.

Hecht, H., and Proffitt, D. R., (1995). “The Price of Knowledge: Effects of Experience on the Water Level Task”. Psychological Science, Vol. 6, No. 2, pp. 90-95.

Heilman, C. M., Bowman, D., and Wright, G. P., (2000). “Evolution of Brand Preferences and Choice Behaviors of Consumers New to the Market.” Journal of Marketing Research, Vol.37, pp. 139-155.

Heimbach, J. T. and Stocks, R. C., (1980). "FDA 1978 consumer Food labeling Survey." Washington D. C., Department of Health, Education and Welfare.

Henik, A., and Tzelgov, J., (1982). “Is Three Greater Than Five? The Relation Between Physical and Semantic Size in Comparison Tasks. Memory and Cognition, Vol. 10, pp. 389-395.

Herr, P. M., (1989). “Priming Price: Prior Knowledge and Context Effects”, Journal of Consumer Research, Vol. 16, pp 67-75.

Herman, R. O., and Warland, R., H., (1990). “Consumers’ Use of Recommended Food Buying Practices.” Journal of Consumer Affairs, Vol. 24, pp. 307-325.

Higgins, E, T., and King, G., (1981). “ Accessibility of Social Constructs: Information Processing Consequences of individuals and contextual Variability.” In (Eds.) Personality and Behavior.

Higgins, E. T., and Lurie, L., (1983). “Context, Categorization, and Recall: The Change of Standard Effect.” Cognitive Psychology, Vol. 15, pp. 525-547.

Hinrichs, J. R., Berie, J. L., and Mosell, M. K., (1982). “Place Information in Multi-digit Number Comparison.” Memory and Cognition, Vol. 10, pp. 487-495.

_____, Yurko, D. S., and Hu, J. M., (1981). “Two Digit Number Comparison: Use of Place Information.” Journal of Experimental Psychology: Human Perception and Performance, Vol. 7, pp. 890-901.

Holbrook, Morris B., 1978. “How Probable is Probable?”: A Numerical Translation of Verbal Probability Expressions. Journal of Forecasting, Vol. 1, pp. 25 -269.

Holbrook, Morris B., 1978. "Beyond Attitude Structure: Toward the Informational Determinants of Attitude." Journal of Marketing Research, Vol. 15, pp. 545 - 556.

Holbrook, M. B., (1981). “Some Further Dimensions of Psycholinguistics, Imagery, and Consumer Response”. In Advances in Consumer Research (ACR), Vol. 9, A. A. Mitchell (eds.).

Horner, P., (1990). “The Mediating Role of Attitude Toward the Informational Determinants of Attitude.” Journal of Marketing Research, Vol.15 (November), pp. 78-86.
Horton, D. L., and Mills, C. B., 1984. “ Human Learning and Memory.” Annual Review of Psychology, Vol. 35, pp. 361-394.

Howard, J. A., and Sheth, J. N., (1969). The Theory of Buyer Behavior. John Wiley and Sons: New York, pp. 54.

Huang, L., (1998). “The Impact of Information Processing Goals and Expertise on Candidate Information Search.” Dissertation Abstract International, Vol. A59/02.

Huang, X., Leong, E.K., and Stanners; P. (1998). “Comparing the Effectiveness of the Web Site with Traditional Media.” Journal of Advertising Research, Vol. 38.

Huber, Oswald, 1980. “The Influence of Some Task Variables on Cognitive operations in an Information Processing Decision Model.” Acta Psychologica, Vol. 45, pp. 187-96.

Huffman, C. and Houston, M. J., (1993). "Goal Oriented Experiences and Development of Knowledge." Journal of Consumer Research, Vol. 20, pp. 190-207.

Hyde, T. S., and Jenkins, J. J., (1973, “Recall for Words as a function of semantic, Graphic and Syntactic Orienting Tasks.” Journal of Verbal Learning and Verbal Behavior, Vol. 12, pp. 471-480.

Hyde, T. S., and Jenkins, J. J., (1973, “Recall for Words as a function of semantic, Graphic and Syntactic Orienting Tasks.” Journal of Verbal Learning and Verbal Behavior, Vol. 12, pp. 471-480.

Indow, T. and K. Togano, (1979). “On retrieving Sequence from LTM.” Psychological Review, Vol. 77, pp. 317-33.

Ippolito, P. M., and Mathios, A. D., (1994). “New Food Labeling Regulations and Flow of Nutrition Information to Consumers.” Journal of Public Policy Marketing, Vol. 12, No. 2, pp. 188-205.

Jacoby, J., (1977). “The Emerging Behavioral Approach Technology in Consumer Decision Making Research.” In Advances in Consumer Research (eds.) Vol. 4, pp. 263-265.

Jacoby, J., Speller, D. E., and Kohn, V., (1974). “Brand Choice Behavior as a Function of Information Load.” Journal of Marketing Research, Vol. 11, pp. 63-69.

Jacoby, J., Troutman, J., Kuss, A., and Mazursky, D., (1986). “Experience and Expertise in Complex Decision-Making.” In Proceedings of the 17th Annual Conference, Advances in Consumer Research, (ACR), pp. 469-472.

Jaffe-Katz, A., Budescu, D., and Wallsten, T. S., (1989). “Timed Magnitude Comparisons of Numerical and Non-Numerical Uncertainty”. Memory and Cognition, Vol. 17, No. 3, pp. 249-264.

Johnson, J. D., (1979). Advertising Today. Chicago: Science Research Associates.

Johnson, P. E., Duran, A. S., Hassebrock, F., Moller, T., Prietula, M., Feltovich, P. J., and Swanson, D. B., (1981). “Expertise and Error in Diagnostic Reasoning.” Cognitive Science, Vol. 5, pp. 235-283.

Johnson, B. T., and Eagly, A. H. “Effects of Involvement on Persuasion: A Meta Analysis. Psychological Bulletin, Vol. 106, No. 2, pp. 290-314.

Johnson, M. D. and Fornell, C., (1987). “The Nature and Methodological Implications of the Cognitive Representation of Products.” Journal of Consumer Research, Vol. 14, pp. 214-228.

Johnson, E. J., and Russo, E. J., (1980). "Product Familiarity and Learning New Information." Advances in Consumer Research, ACR, Vol. 8, pp. 151-155.

Kaatz, Ron, 1985, “Feedback '85.” Marketing and Media Decisions, November, pp. 88-89.

Kahneman, D., and Tversky, A., (1982). “Judgment Under Uncertainty: Heuristics and Biases.” New York: Cambridge University Press.

Kanwar, R., Olson, J. C., and Sims, L. S., (1981). “Toward Conceptualizing and Measuring Cognitive Structures.” In Advances in Consumer Research, Vol. 8, ed. Kent B. Monroe, Ann Arbor, MI: Association for Consumer Research, pp. 122-127.

Kaplan, B. M., 1983, Television. "Points to Clutter." Marketing and Media Decisions, October, pp 88-90.

Karen V. Fernandez and Dennis L. Rosen (2000). ”Effectiveness of Information and Color in Yellow Pages Advertisement.” Journal of Advertising, Vol. 290, No.2, Summer.

Keating and Latane (1976). “Politicians on TV: The Image is the Message.” Journal of Social Issues, Vol. 32, pp. 116-132.

Keller, K. L., (1987). "Memory Factors in Advertising: The effect of Advertising Retrieval Cues on Brand Evaluations." Journal of Consumer Research, Vol. 14, pp. 316-31.

_____, and Staelin, R., (1987). “Effects of Quality and Quantity of Information on Decision Effectiveness.” Journal of Consumer Research, Vol. 14, pp. 200-213.

Kelley, C.A., (1989). “A Study of Selected Issues in Vividness Research: The Role of Attention and Elaboration Enhancing Cues.” In Advances in Consumer Research, ACR, Vol. 16, T. Srull (eds.).

Kelley, C. A., Gaidis, W. C., and Reingen, P. H., (1989). “The Use of Vivid Stimuli to Enhance Comprehension of Content of Product Warning Messages.” Journal of Consumer Affairs, Vol. 23, pp. 243-266.

Kent, R.J., and Kellaris, J.J., (2001). “Competitive Interference Effects in Memory for Advertising: Are Familiar Brands Exempt?” Journal of Marketing Communication, Vol. 7, No.3, pp. 159-169.

Keppel, G., (1982). Design and Analysis: A Researchers Handbook (2nd ed.), Englewood Cliffs, NJ: Prentice Hall Inc.

Kerlinger, F., (1986). “Foundations of Behavioral Research,” (3rd ed.), Holt, Rhinehart and Winston.

Key, W., (1973). "Subliminal Seduction." New York: Signet Books.

Kieras, D., (1978). “Beyond Pictures and Words: Alternative Information Processing Models for Imagery Effects in Verbal Memory.” Psychological Bulletin, Vol. 85, No. 3, pp. 532-554.

Kimble, C. E., and Zehr, H. D., (1982). “Self-consciousness, Information Load, Self-presentation, and Memory in Social Situation.” The Journal of Social Psychology, Vol. 118, pp. 39-46.

King, M. F., and Balasubramanian, S. K., (1994). "The Effects of Expertise, End Goal and Product Type on Adoption of Preference Formation Strategy." Journal of Academy of Marketing Science, Vol. 22, pp. 146-159.

Kintsch, W., 1970. “Models for Free Recall and Recognition,” in Models of Human Memory, ed., D.A. Norman (New York: Academic Press).

_____, (1974). The Representation of Meaning in Memory. Hillsdale, NJ: LEA.

_____ and Van Dijk, T. A., 1978. "Towards a Model of Discourse Comprehension and Production." Psychological Review, Vol. 85, pp. 363-94.

Kisielieus, J., and Strenthal, B., (1984). "Detecting and Explaining Vividness effects in Attitudinal Judgments." Journal of Marketing Research, Vol. 21, pp. 54-64.

_____, and Roedder, D. L., (1982). “The Effects of Imagery on Attitude Behavior Consistency.” Advances in Consumer Behavior, Vol. 10, pp. 72-74.

Klare, G. R., (1963). The Measurement of Readability. Ames: Iowa State University Press.

Kosslyn, S. M., (1973). “Information Representation in Visual Images.” Cognitive Psychology, Vol. 7, pp. 341-470.

Kotler, P., (1988). “Marketing Management: Analysis, Planning, Implementation, and Control.” Englewood Cliffs, NJ: Prentice Hall.

Krugman, H. E., (2003). “Memory Without Recall, Exposure Without Perception.” Journal of Advertising Rsearch, Vol. 40, pp. 49-54.

Krugman, H. E., (1983). “TV Program Interest and Commercial Interruption.” Journal of Advertising Research, Vol. 23, No., pp. 21-23.

_____, (1965). “The Impact of Television Advertising: Learning Without Involvement.” Public Opinion Quarterly 29, pp. 349-356.

_____, (1977). “Memory Without Recall, Exposure Without Perception.” Journal of Advertising Research, Vol. 4, pp. 7-12.

_____, (1986). “Low Recall and High Recognition of Advertising.” Journal of Advertising Research, Vol. 26, pp. 79-86.

_____, (1968). “Processes Underlying Exposure to Advertising.” American Psychologist, Vol. 23, No. 4, pp. 245-253.

Larkin, J. H., (1979). “Processing Information for Effective Problem Solving.” Engineering Education, Vol. 72, pp. 285-288.

_____, McDermott, J., Simon, D. P., and Simon, H. A., (1980). “Expert and Novice Performance in Solving Physics Problems.” Science, Vol. 208, pp. 1335-1342.

Laura A. Peracchio and Joan Myers-Levy, (1997). "Evaluating Persuasion-Enhancing Techniques from a Resource-Matching Perspective. Journal of Consumer Research, Vol. 24, September.

Lavidge, Robert J. and Steiner, Gary A., (1961). "A Model for Predictive Measurements of Advertising Effectiveness." Journal of Marketing, Vol. 25, pp. 59-62.

Lederer, Edith M. (1986), Associate Press, "Camera Captures Surprises While Peeking at TV Viewers." Wall Street Journal. 22 May, sec. c, pp. 16.

Lee, S., and Barnes, J. H., (1990). “Using Color Preferences in Magazine Advertising”. Journal of Advertising Research, Vol. 29, No. 6, pp. 25-30.

Lee, D. H., and Olshavsky, R. W., (1994). "Toward a Predictive Model of the Consumer Inference Process: The Role of Expertise." Psychology and Marketing, Vol. 11, pp. 109-123.

Lee, H., and Lee, J., (2001). “Advertising’s Longitudinal Effects on Brand Attitudes: The Moderating Roles of Evaluation Goals and Attitude Confidence.” Advances in Consumer Research, Vol. 29, pp.173-179.

Leigh and C. R. Martin. (Ann Arbor, Michigan: Division of Research, University of Michigan), Manuscript, pp. 135-146.

Leung, M., Low, R., and Sweller, J., (1997). “Learning form Equations or Words”. Instructional Science, Vol. 25, No. 1, pp. 37-70.

Levy, A. S., Fein, S. B., and Schucker, R. E., (1991). “Nutrition Labeling Formats: Performance and Preference.” Food Technology, July, pp. 116-121.

_____, Mathews, O., Stephenson, M., Tenney, J., and Schuker, R. E., (1985). “The Impact of a Nutrition Information Program on Food Purchases.” Journal of Public Policy and Marketing, Vol. 4, pp. 1-13.

Li., H., and Bukovac, (1999).Cognitive impact of banner ad characteristics: an experimental study. Journalism and Mass Communication Quarterly. vol.76, No.2, pp. 341-353.

Li, H., Daugherty, T., and Biocca, F., (2002). “Impact of 3-D Advertising on Product Knowledge, Brand Attitude, and Purchase Intention: The Mediating Role of Presence.” Journal of Advertising, Vol. 31, No. 3, pp. 43-56.

Libby, R., and Frederick, D. M., (1989). Expertise and the Ability to Explain Audit Findings. University of Michigan – Cognitive Science and Intelligence Division, Technical Report No. 21.

Lindberg, E. Garling, T., and Montgomery, A., (1991). “Prediction of Preferences for and Choice Between Verbally and Numerically described Alternatives.” Acta Psychologica, Vol. 76, pp. 165-176.

Lippman, M., (1974). “Enactive Imagery in Paired-Associate Learning.” Memory and Cognition, Vol. 2, pp. 385-390.

Litchtenstein, S., and Fischhoff, B., (1977). “Do Those Who Know More Also Know More about How Much They Know.” Organizational Behavior and Human Performance, Vol. 20, pp 159-183.

_____, Slovic, P., Fischhoff, B., Layman, M., and Combs, B., (1978). “Judged Frequency of Lethal Events.” Journal of Experiemntal Psychology: Human Learning and Memory, Vol. 4, pp. 551-578.

_____ and Srull, T. K., (1985). “Conceptual and Methodological Issues in Examining the Relationship Between Consumer Memory and Judgment.” In L. F. Alwitt and A. A., Mitchell (Eds.), Psychological Processes and Advertising Effects, Vol. 1, pp. 45-63. Hillsdale, NJ: LEA.

_____ and Newman, J. R., (1967). “Empirical Scaling of Common Verbal Phrases Associated with Numerical Probabilities.” Psychonomic Science, Vol. 19, pp. 563-564.

Loftus, E. F., (1979). “Reaction to Blatantly Contradictory Information.” Memory and Cognition, Vol. 7, pp. 368-374.

Loftus, G. R., (1972). “ Eye Fixation and Recognition Memory for Pictures.” Cognitive Psychology. Vol. 3, pp. 525-551.

Loftus, G. R. and Kallman, (1979). “Encoding and Use of Detail Information in Picture Recognition.” Journal of Experimental Psychology: Human Learning and Memory, Vol. 5, pp. 197-211.

Lopes, L., and Ekberg, D. H., (1980). “Test of an Ordering Hypothesis in Decision Making.” Acta Psychologica, Vol. 45, pp. 161-167.

Luskin, J., (1976). "The Manufacturers Contribution to Appliance Retailing." Appliance Dealers Conference, NY: November-Winters Conference.

Lutz, K. A., and Lutz, R. J., (1977). “ Effects of Interactive Imagery on Learning: An Application to Advertising.” Journal of Applied Psychology, Vol. 62, pp. 493-498.

Lutz, R. J., (1975). “Changing Brand Attitude through Modification of Cognitive Structures.” Journal of Consumer Research, Vol. 1, pp. 49-59.

Lynch, J. G., and Srull, T. K., (1982). “Memory and Attentional Factors in Consumer Choice: Concepts and Research Methods”. Journal of Consumer Research, Vol. 9, pp. 18-37.

Machleit, K.A., and Wilson, R.D., (1988).“Emotional Feelings and Attitude toward the Advertisement: The Roles of Brand Familiarity and Repetition.” Journal of Advertising, Vol. 17, No.3, pp.27-35.

MacInnis, D. J., and Jaworski, B. J., (1989). “Information Processing from Advertisements: Toward an Integrated Framework.” Journal of Marketing, Vol. 53, pp. 1-23.

Mackenzie, S., Lutz, R. J., and Belch, G., (1986). “The Role of Attitude Toward the Ad as a Mediator of Advertising Effectiveness: A Test of Competing Explanation”. Journal of Marketing Research, Vol. 23, pp. 130-143.

_____, and Spreng, R. A., (1992). “How Does Motivation Moderate the Impact of Central and Peripheral Processing on Brand Attitudes and Intentions?” Journal of Consumer Research, Vol. 18 (March), pp. 519-529.

_____, (1986). “The Role of Attention in Mediating the Effects of Advertising on Attribute Importance.” Journal of Consumer Behavior, Vol. 13, pp. 174-195.

_____, and Lutz, R., (1989). “An Empirical Examination of the Structural Antecedents of $_{Aad}$ in an Ad Pre-testing Context.” Journal of Marketing, Vol. 53, pp. 48-65.

Maheshwaran, D., and Sternthal, B., (1990). “The Effects of Knowledge, Motivation, and Type of Message on Ad Processing and Product Judgments”. Journal of Consumer Research, Vol. 17, pp. 66-73.

Machleit, K. A., Allen, C. T., and Madden, T. J., (1993). “The Mature Brand and Brand Interest: An Alternative Consequence of Ad-Evoked Affect”. Journal of Marketing, Vol. 57, pp. 72-82.’

Machleit, K. A., and Wilson, R. D., (1988). “Emotional Feelings and Attitude Toward the Ad: The Roles of Brand Familiarity and Repetition”. Journal of Advertising, Vol. 17, No. 3, pp.27-35

MacInnis, D. J., Moorman, C., and Jaworski, B. J., (1990). Enhancing Consumers Motivation, Opportunity and Ability to Process Brand Information from Ads: Conceptual Framework and Field Research Agenda. Department of Marketing, Manuscript, The University of Arizona.

Madden, T.J., Allen, C.T. and Twible, J.L. (1988). “Attitude toward the ad: an assessment of diverse measurement indices under different processing ‘sets”. Journal of Marketing Research, Vol. 25, pp.242–52.

Manis, M., Dovalina, I., Avis, N., and Cordoze, S., (1980). “ Base Rate Can Affect Individual Prediction.” Journal of Personality and Social Psychology, Vol. 38, pp. 231- 248.

Marks, C. J., and Olson, J. C., (1981). “Toward a Cognitive Structure Conceptualization of Product Familiarity” in Advances in Consumer Research (ed.) Kent Monroe, Ann Arbor, MI, ACR, Vol. 18, pp. 145-150.

Markus, H., Moreland, R. L., and Smith, J., (1985). “Role of the Self-Concept in the Perception of others.” Journal of Personality and Social Psychology, Vol. 49, pp. 1494-1512.

Marquez, F. T., (1977). “Advertising Content: Persuasion, Information or Intimidation?.” Journalism Quarterly, Vol. 54, pp. 482-491.

Mason, K., and Bequette, J., (1998). “Product Experience and Consumer Attribute Inference Accuracy.” Journal of Consumer Marketing, Vol. 15, pp. 343-357.

Mattei, Irene, 1984, Letter, Advertising Age, 26 November, pp. 20.

Mayer, R. E., (1983). Thinking, Problem Solving and Cognition. New York: Freeman Press.

Mazis, Michael, B., and Atkinson, Janice, E., 1976. “An Experimental Evaluation of Proposed Corrective Advertising.” Journal of Marketing Research, Vol. 13 (May).

McArthur, L.Z., (1980). "What Grabs You? The Role of Attention in Impression Formation and Causal Attribution. In E. T. Higgins, C. P. Herman and M. P. Zanna (eds.), Social Cognition: The Ontario Symposium, Hillsdale, NJ: LEA.

McCloskey, M., (1992). “Cognitive Mechanisms in Numerical Processing: Evidence From Acquired Dyscalculia.” Cognition, Vol. 44, pp. 107-157.

McGrath, J. E., (1982). “Dilematics? The Study of Research Choices and Dilemmas.” In J. E. McGrath, J. Martin and R. A. Kulka (eds.) Judgment Calls in Research, Newbury Park, CA: Sage Publications, pp. 69-102.

McGraw, K. M. and Pinney, N., (1990). “The effects of general and domain-specific expertise on political memory and judgment.” Social Cognition. Vol. 8, No. 1, pp. 9-30.

McLaughlin, B., (1965). “Intentional and Incidental Learning in Human Subjects: The Role of Instructions to Learn and Motivation”. Psychological Bulletin, 63, pp. 359-76.

Medin, D. L., and Smith, E. E., (1981). “Strategies and Classification Learning.” Journal of Experimental Psychology: Human Learning and Memory, Vol. 7, pp. 241-253.

Menon, G and Raghubir, P., (2003). “Ease of Retrieval as an Automatic Input in Judgments: A Mere Accessibility Framework?” Journal of Consumer Research, Vol. 30, pp. 230-243.

Meyers-Levy, J. and Peracchio, L. A., (1996). “Moderators of the Impact of Self-Reference or Persuasion.” Journal of Consumer Research, Vol. 22, pp. 408-423.

_____, and Peracchio, L. A., (1995). “How the Use of Color in Advertising Affects Attitude: The Influence of Processing Motivation and Cognitive Demands.” Journal of Consumer Research, Vol. 22, pp. 121-138.

Mick, D. G., (1992). "Levels of Subjective Comprehension in Advertising Processing in Their Relations to and Perceptions, Attitudes and Memory." Journal of Consumer Research, Vol. 18, pp. 411-424.

Middlestadt, S. E., (1989). “The Effect of Background and Ambient Color on Product Attitudes and Beliefs.” Advances in Consumer Research, Vol. 17, pp. 244-249.

Miguel, Kazan-Saad, (1986). “Tactile-Kinesthetic and verbal Information in STM.” Perceptual Motor Skills, Vol. 63, pp. 547-552.

Miller, J. A., (1978). “Labeling Research: The State of the Art.” Report No. 78-115. Cambridge, MA: Marketing Science Institute, pp. 21-22.

Miller, D. W., and Marks, L., (1997). “The Effects of Imagery-Evoking Radio Advertising Strategies on Affective Responses.” Psychology and Marketing, Vol. 14, pp. 337-360.

Miniard, P. W., Bhatla, S., and Rose, R. L., (1990). “On the formation and relationship of ad and brand attitudes: An experimental and causal analysis.” Journal of Marketing Research, Vol. 27, No. 3, pp. 290-303.

Mishra, S., Umesh, U. N., & Stem, E. D., (1993). “Antecedents of the Attraction Effect: An Information Processing Approach.” Journal of Marketing Research, Vol. 30, pp. 331-349.

Mitchell, A. A. and J. C. Olson, (1981). “Are Product Attribute beliefs the only mediator of Advertising Effects on Brand Attitudes?” Journal of Marketing Research, Vol. 18, pp. 381-332.

_____, Henry, C. and Chi, M., (1983). “Expertise and Novices: Differences in the Content and Organization of Knowledge about Motorcycles.” In Advances in Consumer Research, A. Tybout and R. Baggozzi, ACR.

_____, (1983). “The Effects of Visual and Emotional Advertising: An Information Processing Approach.” In L. Percy and A.G. Woodside (Eds.) Advertising and Consumer Psychology, MA: Lexington.

_____, (1993). “Attitude Toward the Advertisement Effects Over Time and in Attitude Change Situations,” in Advertising Exposure, Memory, and Choice, ed. Andrew A. Mitchell, Hillsdale, NJ: LEA Inc., pp. 209-238.

Mittal, B., (1990). “The relative roles of brand beliefs and attitude toward the ad as mediators of brand attitude: A second look.” Journal of Marketing Research, Vol. 27, No. 2, pp. 209-219.

Monroe, K. B., and Lee, A. Y., (1999). “Remembering Versus Knowing: Issues in Buyers’ Processing of Price Information.” Journal of the Academy of Marketing Science, Vol. 27, No. 2, pp. 207-225.

Moore, D. L., and Hutchinson, W. J., (1983). “The Effects of Ad Effect on Advertising Effectiveness.” In Advances in Consumer Research, R. P. Bagozzi & Tybout, A. M., Vol. 10, Ann-Arbor: Association of Consumer Research.

Moore, W. L., and Lehman, D. R., (1989). “Individual Differences in Search Behavior for a Non-Durable.” Journal of Consumer Research, Vol. 7, pp. 296-307.

Moorman, C., (1990). “The Effects of Stimulus and Consumer Characteristics on the Utilization of Nutrition Information.” Journal of Consumer Research, Vol.17, (December), pp. 362-74.

Moyer, R. S. and Landauer, J. K., (1973). “Determinants of Reaction Time for Digit Inequality Judgments.” Bulletin of the Psychonomic Society, Vol. 1, pp. 167-168.

Muehling, D. D., (1987). “An investigation of Factors Underlying Attitude-Toward-Advertising-in-General.” Journal of Advertising, Vol. 16, No. 1, pp. 32-40.

_____, and Laczniak, R., (1988). “Adevrtising’s Immediate and Delayed Influence on Brand Attitudes: Considerations across Message-Involvement Levels.” 5Journal of Advertising, Vol. 17, Iss.4, pp. 23-34.

Muir-Broaddus, J. E., (1998). “Demonstrating the Effects of Knowledge on the Rate of Retrieval.” Teaching of Psychology, Vol. 25, pp. 119-120.

Muller, T. E., (1985). “Structural Information Factors Which Stimulate the Use of Nutrition Information: Field Experiment.” Journal of Marketing Research, Vol. 22, pp. 30-142.

Murphy, G., and Smith, E., (1982). “Basic Level Superiority in Picture Categorization.” Journal of Verbal Learning and Verbal Behavior, Vol. 21, pp. 1-20.

Murphy, J., Cunningham, I., and Wilcox, G. B., (1979). "The Impact of Programs Environment on Recall of Humorous Television Commercials." Journal of Advertising, Vol. 8, pp. 17-21.

Narasimhan, S., and Ratchford, B., (1991). “An Empirical Test of a Model of External Search for Automobiles.” Journal of Consumer Research, Vol. 18, pp. 233-242.

Nelson, D. L., (1979). “Remembering Pictures and Words: Appearance, Significance, and Name,” in L. Cermark and F. I. M. Craik (eds.), Levels of Processing in Human Memory, Hillsdale, NJ: Erlbaum.

_____, Reed, V. S., and McEvoy, C. L., (1977). “Learning to Order Pictures and Words: A Model of Sensory and Semantic Encoding.” Journal of Experimental Psychology: Human Learning and Memory, Vol. 3, pp. 485-497.

Newman, J. W., and Staelin, R., (1972). “Pre-Purchase Information Seeking for New Cars and Major Household Appliances.” Journal of Marketing Research, Vol. 9, pp. 249-257.

Nickerson, R. S., (1968), "A Note on long -term Recognition Memory for Pictorial Material." Psychonomic science, Vol. 11, pp. 58.

Nisbett, R. E., and Borgida, E., (1975). “Attribution and the psychology of Prediction.” Journal of Personality and Social Psychology, Vol. 32, pp. 932-943.

_____, Borgida, E., Crandell, R., and Reed, H., (1976). “Popular Induction: Information is not necessarily Informative.” In J. S. Carroll and J. W. Payne (Eds.), Cognition and Social Behavior, pp. 113-133. Hillsdale: LEA.

_____, and Ross, L., (1980). “Human Inference: Strategies and Shortcomings of Social Judgment.” Englewood Cliffs, NJ: Prentice Hall.

Nedungadi, P. (1990). “Recall and Consumer Consideration Sets: Influencing Choice without Altering Brand Evaluation.” Journal of Consumer Research, Vol. 17 (December), pp. 263-276.

Nedungadi, P., Chattopadhyay, A., and Muthukrishnan, A.V. (2001). “Category Structure, Brand Recall and Choice.” International Journal of Research in Marketing, Vol. 18 (September), pp. 191-202.

Norton, R. W., (1975). “Measurement of Ambiguity Tolerance.” Journal of Personality Assessment, Vol. 39, pp. 607-619.

Nunnally, J. C., (1978). Psychometric Theory (2nd Edition), New York: McGraw Hill.

Nylen, D. W., (1986). Advertising: Planning, Implementation, and Control. Dallas, Texas: South Western Publishing Company.

Okechuku, C., (1992). “The Relationships of Prior Knowledge and Involvement to Advertising Recall and Evaluation.” International Journal of Research in Marketing, Vol. 9, No. 2, pp. 115-130.

Olson J. C., and Mitchell, A. A., (1981). “Are Product Attribute Beliefs the Only Mediator of Advertising Effects on Brand Attitude?” Journal of Marketing Research, Vol. 18, pp. 318-32.

Olson J. C., and Mitchell, A. A., (1975). “The Process of Attitude Acquisition: The Value of a Developmental Approach to consumer Attitude Research,” in Advances in Consumer Research, Vol. 2, Association for Consumer Research, pp. 240-64.

Olson, M. J., and Budescu, D. V., (1997). “Pattern of Preference for Numerical and Verbal Probabilities.” Journal of Behavioral Decision-Making, Vol. 10, pp. 117-131.

Osgoode, C. E., (1959). The Representational Model of and Relevant Research Methods. In I. de Sola Pool (eds.), Trends in Content Analysis. Urbana, Ill.: University of Illinois Press, 1959.

Owens, J., Bower, G. H., and Johnson, E. J., (1988). "Adaptive Strategy Selection in Decision Making." Journal of Experimental Psychology: Learning, Memory and Cognition.

Padberg, D., (1992). “Nutritional Labeling as a Policy Instrument.” American Journal of Agricultural Economics, Vol. 74, No.5, pp. 208-212.

Paivio, A., (1969). “Mental Imagery in Associative Learning and Memory.” Psychological Review, Vol. 76, Issue 3, pp. 241-263.

_____, (1971). “Imagery and Verbal Processes.” New York: Holt Rheinhart.

_____, (1986). “Mental Representations: A Dual Coding Approach, Oxford University Press Inc., New York, New York.

_____, Rogers, T. B., and Smythe, P. C., (1968). “Why are Pictures Easier to Recall than Words?” Psychonomic Science, Vol. 11, pp. 137-138.

_____, Yuille, J. C., and Madigan, S. A., (1968). “Concreteness, Imagery and Meaningful Values for 925 Nouns.“ Journal of Experimental Psychology, Vol. 76, pp. 1-25.

Paolos, J. A., (1988). “In-Numeracy: Mathematical Illiteracy and Its Consequences.” New York: Hill and Wang Publication.

Parducci, A., (1968). “How Often is Often.” American Psychologist, Vol. 23, pp. 828.

Paris, S. G., and Lindauer, B. K., (1977). Constructive Aspects of Children’s Comprehension and Memory. In R. V. Ruil and J. W. Hagen (eds.), Perspectives on the Development of Memory and Cognition, Hillsdale, NJ: LEA.

Park, C. W., and Hastak, M., (1994). “Memory Based Product Judgments: Effects of Involvement at Encoding and Retrieval.” Journal of Consumer Research, Vol. 21, pp. 534-547.

_____, and Lessig, V. P., (1981). “Familiarity and its Impact on Consumer Decision Biases and Heuristics.” Journal of Consumer Research, Vol. 8, pp. 223-230.

Patel, V. L., Groen, G. J., and Frederiksen, C. H., (1986). “Differences Between Students and Physicians in Memory”. Medical Education, Vol. 20, pp. 3-9.

Pavio, A., Rogers, T. B., and Smythe, P. C., (1968). “Why Are Pictures Easier to Recall Than Words?” Psychonomic Science, Vol. 11, pp. 137-138.

Payne, J. W., (1982). "Contingent Decision Behavior," Psychological Bulletin, Vol. 92, No. 2, pp. 382-402.

Pechmann, C., and Ratneshwar, S., (1992). “ Consumer Covariation Judgments: Theory or Data Driven?” Journal of Consumer Research, Vol. 19, pp. 373-386.

Penny, C. G., (1975). "Modality Effects in Short Term Verbal Memory." Psychological Bulletin, Vol. 82, pp. 68-84.

Pepper, S., (1981). Problems in Quantification of Frequency Expressions. In D. Fiske (Eds), New Directions for Methodology of Social and Behavioral Sciences: Problems with languages Imprecision. Jossy Bass: San Francisco.

Peter, J. P., and Olson, J. C., (1996). Consumer Behavior and Marketing Strategy, 4th Edition, Irwin, Chicago, pp. 81-117

Peterson, R. A., (1977). “Consumer Perceptions as a Function of Product Color, Price and Nutrition Labeling.” Advances in Consumer Research, Vol. 4, pp. 61-63.

Petty, R. E., and Cacioppo, J. T., (1986). "The ELM of Persuasion." Advances in Experimental Social Psychology, Vol. 19, pp. 123-205, (Eds.), L., Berkowitz Orlando, FL: Academic Press.

_____, and Cacioppo, J. T., (1986). Communication and Persuasion. New York: Springerverlag.

_____, Wells, G. L., and Brock, T. C., (1976). “Distraction can Enhance or Reduce Yielding to Propaganda: Thought Disruption Versus Effort Justification.” Journal of Personality and Social Psychology, Vol. 34, pp. 874-884.

_____, Unnava, R. H., and Strathman, A., (1991). “Theories of Attitude Change, in Handbook of Consumer behavior, ed. Thomas S. Robertson and Harold Kassarhjian, Englewood Cliffs, NJ: Prentice-Hall, pp. 241-280.

Pieters, F.G.M.., and Wedel, M., (2004). “Attention Capture and transfer in Advertising: Brand Pictorial and Text Size Effect.” Journal of Marketing, Vo;.68, No. 2, pp 36-50

Posner, M. I., (1967). “Characteristics of Visual and Kinesthetic memory Codes.” Journal of Experimental Psychology, Vol. 75, pp. 103-107.

_____, (1971). "Organizing and Interference." Psychological Review, Vol. 78, pp. 290-302.

Potter, M. C., and Levy, Ellen I., (1969). "Recognition Memory for a Rapid Sequence of Pictures." Journal of Experimental Psychology, Vol. 81, pp. 10-15.

Pradeep, K., and Bettman, J. R., (1977). “Effects of Information Format on Consumer Information Acquisition.” Journal of Consumer Research, Vol. 3 (March), pp. 233-240.

Preston, I. L., and Bowen, L., (1971). “Perceiving Advertisements as Emotional, Rational and Irrational.” Journalism Quarterly, Vol. 48, pp. 73-84.

Prince, S.E., Daselarr, S.M., and Cabeza,R. (2005). “Neural Correlates of Relational Memory: Succesful encoding and Retrieval of Semantic and Perceptual Associations.”Journal of Neuroscience, Vol. 25, No.5, pp. 1203-1210.

Punam, A. and Sternthal, B., (1989). Strategies for designing Persuasive Messages: Deductions from the Resources Matching Hypothesis. In Cognitive and Affective Responses to Advertising, ed. Patricia Cafferata and Alice Tybout, Lexington, MA: Lexington Books, pp. 135-159.

Rao, V., and Craig, C. S., (1975). “Applications of Conjoint Measurement to Communication Research.” Communication Research, Vol. 2, pp. 317-328.

Ratneshwar, S., Shocker, A. D., and Stewart, D. W., (1987). “Toward Understanding the Attraction Effect: The Implications of Product Meaningfulness and Familiarity.” Journal of Consumer Research, Vol. 13, pp. 520-533.

Rao, A. R., and Monroe, K., (1988). “The Moderating Effect of Prior Knowledge on Cue Utilization in Product Evaluation.” Journal of Consumer Research, Vol. 15, pp. 253-264.

_____, and Sieben, W. A., (1992).” The Effect of Price Knowledge on Price Acceptabiltiy and the type of Information Examined.” Journal of Consumer Research, Vol. 19, pp. 256-270.

Raudepp, E., (1992). “How Do You Think? Left or Right?” Machine Design, Vol. 64, No.17, August, pp. 85-89.

Ray, Michael L., and Sawyer, Alan G. 1971, "Repetition in Media Models: A Laboratory Technique." Journal of Marketing Research, Vol. 8, pp. 20-29.

Reif, F., and Heller, J. I., (1982). “Knowledge Structures and Problem Solving in Physics.” Educational Psychologists, Vol. 17, pp. 102-127.

Resnik, A., and Stern, B. L., (1977). "An analysis of Information Content in TV Advertising." Journal of Marketing, Vol. 1, No. 41, pp. 50-53.

Reyes, R. M., Thompson, W. C. and Bower, G. H., (1980). “Judgmental Biases Resulting From Differing Availabilities of Arguments.” Journal of Personality and Social Psychology, Vol. 39, pp. 2-12.

Rifon, N. J., Reece, B. B., and Harris, S. A., (1991). “TV Commercials for Food Products: Implications of Brand Extension Name Claims.” Proceedings of the 1991 Conference of The American Academy of Advertising, pp. 24-30.

Roberts, D. F., and Macoby, M., (1973). Information Processing and Persuasion: Counter-Arguing Behavior. In P. Clark (eds.), New models for Communication Research, Sage Publication, pp. 269-307.

Robinson, K. M., and Standing, L., (1990). “The Effects of Size Changes on Memory for Words and Pictures.” Perceptual and Motor Skills, Vol. 71, pp. 919-922.

Rodgers, S., and Thorson, E. (2000). “The Interactive Advertisement Model: How Users Perceive and Process Online Ads.” Journal of Interactive Advertising, Vol. 1, No.1,

Rook, K. S., (1986). "Encouraging Preventive Behavior for Distant and Proximal Health Threats: effects of Vivid vs. Abstract Information." Journal of Gerontology, Vol. 42, pp. 526-534.

Rook, K. S., (1987). “Effects of Case History Versus Abstract Information on Health Attitudes and Behaviors.” Journal of Applied Psychology, Vol. 17, pp. 533-553.

Ross, Jr., Harold L., (1982). "Recall Versus Persuasion: An Answer." Journal of Advertising Research, Vol. 22, pp. 13-16.

Rosch, E., Mervis, C. B., Gray, W. D., Johnson, D. M., and Boyes-Braem, P., (1976). "Basic Objects in Natural Categories." Cognitive Psychology, Vol. 8, pp. 382-439.

Rosenthal, R., and Rosnow, R. L., (1991). Essentials of Behavioral Research: Methods and Data Analysis (2nd ed.), New York, NY: McGraw Hill Publishing Co.

Rossiter, J. R., and Percy, L., (1978). "Visual Imaging Ability as a Mediator of Advertising Response". In Advances in Consumer Research, ACR.

_____, and Percy, L., (1980). "Attitude Change Through Visual Imagery Advertising." Journal of Advertising, Vol. 9, No. 2, pp. 10-16.

Rudell, F., (1979). Consumer Food Selection and Nutrition Information. New York: Praegn.

Russo J. E., and Dosher, B. A., (1983). "Strategies for Multiattribute Binary Choice." Journal of Experimental Psychology: Learning Memory and Cognition, Vol. 9, pp. 676-96.

Saegert, J., and Young, R. K., (1981). "Comparison of Effects of Repetition and Levels of Processing in Memory for Advertisement," in Advances in Consumer Research, Vol. 8, (eds.), L. Wilkie (Ann Arbor, Michigan: Association for Consumer Research), pp. 431-434.

Sangiry, S., and Cady, P. S., (1996). "Can Picture Use Effectively Enhance the Understanding of Non-Prescription Drug Labels in Older Adults. " Journal of Geriatric Drug Therapy, Vol. 10, No. 1, pp. 51-69.

Scammon, D., (1977). "Information Load and Consumers." Journal of Consumer Research, Vol. 4, December, pp. 148-55.

Schindler, P. S., (1986). "Color and Contrast in Magazine Advertising." Psychology and Marketing, Vol. 3, No. 2, pp. 69-78.

Schulman, A. I., (1971). "Recognition Memory for Targets from a Scanned Word List." British Journal of Psychology, Vol. 62, pp. 335-346.

Schumann, D., Cacioppo, J. T., and Petty, R. E., (1983). "Central and Peripheral Routes to Advertising Effectiveness: The Moderating Role of Involvement. " Journal of Consumer Research, Vol. 10, pp. 134-148

Schmalensee, D., (1983). "Today's Top Priority Research Questions." Journal of Advertising Research, Vol. 23, pp. 49-60.

Sekular, R., Rubin, E., and Armstrong, R., (1971). "Processing Numerical Information: A Choice Time Analysis." Journal of Experimental Psychology, Vol. 90, pp 75-80

Selnes, F., and Troye, S. V., (1989). "Buying Expertise, Information Search and Problem Solving." Journal of Economic Psychology, Vol. 10, pp. 411-428.

Severn, J., Belch, G. E., and Belch, M. A. (1990). “The effects of sexual and non-sexual advertising appeals and information level on cognitive processing and communication effectiveness.” Journal of Advertising, Vol. 19, pp. 4-22.

Shaffer, W. O., and Shiffrin, R. M., (1972). "Rehearsal and Storage of Visual Information." Journal of Experimental Psychology, Vol. 2, pp 292-96.

Shanteau, J. and Nagy, G. F., (1975). An Information-Integration Analysis of Risky Decision-Making. In M.F. Kaplan and S. Schwartz (eds.), Human Judgment and Decision Processes. New York: Academic Press.

_____, and Nagy, G. F., (1976). Decisions Made About Other People: A Human Judgment Analysis of Choice. In J. S. Caroll and J. W. Payne (Eds.), Cognition and Social Behavior, Potomac, Maryland: Erlbaum.

_____, and Nagy, G. F., (1984). “Information Integration in Person Perception: Theory and Application”. In Cook (Eds.), Issues in Person Perception, London: Methuen.

_____, (1992). “How Much Information Does an Expert Use?” Acta Psychologica, Vol. 81, pp. 75-86.

_____, (1989). “Psychological Characteristics and Strategies of Expert Decision Makers.” In B. Rohrmann, L. R. Beach, C. Vlek, and S. R. Watson (Eds.), Advances in Decision Research. Amsterdam: North Holland.

Shedler, J. and Manis, M., (1986). “Can the Availability Heuristics Explain Vividness Effects.” Journal of Personality and Social Psychology, Vol. 51, pp. 26-36.

Shepard, R. N., (1967). "Recognition Memory for Words, Sentences, and Pictures." Journal of Verbal learning and Verbal Behavior, Vol. 6, pp. 156-163.

Shimp, T. A. (1981). “Attitude Toward the Ad as a Mediator of Consumer Brand Choice.” Journal of Advertising, Vol. 10, pp. 9-15.

Silk, A., and Vavra, T. G., (1974). “The Influence of Advertising’s Affective Qualities on Consumer Response.” In G. D. Hughes and M. L. Ray (Eds.), Buyer/Consumer Information Processing, pp 157-86. Chapel Hill, North Carolina: University of North Carolina Press.

Simmons, C. J., Bickart, B. A., and Lynch, Jr., J. G., (1993). “A Program of Classical Conditioning Experiments Testing Variations in the Conditioned Stimulus and Context.” Journal of Consumer Research, Vol. 18, pp. 1-12.

Simon, H. A., and Chase, W. A., (1973). "Skill in Chess." American Scientist, Vol. 61, pp. 394-403.

Singh, S., N., Rothschild, M. L., and Churchill, G. A. (1983). “Recognition as a Measure of Learning from Television Commercials.” Journal of Marketing Research, Vol. 20, pp. 235-248.

Slaughter, K. A., (1985). “Letter.” Advertising Age, Vol. 14, pp. 18.

Slatter, P. E., (1987). Building Experts: Cognitive Emulation. Chichester. Ellis Horwood.

Slovic, P., (1969). “Analyzing the Expert Judge: A Descriptive Study of a Stockbroker’s Decision Processes.” Journal of Applied Psychology, Vol. 53, pp. 255-263.

_____, (1972). “From Shakespeare to Simon: Speculation - and Some Evidence - about Man’s Ability to Process Information." Monograph No. 12, Eugene, OR: Oregon Research Institute, April.

Smith, R.A., (1991). “The Effects of Visual and Verbal Advertising Information on Consumers’ Inferences.” Journal of Advertising, Vol. 20, No.4, pp. 13-24.

Soley, C. C., and L. N., Reid, (1983). “Predicting Industrial Advertising Readership”. Industrial Marketing Management, Vol. 12, No. 1, pp. 201-206.

Solso, R. L., (1979). Cognitive Psychology. New York: Harcourt Brace Jovonovich.

Sperling, G., (1960). “The Information Available in Brief Visual Representation.” Psychological Monographs, Vol. 74, No. 11, pp. 42-56.

Spilich, G. J., Vosender, G. T., Chiesi, H. L. and Voss, J. F., (1979). “ Text Processing of Domain Related Information for Individuals with High and Low Domain Knowledge.” Journal of Verbal Learning and Verbal Behavior, Vol. 18, pp. 275-290.

Srull, T. K., (1983). “The Role of Product Knowledge in the Acquisition, Retention, and Use of New Information.” In Bagozzi, R. P., and Tybout, A. M., (Eds), Advances in Consumer Research, Vol. 10, Association for Consumer Research, Ann Arbor, MI, pp. 572-576.

_____, and Wyer, R. S., (1980). “Category Accessibility and Social Perceptions: Some Implications for the Study of Person Memory and Interpersonal Judgments.” Journal of Personality and Social Psychology, Vol. 38, No. 6, pp. 841-851.

Stafford, M.R., (1996). “Tangibility in Services Advertising: An Investigation of Verbal vs. Visual Cues.” Journal of Advertising, Vol. 25, No.3, pp. 13-28

Standing, L., (1973). "Learning 10,000 Pictures." Quarterly Journal of Experimental Psychology, Vol. 25, pp. 207-222.

Starch, D., (1966). “How Does the Shape of Ads Affect Readership?” Media/scope, Vol. 10, pp. 83-85.

Steen, L. A., (1990). “Numeracy”. Daedalus, Vol. 119, pp. 211-231.

Stefurak, D. L., and Boynton, R. M., (1986). “Advertising Frequency Requirements for Older Adults.” Perceptions and Psychophysics, Vol. 39, pp. 164-174.

Steiner, G. A., (1966). "The People Look at Commercials: A Study of Audience Behavior." Journal of Business, Vol. 39.

Stephens, M.N., and Simonson, I. (1997): “Attribute Task Compatibility as a Determinant of Consumer Preference Rehearsals.” Journal of Marketing Research, Vol. 34, No.2, pp.205-213.

Stephens, N., (1982). "The Effectiveness of Time -Compressed Television Advertisements with older adults." Journal of Advertising, Vol. 11.

Stern, W., (1981). Handbook of Package Design Research. John Wiley and Sons, Inc.

Stewart, D. W., (1986). " The Moderating Role of Recall, Comprehension, and Brand Differentiation on the persuasiveness of Television Advertising." Journal of Advertising Research, Vol. 26, No. 2, pp. 43-47.

Sudevan, P. and Taylor, D. A., (1987). “The Cueing and Priming of Cognitive Operation.” Journal of Experimental Psychology: Human Perception and Performance, Vol. 13, pp. 89-103.

Sudman, S., (1976). Applied Sampling. New York, New York: Academic Press

Sujan, M., (1985). “Consumer Knowledge: Effects on Evaluation Strategies Mediating Consumer Judgements.” Journal of Consumer Research, Vol. 12, pp. 31-46.

_____, and Dekleva, C., (1987). “Product Categorization and Inference Making: Some Implication for Comparative Advertising.” Journal of Consumer Research, Vol. 14, pp. 372-378.

Sullivan, G. L., and Macklin, M. C., (1988). “Vividness-Unvividness Effects in Print Advertising: An Experimental Investigation.” Journal of Mental Imagery, Vol. 12, pp. 133-144.

Sullivan, A. M., Andrews, E. A., Hollinghurst, F., Maddigan, R., and Noseworthy, C. M., (1976-1977). “The relative Effectiveness of Instructional Television”. Interchange, Vol. 7, pp. 46-51.

Tardieu H., Elrich, M., and Gyselinck, V., (1992). “Levels of representation and domain-specific knowledge in comprehension of scientific texts.” Language & Cognitive Processes, Vol. 7, pp. 335-351.

Tauber, Edward M., (1982/1983). Editorial, "How does Advertising Work?" Journal of Advertising Research, Vol. 22, No. 6.

Taylor, S. E. and Thompson, S. C., (1982). "Stalking the Elusive Vividness Effect." Psychological Review, Vol. 89, pp. 155-181.

Taylor, S. E., and Wood, J., (1983). "The Vividness Effect: Making a Mountain Out of a Molehill, Advances in Consumer Research, Michigan: ACR, Vol. 10, pp. 540-542.

Tesser, A., (1978). “Self-Generated Attitude Change,” in Advances in Experimental Social Psychology, Vol. 11, (Eds.), Leonard Berkowitz, New York: Academic Press, pp. 289-338.

Tewsbury, D., (1999). “Differences in How We Watch the News: The Impact of Processing Goals and Expertise on Evaluations of Political Actors.” Communication Research. Vol. 26, pp. 4-29.

Thompson, C. J., and Hirschman, E. C., (1995). “Understanding the Socialized Body: A Poststructuralist Analysis of Consumers’ Self-Conceptions, Body Images, and Self-Care Practices.” Journal of Consumer Research, Vol. 22, pp. 139-153.

Thompson, E., Palacios, A., and Varela, F. J., (1992). “Ways of Coloring: Compartive Color Vision as a Case Study for Cognitive Science.” Behavioral and Brain Sciences, Vol. 15, pp. 1-74.

Thornson, E. and M. Friestad, (1984). The Effect of Emotion on Episodic Memory for TV Commercials. In (Eds.), Cognitive and Affective Responses to Advertising. MA: Lexinton Books.

Tillman, R., and Kirkpatrick, C. A., (1972). “Promotion Persuasive Communication in Marketing. Richard D. Irwin, Inc., Homewood, Illinois, USA.

Triesman, A. M., (1992). "Spreading Suppression or Feature Integration?" Journal of Experimental Psychology: Human Perception and Performance, Vol. 18, pp. 589-593.

Tucker, J., (1987). “Psychology of Color.” Target Marketing, Vol. 10, pp. 40-49.

Tulving, E., (1983). Elements of Episodic Memory: Oxford University Psychology Series, pp. 169-194.

Tversky, A. and Kahneman, D., (1973). “Availability: A Heuristics Judging, Frequency and Probability.” Cognitive Psychology, Vol. 5, (September), pp. 207-232.

Tyebjee, T., (1979). “Affirmative Disclosure of Nutrition Information and Consumers’ Food Preferences: A Review.” Journal of Consumer Affairs, Vol. 13, pp. 206-223.

Tzelgov, J., Meyer, J., and Henik, A. (1992). “Automatic and Intentional Processing of Numerical Information.” Journal of Experimental Psychology: Learning, Memory, and Cognition, Vol. 18, pp. 166-179.

Unnava, H. R., and Burnkrant, R. E., (1991). ” An Imagery-Processing View of the Role of Pictures in Print Advertisements.” Journal of Marketing Research. Vol. 28, pp. 226-231.

Urbany, J. E., Dickson, P. R., and Wilkie, W., (1989). “ Buyer Uncertainty and Information Search.” Journal of Consumer Research, Vol. 16, pp. 208-215.

Valenzie E. and Eldridge, L., (1973). “Effects of Price Information, Composition Differences, Expertise and Rating Scales on Product Quality Rating.” Proceedings of the 81st convention of the American Psychological Association, Vol. 8, pp. 829-830.

Vandenberg (1980). “Food Label Information: What Consumers Say they Use and What they Actually Use. FDA Report: Washington DC, 1980.

Van Dijk, T. A., and Kintsch, W., (1983). Strategies of Discourse Comprehension. New York: Academic Press.

Venkataramani, G.J., Maheswaran, D., and Peracchio, L.A. (2006). “Mapping the Frontiers: Theoretical Advances in Consumer Research on Memory, Affect, and Persuasion.” Journal of Consumer Research, Vol. 33, pp.139–149.

Venketesan, M., and Haaland, G. A., (1986). "Divided Attention and Television Commercials: An Experimental Study." Journal of Marketing Research, Vol. 5, pp. 203-205.

_____, (1977). “Providing Nutritional Information on Consumers,” paper presented at special NSF/MIT conference: Consumer Research for Consumer Policy. Cambridge: MA, pp. 28-29.

_____, Wade L., and Kendall, K. W., (1986). “An Empirical Study of Alternate Formats for Nutritional Information Disclosure in Advertising.” Journal of Public Policy and Marketing, Vol. 5, pp. 29-43.

Viswanathan, M., and Childers, T., (1992). “The Encoding and Utilization of Magnitudes along Product Attributes: An Investigation Using Numerical and Verbal Information.” University of Illinois-Urbana-Champaign: Unpublished Manuscript.

_____, (1993). “Measurement of Individual Differences in Preference for Numerical Information”. Journal of Applied Psychology, Vol. 78, pp. 741-752.

_____, and Narayanan, S., (1994). “A Study of Comparative Judgments of Numerical and Verbal Attribute Labels.” Journal of Consumer Psychology, Vol. 3, No. 1, pp. 79-101.

_____, and Narayanan, S., (1992). “Processing Numerical and Verbal Attribute Information: A Study Using Information Acquisition Patterns.” Marketing Letters, Vol. 3, pp. 201-208.

_____, (1994). “The Influence of Summary Information on the Usage of Nutrition Information.” Journal of Public policy Marketing, Vol. 13, No. 1, pp. 48-60.

_____, and Childers, T. L., (1996). Processing of numerical and verbal product information.” Journal of Consumer Psychology, Vol. 5, No. 4, pp. 359-385.

_____, and Hastak, M. (2002). “The Role of Summary Information in Facilitating Consumers’ Comprehension of Nutrition Information.” Journal of Public Policy & Marketing, Vol. 21, No.2, pp.305–318

Von Winterfield, D., and Edwards, W., (1986). Decision Analysis and Behavioral Research. New York: Cambridge University Press.

Vosniadou, S., and Brewer, W. F., (1987). “Theories of Knowledge Restructuring in Development.” Review of Educational Research, Vol. 57, pp. 51-67.

Voss, J. F., Greene, T. R., Port, T. A., and Penner, B. C., (1983). “Problem Solving in the Social Sciences,” in G. H. Bower (eds.), The Psychology of Learning and Motivation. Advances in Research Theory, Vol. 17, New York: Academic Press.

_____, Vesonder, G. T., and Spilich, G. J., (1980). “Text generation and Recall by High Knowledge and Low Knowledge Individuals.” Journal of verbal Learning and Verbal Behavior, Vol. 19, pp. 651-667.

Walker, B., Celsi, R., and Olson, J., (1987). “Exploring the Structural Characteristics of Consumer’ Knowledge.” In Advances in Consumer Research, Vol. 14, pp. 17-21.

Wallsten, T. S., Budescu, D. V., Zwick, R., Rapoport, A., and Forsyth, B., (1986). “Measuring the Vague Meaning of Probability Terms.” Journal of Experimental Psychology: General, Vol. 115, pp. 348-365.

_____, Budescu, D. V., Zwick, R., and Kemp, S. M., (1993). “Preferences and Reasons for Communicating Probabilistic Information in Verbal or Numerical Terms.” Bulletin of the Psychonomic Society, Vol. 31, pp. 135-138.

_____, Budescu, D. V., Zwick, R., (1993). “Comparing the Calibration and Coherence of Numerical and Verbal Probability Judgments.” Management Science, Vol. 39, pp. 176-90.

Warren, C. & J. Morton, (1982). "The effects of Priming on Picture Recognition". British Journal of Psychology, Vol. 73, pp. 17-29.

Watkins, M.J., Peymircioglu, Z.F., and Brems, D. J., (1984). Pictorial Rehearsal. NY: Sage

Waugh, N. C. and Norman, D. A., (1965). “Primary Memory.” Psychological Review, Vol. 72, pp. 89-104.

Webb, N., (1984). “Levels of Adult Numeracy.” Journal of the Marketing Research Society, Vol. 26, pp. 129-139.

Weinert, E. F., Hasselhorn , A., (1986). Human Memory and Cognitive Capabilities. (Eds), In Felix and Hansendorf’s, Mechanism and Performances. Elsevier Science Publisher, B.V. (N. Holland), 1986.

Weiss, W., (1969). Effects of Mass Media of Communication. In Handbook of Social Psychology (2nd ed), Vol. 5, Reading, Massachusetts: Addison Wesley.

Weldon, M. S., Roedinger III, H. L., and Challis, B., H., (1989). “The properties of Retrieval Cues Constrain the Picture Superiority Effect.” Memory and Cognition, Vol. 17, pp. 95-105.

Wells, W. D., (1964). "Recognition, Recall, and Rating Scales." Journal of Advertising Research, Vol. 4, No. 3, pp. 2-8.

Wells, W., Burnett, J., and Moriarty, S., (1992). Advertising Principles and Practice. Prentice Hall: NJ.

Wheeler, C.S., Petty, R.E., Bizer, G., (2005). “Self Schema Matching and Attitude Change: Situational and Dispositional Determinants of Message Elaboration.” Journal of Consumer Research, Vol.31, pp. 787-797.

Wilkie, W. L., (1991). “Consumer Behavior”, John Wiley and Sons.

Wilson, M. G., Northcraft, G. B., and Neale, M. A., (1989). “Information Competition and Vividness Effects in Judgment.” Organizational Behavior and Human Decision Processes, Vol. 44, pp. 132-139.

Windschitl, P. D., and Wells, G., (1996). “Measuring Psychological Uncertainty: Verbal Versus Numeric.” Journal of Experimental Psychology: Applied, Vol. 2, pp. 343-364.

Winkler, J. D., Taylor, S. E., Tebbetts, R. F., Jemmott, J. B., and Johnson, J. (1979). “The Information Types, Cognitive Heuristics and Political Persuasion.” Paper Presented at the Annual Meeting, American Psychological Association (APA), New York, NY.

Wise, S. L., (1985). “The Development and Validation of a Scale Measuring Attitudes Toward Statistics.” Educational and Psychological Measurement, Vol. 45, pp. 401-405.

Wiseman, S., MacLeod, C., Lootsteen, P. J., (1985). “Picture Recognition Improves with Subsequent Verbal Information.” Journal of Experimental Psychology: Learning, Memory and Cognition, Vol. 11, No. 3, pp. 588-595.

Witt, W., (1976). “Effects of Quantification in Scientific Writing.” Journal of Communication, Vol. 26, pp. 67-69.

Wright, P. L., (1978). “Extracting Information from Mass Media Advertisements.” In the Effect of Information on Consumer & Market Behavior, (Ed.), Andrew Mitchell, Chicago: American Marketing Association, pp. 61-64.

_____, and Barbour, F., (1975). “The Relevance of Decision Process Models in Structuring Persuasive Messages.” Communication Research, pp. 232-245.

_____, and Rip, P. D., (1980). “Product Class Advertising Effects on First Time Buyers Decision Strategies.” Journal of Consumer Research, Vol. 8, pp. 176-188.

_____, (1981). Cognitive Responses to Mass Media Advocacy, In R. E. Petty, J. M. Ostrom and T. C. Brock (Eds.), Cognitive Responses in Persuasion, pp. 263-282, LEA: NJ.

Wyer, R.S., and Srull, T.K. (1989). “Memory and Cognition in its Social Context, NJ: Erlbaum

Yoon, (2003). “An experimental approach to understanding banner advertising effectiveness.” Journal of Targeting, Measurement and Analysis for Marketing. Vol. 11 No.3, pp. 255-272.

Zeitz, C. M., (1994). “Expertise Differences in Memory, Abstraction, and Reasoning in the Domain of Literature.” Cognition and Instruction, Vol. 12, pp. 277-312.

Zhang, (2000). “The effects of animation on information seeking performance on the World Wide Web: securing attention or interfering with primary tasks.” Journal of Association for Information Systems. Vol.1, March, pp.1-28.

Zielske, Hubert A. 1982, "Does Day-After Recall Penalize 'Feeling' Ads?" Journal of Advertising Research, Vol. 22, pp. 20-22.

Zimmer, A. C., (1983). Verbal Versus Numerical Processing of Subjective Probabilites. In R.W. Scholtz, Amsterdam: North Holland Publishing Co.

Zinkham, G. M., Locander, W. B. and Leigh, J. H., (1986). "Dimensional Relationships of Aided Recall and Recognition." Journal of Advertising, Vol. 15, pp. 38-46.

Zoglin, Richard, 1984, Video. "The Competition Looks On." Time, Vol. 24, December, pp. 53.

APPENDICES

Appendix A: Statement for Research Involving Human Subjects

Appendix A-1: Statement

You agree to participate in a research study being conducted by Sanjay Nagaraj as a part of the requirements for his doctoral degree in marketing. The purpose of this study is to determine the impact of consumer knowledge, information mode and presentation form on memory and judgment.

Participation in this study will take approximately ten (10) minutes. You understand that the study will involve filling out three to four page questionnaire, looking at a print advertisement, and filling out a questionnaire. The study will deal with your attitude towards advertising. An example of the type of questions you will be asked is:

Indicate your attitude toward the ad for the product shown, for example:

1 Good----------Bad
2 Favorable----------Unfavorable

1. You understand there are no risks or personal benefits involved in this study.
2. You understand your participation in this study is entirely voluntary.
3. Refusal to participate will involve no penalty or loss of benefits to which you would otherwise be entitled, and that you may discontinue participation any time without penalty or loss of benefits to which you are otherwise entitled.
4. You realize that all your answers will be held strictly confidential and anonymous since you will not be asked to give your name or any information that would identify you as an individual.
5. All of your questions have been answered to your satisfaction. You also understand that if you later have any additional questions concerning this research project, you can contact Sanjay Nagaraj at: Sanjay.Nagaraj@yahoo.com.
6. This project was reviewed by the designated faculty, and upon belief that these research procedures were adequately safeguards your privacy, welfare, and civil liberties and right, this project will be approved.
7. For more information, you may also contact the relevant Administration and/or the Registrars office.
8. You have heard and understood the material above, and any questions you asked have been answered to your satisfaction. You realize that the completion of this questionnaire indicates your consent to participate in this study.

Appendix B: Research Questionnaire

INSTRUCTIONS

Thank you for participating in this study. Your opinions will be kept at strictest confidence. This study is designed to obtain your reactions to advertisements created by an advertising agency for a new brand. You will be viewing an ad in just a moment after which you will have as much as time as you need to answer questions regarding this ad and the product. Your understanding of the information provided in the ad is important since we will be asking you questions regarding the product advertised. Thus please focus on your overall impressions of how much you like or dislike both the ad and the brand in the ad. Please review the ad for a laptop computer and wait for further instructions.

Please do not go to next screen of the questionnaire until further instructions from the researcher.

Q1. Please write down as many details as possible regarding information (e.g., attributes) about the advertisement for the laptop computer you just saw.

Q1. Please indicate your attitude toward the ad for the computer product shown on the scale given below. Please circle only one.

Good	1	2	3	4	5	6	7	Bad
Like	1	2	3	4	5	6	7	Dislike
Interesting	1	2	3	4	5	6	7	Not at all Interesting
Creative	1	2	3	4	5	6	7	Not at all Creative
Informative	1	2	3	4	5	6	7	Not at all Informative
Favorable	1	2	3	4	5	6	7	Unfavorable
Pleasant	1	2	3	4	5	6	7	Unpleasant

Q2. How certain are you that you understood the attribute information in the ad?

Not at all Certain	1	2	3	4	5	6	7	Very Certain

Q3. How confused did you feel while reading the attribute information shown in the ad?

Not at all Confused	1	2	3	4	5	6	7	Very Confused

Q4. How satisfied are you that you understood the attribute information shown in the ad?

Very Dissatisfied	1	2	3	4	5	6	7	Very Satisfied

Q5. How confident is your evaluation of the computer product shown in the ad?

Not at all Confident	1	2	3	4	5	6	7	Very Confident

Q6. Please indicate your attitude toward the Viking brand of the laptop computer product shown on the scale given below.

Good	1	2	3	4	5	6	7	Bad
Like	1	2	3	4	5	6	7	Dislike
Favorable	1	2	3	4	5	6	7	Unfavorable
Superior	1	2	3	4	5	6	7	Inferior
High Quality	1	2	3	4	5	6	7	Low Quality

Q7. If you were shopping for a laptop computer, how likely is that you would seriously consider a Viking computer?

Very Unlikely	1	2	3	4	5	6	7	Very Likely

Q8. Assuming you wanted to purchase a computer, how likely would it be that you would purchase a product similar to the Viking laptop computer?

Very Unlikely	1	2	3	4	5	6	7	Very Likely

Q9. Assuming you wanted to purchase a product similar to the Viking laptop computer, how desirable do you think this particular brand would be?

Very Undesirable	1	2	3	4	5	6	7	Very Desirable

Q10. Assuming that you purchased a Viking computer, how confident are you that you made a good decision?

Not at all Confident	1	2	3	4	5	6	7	Very Confident

Q11. How would you rate the presentation form of the ad you just saw? Please provide your impressions on the following scales?

Not at All colorful	1	2	3	4	5	6	7	Very colorful
Very Dull	1	2	3	4	5	6	7	Very Rich
Very Vague	1	2	3	4	5	6	7	Very Graphic
Not at all Distinctive	1	2	3	4	5	6	7	Very Distinctive

Q12. How would you rate the descriptions of the product attributes in the ad that you just saw? Please provide your impressions on the following scales?

Very Vague	1	2	3	4	5	6	7	Very Precise
Not at all Accurate	1	2	3	4	5	6	7	Very Accurate
Inexact	1	2	3	4	5	6	7	Very Exact
Very Unclear	1	2	3	4	5	6	7	Very Clear
Not at all Specific	1	2	3	4	5	6	7	Very Specific

Appendix B-1: Preference[59]

Q13. Please answer the following questions that closely match your preferences on a scale of 1 to 7 (1 is Strongly Disagree and 7 is strongly agree). Please circle only one.

I enjoy work that requires the use of numbers

Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

I think quantitative information is difficult to understand

Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

I find it satisfying to solve day-day problems involving numbers

Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

Information in a numerical mode is very useful in everyday life

Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

I prefer not to pay attention to information involving numbers

Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

I think more information should be available in a numerical form

Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

I do not think about issues involving numbers

Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

Numbers are not necessary in most situations

Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

Numbers are not of importance to me

Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

Thinking is enjoyable when it does not involve quantitative information

Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

[59] Source: Adapted from Viswanthan (1993) PNI Scales, Journal of Applied Psychology", Vol. 78 (5), pp. 741-752.

It is easier to think when information does not involve numbers

Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

I like to make calculations using quantitative information

Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

I make better decisions when using quantitative information

Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

I think it is important to learn and use numerical information to make well-informed decisions

Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

Quantitative/Numerical information is vital for accurate decisions

Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

I enjoy thinking about issues that do not involve numerical information

Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

Understanding numbers is as important as reading or writing

Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

I lose interest easily when information involves graphs, charts and Statistics

Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

Numbers are redundant for most situations

Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

It is a waste of time to learn information containing a lot of numbers

Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

I like to go over numbers in my mind

Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

It helps me to think if I put down information as numbers

Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

I prefer to make decisions based on numerical information

Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

I find it easy to compare two pieces of numerical information

Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree

Appendix B-2: Demographics

The following information is important for this research. Please indicate appropriately your answers to the following questions.

a) Gender: Female ____ Male ____

b) Nationality: _____

c) Are you enrolled in any computer programming or computer related courses?

Yes or No

Which programs are you enrolled in _____

d) Please indicate whether the amount of time given to view the ad was adequate?

Not Adequate _____ Adequate _____ Very Adequate _____

Age: _____

Education: _____

Family Income: < than 30,000
30,000 - 40,000
40,000 – 60,000
> Than 60,000

Appendix C: Pretest Questionnaire

Appendix C-1: Pretest 1 - Information Mode Equivalence

Please provide only one answer for each question that you think is most reasonable to you.

DISPLAY WIDTH
How would you describe in a 13.3'' XVGA TFT matrix laptop computer screen display as:

a) Very wide
b) Wide
c) Medium
d) Small
e) Very Small

WEIGHT
How would you describe a laptop weighing 2.6Kg as?

b) Very heavy
c) Heavy
d) Medium weight
e) Light
f) Very light

MODEM SPEED
In your opinion, how would you describe 56.6 Kbps as the speed of a modem in a laptop computer?

a) Very fast
b) Fast
c) Slow
d) Very slow

ROM Drive
In your opinion, how would you describe the 4x/32x DVD ROM?

a) Very Fast
b) Fast
c) Medium
d) Slow
e) Very Slow

CACHE FUNCTION
In your opinion, how would you describe a 512KB Pipeline Burst Cache as?

a) Very large
b) Large
c) Medium
d) Small
e) Very small

STANDARD MEMORY-RAM

In your opinion, how would you describe a RAM of 64MB as?

a) Very Large
b) Large
c) Medium
d) Small
e) Very small

STORAGE SPACE
In your opinion, how would you describe a laptop computer that has storage space of 6.4 GB as?

a) Very Large
b) Large
c) Medium
d) Small
e) Very small

MICROPROCESSOR
In your opinion, how would you describe a Laptop computer that has CPU of PII 350 Mhz ‘as?

a) Very fast
b) Fast
c) Medium
d) Slow
e) Very slow

GRAPHIC ACCELERATOR
In your opinion, how would you describe a Laptop computer that has a 128 bit graphic accelerator as?

a) Very Fast
b) Fast
c) Medium
d) Slow
e) Very Slow

Appendix C-2: Pretest 2 – Reverse Information Mode Equivalence

Please provide only one answer for each question that you think is most reasonable to you.

DISPLAY WIDTH
How wide should a laptop's XVGA TFT screen display width be: Please provide a numerical value in inches?

_____

WEIGHT
If you were told that the weight of a laptop computer brand is very light, roughly how much should it weigh? Please provide a numerical value in KG?

_____

MODEM SPEED
If you were told that the modem in a laptop computer has a very fast dial-up, roughly how fast should it be? Please provide a numerical value in Kbps?

_____

ROM Drive
If you were told that the DVD-ROM drive in laptop computer is very fast, roughly how fast should it be? Please provide a numerical value?

_____

CACHE FUNCTION

If you were told that the Pipeline Burst Cache in a laptop computer is very large, roughly how large should it be? Please give a numerical value in Kb.

_____

STANDARD MEMORY-RAM
If you were told that a laptop computer has a large RAM, roughly how large should it be? Please provide a numerical value in MB.

_____

STORAGE SPACE
If you were told that the storage space in a laptop computer is large, in your opinion, how large should it be? Please provide a numerical value in GB.

_____

MICROPROCESSOR
If you were told that a laptop computer has a fast PII CPU, in your opinion, how fast should it be? Please provide a numerical value in Mhz.

_____

GRAPHIC ACCELERATOR
In your opinion, what numerical value would you assign to a high-depth graphic accelerator provided in a Laptop computer?

_____

Appendix C-3: Pretest 3 - Scale Reliability for Presentation Form

How would you rate the presentation form of the ad you just saw? Please provide your impressions on the following scales.

Not at all Colorful	1	2	3	4	5	6	7	Very Colorful
Very Dull	1	2	3	4	5	6	7	Very Rich
Very Vague	1	2	3	4	5	6	7	Very Graphic
Not at all Distinctive	1	2	3	4	5	6	7	Very Distinctive

Appendix C-4: Pretest 4 - Scale Reliability for Information Mode

How would you rate the descriptions of the product attributes in the ad that you just saw? Please provide your impressions on the following scales?

Very Vague	1	2	3	4	5	6	7	Very Precise
Not at all Accurate	1	2	3	4	5	6	7	Very Accurate
Inexact	1	2	3	4	5	6	7	Very Exact
Very Unclear	1	2	3	4	5	6	7	Very Clear
Not at all Specific	1	2	3	4	5	6	7	Very Specific

Appendix D: Example of Ad Stimuli

Figure D-1: Vivid-Numerical

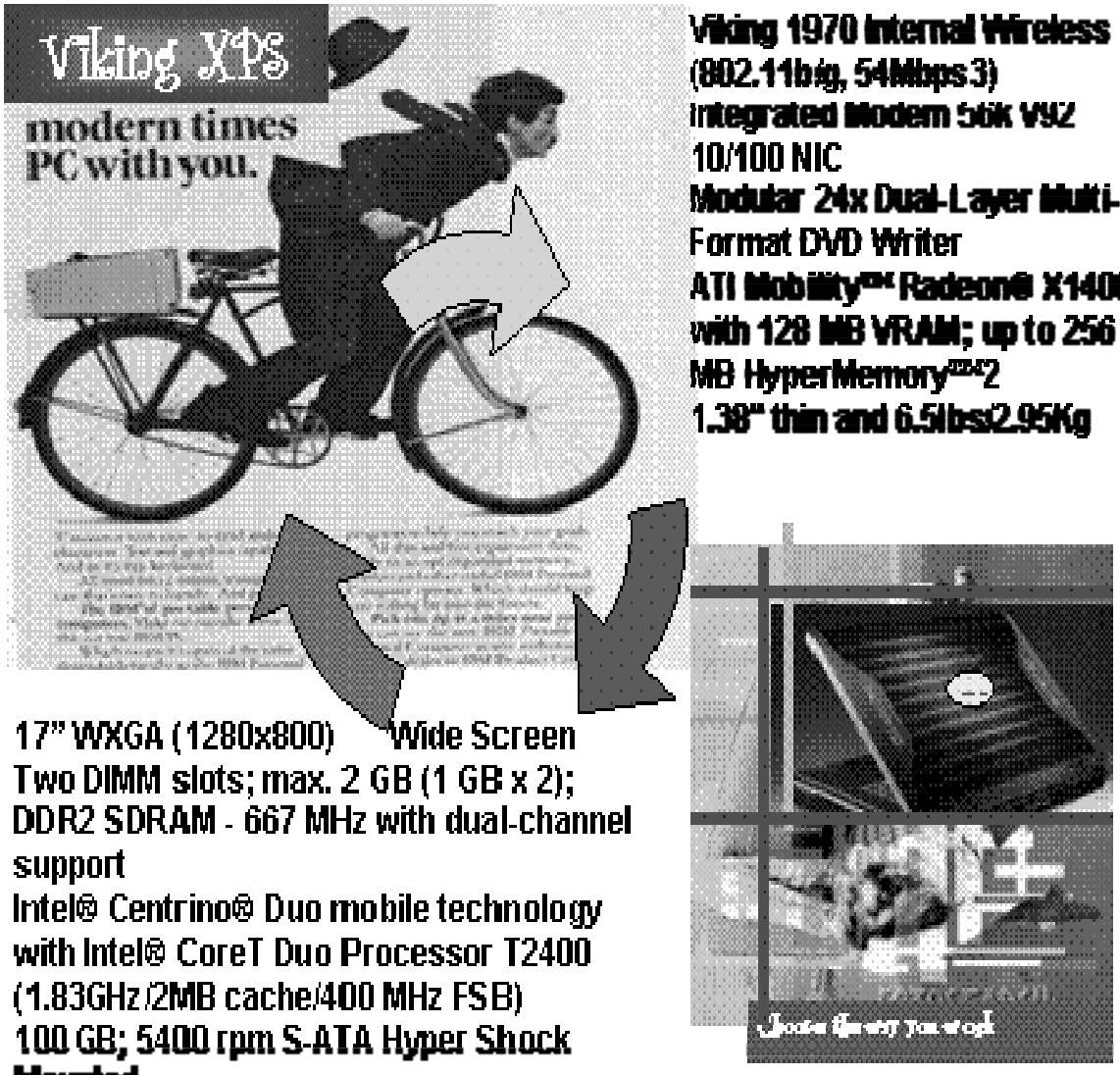


Figure D-2: Vivid-Verbal

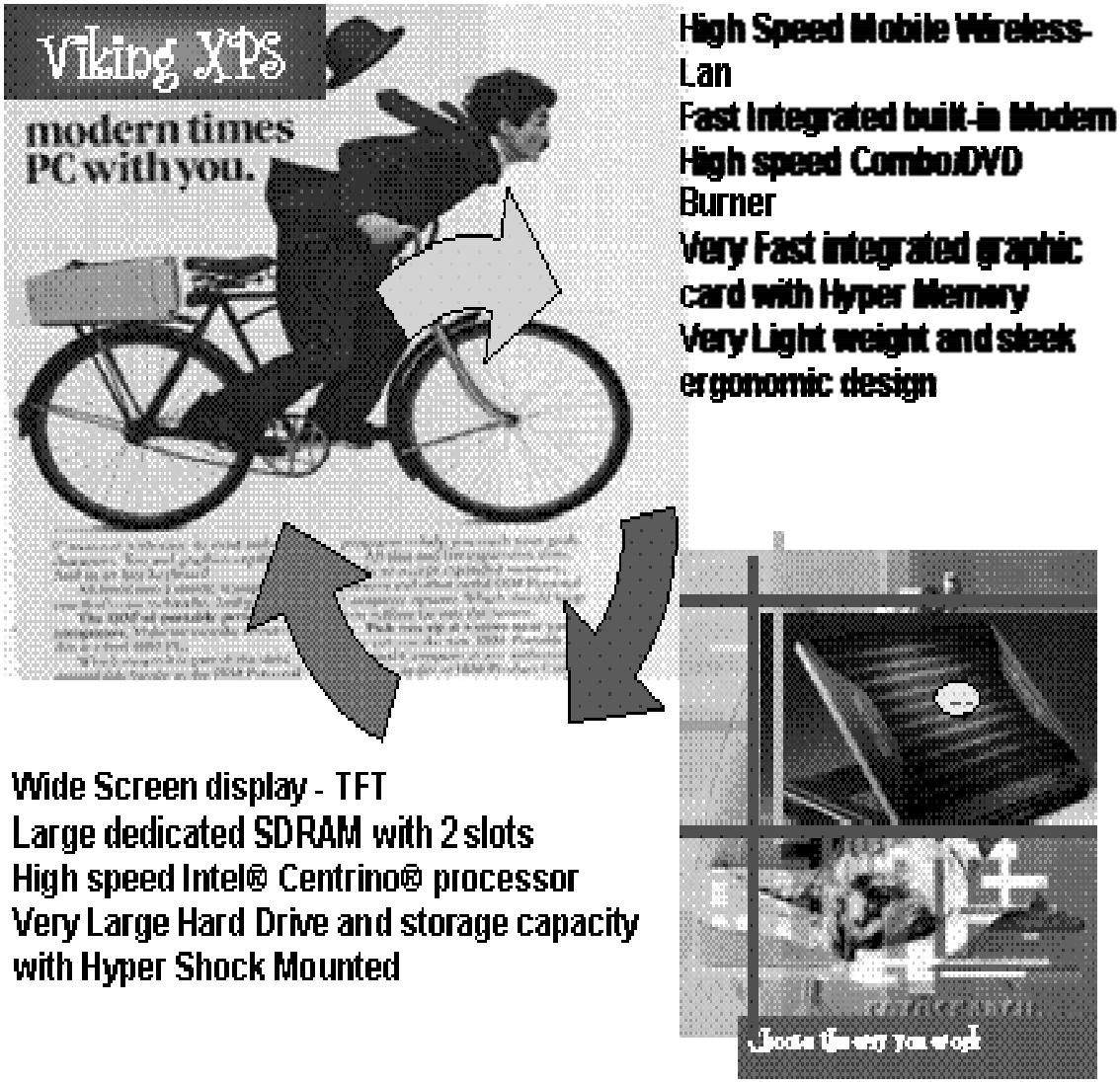


Figure D-3: Non-Vivid Numerical

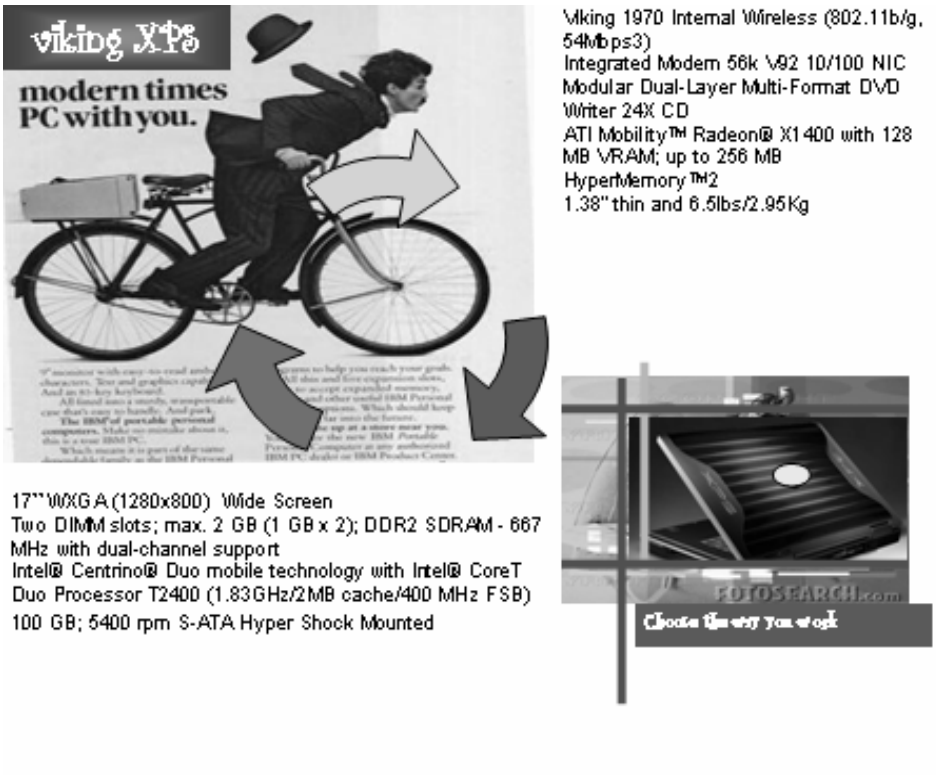
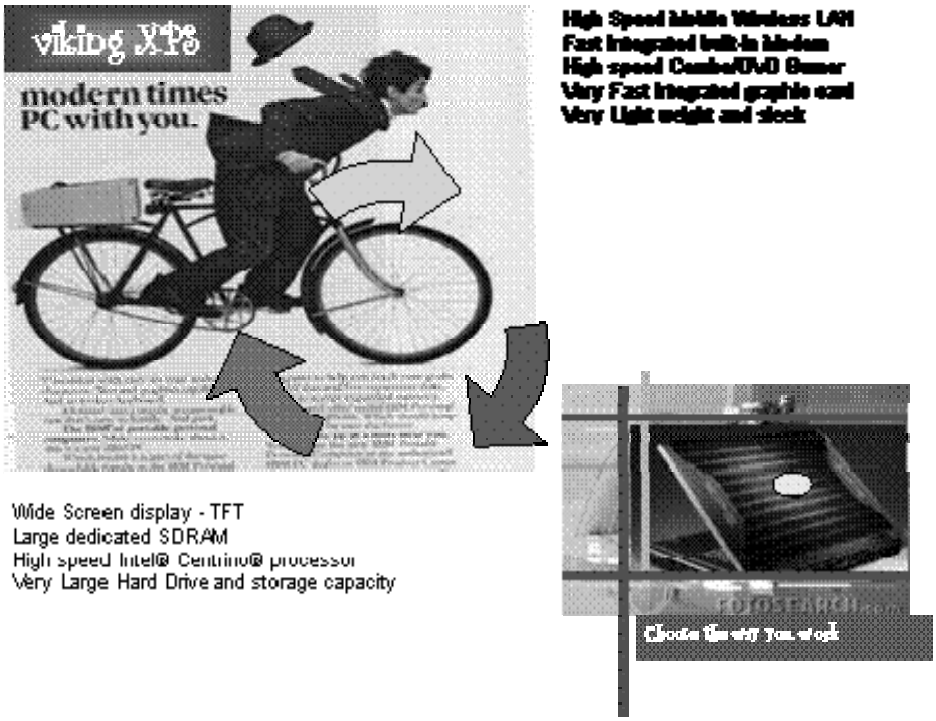


Figure D-4: Non-Vivid Verbal



Appendix E: Statistics and Terminologies

Appendix E-1: Statistics and Tests - MANOVA

MANOVA & MANCOVA
1. Multivariate analysis of variance (MANOVA) is simply an ANOVA with several dependent variables.
2. Instead of a univariate F value, we would obtain a multivariate F value (Wilks' lambda) based on a comparison of the error variance/covariance matrix and the effect variance/covariance matrix.
3. The "covariance" here is included because the two measures are probably correlated and we must take this correlation into account when performing the significance test.
4. Testing the multiple dependent variables is accomplished by creating new dependent variables that maximize group differences. These artificial dependent variables are linear combinations of the measured dependent variables.

Multivariate tests in contrast, answer the question, "Is each effect significant?" That is, where the F test focuses on the dependents, the multivariate tests focus on the independents and their interactions. The multivariate formula for F is based not only on the sum of squares between and within groups, as in ANOVA, but also on the sum of cross products - that is, it takes covariance into account as well as group means. There are four leading multivariate tests of group differences. *(This research uses Wilks' Lambda).*

Wilks' lambda: This is the most common, traditional test where there are more than two groups formed by the independent variables. Wilks' lambda is a multivariate F test, akin to the F test in univariate ANOVA. It is a measure of the difference between groups of the centroid (vector) of means on the independent variables (Smaller the lambda - greater the differences). The Bartlett's V transformation of lambda is then used to compute the significance of lambda. Wilks's lambda is used, in conjunction with Bartlett's V, as a multivariate significance test of mean differences in MANOVA, for the case of multiple interval dependents and multiple (>2) groups formed by the independent(s). The t-test, Hotelling's T, and the F test are special cases of Wilks's lambda.

Appendix E-2: Statistics and Tests – Results and Interpretations

RESULTS & INTERPRETATION
1. If the overall multivariate test is significant, we conclude that the respective effect is significant.
2. After obtaining a significant multivariate test for a particular main effect or interaction, customarily one would examine the univariate F tests for each variable to interpret the respective effect. In other words, one would identify the specific dependent variables that contributed to the significant overall effect.
3. MANOVA is useful in experimental situations where at least some of the independent variables are manipulated.
4. It has several advantages over ANOVA:
a. First, by measuring several dependent variables in a single experiment, there is a better chance of discovering which factor is truly important.
b. Second, it can protect against Type I errors that might occur if multiple ANOVA's were conducted independently.
c. Additionally, it can reveal differences not discovered by ANOVA tests.

CAVEAT
1. It is a substantially more complicated design than ANOVA, and therefore there can be some ambiguity as to which independent variable affects each dependent variable.
2. Moreover, one degree of freedom is lost for each dependent variable that is added.
3. The gain of power obtained from decreased SS error may be offset by the loss in these degrees of freedom.
4. Finally, the dependent variables should be largely uncorrelated. If the dependent variables are highly correlated, there is little advantage in including more than one in the test given the resultant loss in degrees of freedom.

Appendix E-3: Statistics and Tests - Assumptions

Assumptions

a. **Observations are independent of one another**. MANOVA is not robust when the selection of one observation depends on selection of one or more earlier ones, as in the case of before-after and other repeated measures designs. However a variant of MANOVA does exist for repeated measures designs.

b. **The independent variable** is or the variables are categorical.

c. **The dependent variables** are continuous and interval level.

d. **Low measurement error of the covariates**. The covariate variables are continuous and interval level, and are assumed to be measured without error. Imperfect measurement reduces the statistical power of the F test for MANCOVA and for experimental data, there is a conservative bias (increased likelihood of Type II errors: thinking there is no relationship when in fact there is a relationship) .As a rule of thumb, covariates should have a reliability coefficient of .80 or higher.

e. **Equal group sizes**. To the extent that group sizes are very unequal, statistical power diminishes. SPSS adjusts automatically for unequal group sizes. In SPSS, METHOD=UNIQUE is the usual method.

f. **Appropriate sums of squares**. Normally there are data for every cell in the design. For instance, 2-way ANOVA with a 3-level factor and a 4-level factor will have 12 cells (groups). But if there are no data for some of the cells, the ordinary computation of sums of squares ("Type III" is the ordinary, default type) will result in bias. When there are empty cells, one must ask for "Type IV" sums of squares, which compare a given cell with averages of other cells. In SPSS, Analyze, General Linear Model, Univariate; click Model, then set "Sum of Squares" to "Type IV" or other appropriate type depending on one's design:

   i. *Type I*. Used in hierarchical balanced designs where main effects are specified before first-order interaction effects and first-order interaction effects are specified before second-order interaction, etc. Also used for purely nested models where a first effect is nested within a second effect, the second within a third, etc. And used in polynomial regression models where simple terms are specified before higher-order terms (ex., squared terms).

   ii. *Type II*. Used with purely nested designs which have main factors and no interaction effects, or with any regression model, or for balanced models common in experimental research.

   iii. *Type III*. The default type and by far the most common, for any models mentioned above and any balanced or unbalanced model as long as there are no empty cells in the design.

   iv. *Type IV*. Required if any cells are empty in a balanced or unbalanced design. This would include all nested designs, such as Latin square design.

g. **Adequate sample size**. At a minimum, every cell must have more cases than there are dependent variables. With multiple factors and multiple dependents, group sizes fall below minimum levels more easily than in ANOVA/ANCOVA.

h. **Homogeneity of variances.** The dependent variable should have the same variance in each category of the independent variable. When there is more than one independent, there must be homogeneity of variances in the cells formed by the independent categorical variables. The reason for this assumption is that the denominator of the F-ratio is the within-group mean square, which is the average of group variances taking group sizes into account. When groups differ widely in variances, this average is a poor summary measure. Violation of the homogeneity of variances assumption will increase type I errors in the F test (wrongly rejecting the null hypothesis). The more unequal the sample sizes in the cells, the more likely violation of the homogeneity assumption.

i. However, ANOVA is robust for small and even moderate departures from homogeneity of variance (Box, 1954). Still, a rule of thumb is that the ratio of largest to smallest group variances should be 3:1 or less. Moore (1995) suggests the more lenient standard of 4:1. When choosing rules of thumb, we must remember that the more unequal sample sizes, the smaller the differences in variances which are acceptable. Marked violations of the homogeneity of variances assumption can lead to either over- or under-estimation of the significance level disrupt the F-test.

   i. **Levene's test of homogeneity of variance** is computed by SPSS to test the ANOVA assumption that each group (category) of the independent(s) has the same variance. If the Levene statistic is significant at the .05 levels or better, the researcher rejects the null hypothesis that the groups have equal variances. The Levene test is robust in the face of departures from normality. Note, however, that failure to meet the assumption of homogeneity of variances is not fatal to ANOVA, which is relatively robust, particularly when groups are of equal sample size. For Example: When groups are of very unequal sample size, *Welch's variance-weighted ANOVA* was recommended.

   ii. **Bartlett's test of homogeneity of variance** is an older test which is alternative to Levene's test. Bartlett's test is a chi-square statistic with (k-1) degrees of freedom, where k is the number of categories in the independent variable. The Bartlett's test is dependent on meeting the assumption of normality and therefore Levene's test has now largely replaced it.

   iii. **Brown & Forsythe's F test of equality of means** is more robust than ANOVA using the Levene's test when groups are unequal in size and the absolute deviation scores (deviations from the group means) are highly skewed, causing a violation of the normality assumption. The Brown-Forsythe F test does not assume homogeneity of variances.

   iv. **Welch's test of equality of means** is used when variances and/or group sizes are unequal. In SPSS, Analyze, Compare Means, One-Way ANOVA; click Options; select Welch test.

Box plots are a graphical way of testing for lack of homogeneity of variances. One requests side-by-side box plots for each group, such that samples form the x axis. The more the width of the boxes varies markedly by sample, the more the assumption of homogeneity of variances is violated.

Appendix F: Summary of Selected literature

Appendix F-1: Presentation Form

Authors	Topic	Manipulation	Relevant Dependent Variables	Relevant Results
Borgida (1979)	Auto negligence case	The character testimony expressed in terms of specific acts versus general reputation (between group designs).	Verdict and damage award, attribution of responsibility, recall and judgment.	Vividness had no effect on recall
Taylor, Wood and Thompson (1988)	Information and messages about juvenile crimes, colors effect on moods etc.	Both vivid and non-vivid versions of the messages were presented to each subject (within group design).	General persuasion, personal Persuasion, evaluation, judgment, and recall.	Vivid version of the message performed better during memory task and was found to be generally persuasive than pallid information.
Frandsen (1965)	Threat appeals and media of transmission	Vivid versus pallid information descriptions (between group designs).	Memory task (recall) and evaluation task (attitude change)	No vividness effect on recall and judgment
McGill and Anand (1989).	Role of cognitive elaboration and effects of vivid attributes.	Apartments and automobiles are chosen as the product classes in the experiment. Subjects were asked to visualize and elaborate the information presented to them and evaluated in terms of a 'flamboyant' versus 'stalwart' alternative.	Evaluation and cognitive responses.	There was significant main effect for vividness. Vividness effect was also moderated by a significant vividness by elaboration interaction.

Authors	Topic	Manipulation	Relevant Dependent Variables	Relevant Results
Shedler and Manis (1986).	Parental fitness argument.	Vivid and pallid arguments for favorable and unfavorable conditions (within group design).	Judgment, recall for both immediate and recall situations.	Vividness effects on both judgment and recall.
Shedler and Manis (1986, exp.2).	Student's names and academic institutions.	Presence and absence of pictorials (within group design).	Memory tasks for students names and academic associations	Vividness influenced both judgment and recall.
Kisielius and Sternthal (1984)	Print advertisement.	Advertisement in a written format versus both written and in a pictorial format. Instructions to su0bjects also included presentation speed and other communication information (between group design).	Judgments and evaluation about the shampoo product category.	There were significant interactions and no main effects presentation format.
Shieffer (1986).	Effect of verbal and non-verbal vividness on student information processing.	Impact of vivid and non-vivid, verbal and non-verbal behavior of a lecturer on four categories of student information processing.	Evaluation (semantic differential), cognitive response and recall.	Verbal vividness influenced students' recall, and non-verbal vividness had a positive impact on the student's attention.

Authors	Topic	Manipulation	Relevant Dependent Variables	Relevant Results
Reyes, Thompson and Bower (1980)	The drunk driving case.	Vivid defense arguments versus pallid prosecution arguments or vice versa (Within group design).	Immediate judgments and recall.	No immediate vividness effects, though there was vividness effect after a span of 48 hours.
Miller (1970)	Cowboy film.	Still versus motion film (Between design).	Attitude measures and recall tests	Attitudes were significantly more favored to still pictures. No differences on recall tasks.
Costley and Brucks (1992).	Print advertisements.	Influence of verbal and pictorial presentation of information on brand preferences (within group design).	Recall and preference judgments.	Pictorial attributes were better recalled than verbally described attributes.
Borgida and Nisbett (1977)	Course information.	Case-history presentation versus written presentation (Between group design).	Choice task and memory tasks (recall).	Case history presentation had more influence than written presentation. Recall was better for the written condition.
Fogarty (1995).	Relationship between vivid advertising and judgments made after message presentation.	Radio and television advertising with the use of vividness (utilization of colors, concrete language and animations).	Judgment and recall.	Findings indicate that perceived persuasiveness was increased equally across the three advertising channels if the ads were vivid in nature.

Authors	Topic	Manipulation	Relevant Dependent Variables	Relevant Results
Kisielius and Sternthal (1984).	Detecting and explaining the vividness effects in attitudinal judgments.	Pictorial representation. In this condition, each verbal statement was accompanied by a pictorial analog. (Tested the adequacy of the availability valence hypothesis.	Attitude measures.	Results provide evidence for the vividness effects on judgment than verbal information presented with just pictorial analogs.
Sullivan and Macklin (1988).	Print advertisements.	Vivid versus and pallid pictorial advertisement (between group designs).	Judgment and evaluation about the ad (A_{ad}) and recall of advertisement.	No significant differences were found between conditions.
Hamill, Wilson and Nisbett (1980).	Welfare case.	Case history versus base rate information (within group design).	Judgment and recall tasks	For recall tasks, base rate was good for all, and case history influenced judgments.
Kunbzansky (1996)	Vivid effects and personal relevance.	Personal relevance, argument quality of the message and concrete versus pallid information (Aids prevention message).	Attitude-change and recall tests.	Vivid messages were found to increase fear, risk estimates, and more persuasion as compared to pallid information. Vivid message led to greater intentions for future condom use than pallid information

Authors	Topic	Manipulation	Relevant Dependent Variables	Relevant Results
Broihier (1990)	The importance of persuasive appeals and vividness effects.	Newspaper stories about physical and mental stress symptoms (pictorial versus non-pictorial illustrations).	Recall and risk judgments.	Vividness had no effect on risk judgments, indicating that presence of pictorial illustrations alone did not influence attitudes.
Frey and Eagly (1993)	Vividness can undermine the persuasiveness of the message.	Two social issues were presented of the vivid and pallid condition with different levels of constrained attention.	Recall measures.	Vivid elements in the message (colorful, language, pictorially stimulating and provocative metaphors) interfered with the respondent's reception of its essential meaning and thereby reducing their memorability and persuasiveness.
Wilson, Northcarft and Neale (1989)	Information competition and vividness effects.	Simulated jury decision-making trial (civil lawsuit).	Judgment task and recall.	Vivid information was perceived by subjects to be evoking images and memorable. Judgments were significantly biased in favor of the disputant using vivid presentation.

Appendix F-2: Information Mode

Authors	Topic	Manipulation	Relevant Dependent Variables	Relevant Results
Wallsten, Budescu and Zwick (1993).	Preference and reasons for communicating information in verbal or numerical form.	Preference for numerical and verbal probability scales.	Preference and evaluations.	34% expressed preference for numerical information, 30% expressed opposite preferences and 35% preferred numerical information but would like to convey that it verbally.
Huber (1980)	Influence of task variables on cognitive operations.	Numerical and verbal information, type, and number of alternatives.	Evaluation and cognitive elaborations.	Numerical conditions were more often used for cognitive functions.
Witt (1976).	Effects of Quantification in scientific writing.	Textual difficulty such as, quantification, in an academic setting.	Attitude and evaluation.	Quantification increases textual difficulty. Also favorability decreased after being exposed to quantitative message.

Authors	Topic	Manipulation	Relevant Dependent Variables	Relevant Results
Viswanathan (1991).	Understanding the differences in processing of numerical and verbal magnitudes.	Presentation of numerical and verbal information during a learning task.	Recall, choice, judgment and processing time.	Exp 1: Numerical information required less processing time than verbal information. Exp 2: Numerical information was recalled more accurately than verbal information. Exp 3: Numerical information was recognized faster than verbal information.
Viswanathan and Narayanan (1992).	Information using acquisition patterns related to processing of scale value numerical versus and natural value numerical and verbal attribute information.	Learning and online choice (between subject manipulations). Information mode manipulation (within subject manipulation). Numerical and verbal information were assigned to brands to encourage processing of all information on all brands.	Judgment after learning task and choice tasks.	A greater degree of attribute based processing was not found for natural-value numerical information compared to verbal information. No difference was found between learning and choice conditions.

Authors	Topic	Manipulation	Relevant Dependent Variables	Relevant Results
Stanners (1990).	Non-conscious Processing of numerical information.	Visual numerical information processing and auditory numerical information processing. (Students required performing simple numerical operations).	Reaction time for visual and auditory processing.	Results indicated that subjects reaction times were longer during visual tasks, and their accuracy was attenuated during the auditory task.
Viswanathan (unpublished Manuscript).	Influence of summary information on usage of nutrition information.	Nutritional information on several attributes for several brands. Information was exposed on a brand of breakfast cereal on four attributes.	Recall of nutrition information, judgment on healthiness of brands.	Provision of summary information appears to lead to a sharper discrimination between healthy and unhealthy brands.
Chang (1997).	Dependability of anchors in scales.	Numbers of scale option – verbal and numerical anchors.	Evaluation of dependability of scale labels and attitude measurements .	Numerals associated with the measurement scales were constant. When the numerical scales are clearly defined and consistent across items and tests, labeling difference does not seem to contribute to observed variance.

Authors	Topic	Manipulation	Relevant Dependent Variables	Relevant Results
Stone (1992).	Representation of numerical information with respect to category structures	A rapid serial presentation that requires the subject to retype each stimulus item.	Memory representation and recall tests.	Results favor subject's abstracts distribution information to process and organize incoming information.
Ido and Brent (1990)	Verbal versus numerical probabilities.	Preference paradox (sport writers and broadcasters) evaluation and assessment about the probabilities of a basketball game.	Judgment and decision-making.	While most conveyors of information used verbal terms when expressing their opinions spontaneously, most decision-makers preferred to receive numerical probabilities.
McCloskey and Macaruso (1995).	Representing and using numerical information.	This article synthesizes and recent theoretical and empirical research concerning cognitive representations in one specific domain, that of numbers (verbal, numerical or verbal-numerical).	Cognitive representations and responses to numbers.	Research on numerical representations also contributes to the treatment of developmental and acquired deficits in numerical cognition (McCloskey, 1992).

Authors	Topic	Manipulation	Relevant Dependent Variables	Relevant Results
Svenson and Karlsson (1986).	Decision alternatives characterized by numerical and non-numerical information.	Combinations of numerical and verbal information describing apartments for purchase were presented	Choice tasks and decision alternatives.	The results indicated weak effects but the mode of information presented of the most important attribute (traveling time) seemed to be important for the evaluation of alternatives. In general subjects emphasized more on numerical information as compared to verbal information.
Muller (1985).	Information factors that stimulate the use of nutrition information.	Nutritional importance, information format, amount of information and variation among brands.	Purchase intention and brand preferences.	Four factors were studied: information format, variation among brands, importance and amount of information. Consumers' use of nutritional information would diminish as the amount of information is increased.

Authors	Topic	Manipulation	Relevant Dependent Variables	Relevant Results
Assam and Bucklin (1973).	Nutritional information and brand preferences.	Presented grocery shoppers with nutritional values for canned food and consumer responses.	Brand preferences.	Observed only a limited shift in brand preferences with nutritional information.
Scammon (1977)	Information load and nutritional brand ratings.	Presentation of brands in a nutritional form (numerical descriptors) and in a verbal form (use of adjective descriptors).	Brand preference.	Exposure to nutritional brand ratings failed to alter brand preference.
Rudell (1979)	Nutritional data and variation in brands.	Presentation of nutritional information for multiple brands.	Brand choice.	14% of respondents changed their choices to a more nutritious alternative.
Miller (1978)	Nutrition information usage.	Nutritional information presentation and usage ratings in a print medium.	Purchase intention.	Respondents want to have nutrient data in a numerical form.
Venkatesan (1977).	Providing nutritional information to consumers.	Listing of nutrient content versus summary score or index of nutritional quality for print ads.	Purchase intention.	Consumers are more likely to incorporate nutritional data in their purchase decisions.

Authors	Topic	Manipulation	Relevant Dependent Variables	Relevant Results
Brucks, Mitchell and Staelin (1984)	Nutritional knowledge and information processing.	Nutritional information and moderating effects of knowledge.	Nutrient content, purchase intention and recall.	Results indicate that the more knowledgeable subjects relied less on nutritional information in forming an opinion of the nutritious-ness of the advertised brand.
Moorman (1990).	Nutritional information in percentage reference form	Provision of reference information in USRDA percent form.	Recall and cognitive elaboration.	Findings show that percentage nutrition information led to greater ability to process and more accurate recall and comprehension.

Pre-note: Consumers utilize the information presented by reading it, and upon processing, form some kind of impression about which brands are better. This view of information utilization focuses on the cognitive aspect of usage of information, so that the effects of numerical information would be measured by recall and knowledge measurements or the ability to comprehend numerical (e.g. nutritional values, Bettman, 1975).

Appendix F-3: Consumer Knowledge

Authors	Topic	Manipulation	Relevant Dependent Variables	Relevant Results
Hecht and Proffitt (1995).	Effects of experience and expertise on water level task.	Performance relation to experience and expertise (between group design).	Judgment task.	Novices produced more errors on the complex quantitative task measuring water levels compared to experts in the area.
Graeff (1995).	Comprehension of product attributes and promotional strategies.	Knowledge and means end inferences.	Brand attitude and ad attitude and comprehensio n.	Findings report that comprehension is a constructive process. The results also show that experts comprehend product information.
Maheswaran and Sternthal (1990).	Effects of level of product knowledge on consumers processing of attributes and attributes plus consequences ads.	Product knowledge and its association with brand attitudes in response to attribute only advertisement.	Attitude toward the ad and attitude toward the brand.	Consumers infer positive inferences when exposed to attribute information.
Brucks, Mitchell and Staelin (1982)	Nutritional knowledge and information processing.	Nutritional information and moderating effects of knowledge.	Nutrient content, purchase intention and recall.	Results also indicate that experts may use relative nutrition of a brand or may have encoded the nutritional information at a more concrete level (elaboration)

Authors	Topic	Manipulation	Relevant Dependent Variables	Relevant Results
Spence and Brucks (1997).	Moderating effects of problem solving on experts and novices.	Comparison of experts and novices when solving a complex problem.	Judgment tasks.	Compared to novices, experts select fewer, but more diagnostic information inputs. Their judgments are also more pronounced as compared to novices during problem solving.
Cordell (1997).	Consumer knowledge and product evaluation.	A complex product technical attribute message. Price indicator based on knowledge measure.	Product evaluation as a function of knowledge measure.	Results also indicate that consumers use their knowledge to differentiate among extrinsic product attributes in a manner consistent with relative importance of the attributes.
Rao and Monroe (1988).	Moderating effects of prior knowledge.	Use of price cues and product cues.	Assessment of product quality.	As consumers' product familiarity increases, the use of intrinsic cues for product quality assessments tends to become relatively stronger.

Authors	Topic	Manipulation	Relevant Dependent Variables	Relevant Results
Muthukrishnan and Weitz (1991).	Role of product knowledge and brand extension.	Responses to sporting goods manufacturer for their product and promotional strategy.	Attitude measures, judgment similarity between original brand and new brand.	The three-way interaction showed that there is no expert-novice difference in the liking for brands in the original product category.
Yalch and Yalch (1984).	Effects of numbers on the route to persuasion.	Opinions of advertising and television programming and message quantitative-ness.	Attitudes and cognitive responses.	Numerical information stimulates consumers to rely on peripheral processing as a basis for judgment.
Kim, Kardes, and Herr (1991)	Consumer expertise and Vividness effects and implications for judgment and inference.	Personal computer product category. Testimonials from two different magazines in either a vivid or a pallid form were presented. The content of the testimonials was held constant.	Measure of Attitude	When the testimonials were favorable, more favorable brand attitudes were formed when the testimonials were in a vivid form. This pattern was more pronounce for experts than novices. Hence, the manner in which the information is presented has a strong effect on product evaluations, even when the information is held constant. Although vividly

.				presented Information influences the judgments of both experts and novices; it has a greater impact on judgments of experts.
Sujan (1985).	Consumer knowledge and effects on evaluation strategies.	Piecemeal versus category base processing in simulated print ads (camera-35mm), for match & /mismatch and actual content of the information.	Cognitive responses, response times and evaluations.	Total number of cognitive responses to the product was generated in the mismatch conditions than the match condition. Expertise by match/mismatch condition. Experts producing more thoughts in the mismatch condition as compared to novices lead to interaction.

Appendix G: Miscellaneous –Results

Table G-1: Multivariate Tests -MANCOVA

Knowledge	Effect – Wilks' Lambda	Value	F	Sig.	Partial Eta Squared
Novices	PNI	.936	.979	.437	.064
	IM	.082	159	p<.001	.918
	PF	.212	52.7	p<.001	.788
	IM x PF	.195	58.6	p<.001	.805

Table G-2: Multivariate Tests -MANCOVA

Knowledge	Effect – Wilks' Lambda	Value	F	Sig.	Partial Eta Squared
Experts	PNI	.902	1.54	.186	.098
	IM	.123	101	p<.001	.877
	PF	.728	5.30	p<.001	.272
	IM x PF	.609	9.13	p<.001	.391

Table G-3: Test of Between Subjects – Main Effects (Judgment)

Knowledge	Source	Dependent Variable	df	MS	F	Sig.	Eta
Novices Main Effects	PNI						
		A_{ai}	1	.364	1.44	.234	,019
		P_i	1	.086	.422	.518	,006
		A_b	1	.356	1.23	.271	,016
		A_{ad}	1	.128	.614	.436	,008
	IM						
		A_{ai}	1	113	448	p < .001	,857
		P_i	1	66.9	328	p < .001	,814
		A_b	1	95.43	330	p < .001	,815
		A_{ad}	1	91.74	440	p < .001	,855
	PF						
		A_{ai}	1	4.39	17.3	p < .001	,188
		P_i	1	12.25	60.07	p < .001	,445
		A_b	1	36.64	126	p < .001	,627
		A_{ad}	1	40.83	196	p < .001	,723

Table G-4: Test of Between Subjects – Main Effects (Judgment)

Knowledge	Source	Dependent Variable	df	MS	F	Sig.	Partial Eta Squared
Experts Main Effects							
	PNI	A_{ai}	1	.016	.057	.811	,001
		P_i	1	.502	3.81	.055	,048
		A_b	1	.406	1.97	.164	,026
		A_{ad}	1	.005	.054	.816	,001
	IM	A_{ai}	1	12.9	46.74	p < .001	,384
		P_i	1	27.42	208	p < .001	,735
		A_b	1	31.53	153	p < .001	,672
		A_{ad}	1	9.24	97.9	p < .001	,566
	PF	A_{ai}	1	.594	2.14	.148	,028
		P_i	1	.570	4.32	.041	,054
		A_b	1	.060	.294	.589	,004
		A_{ad}	1	1.43	15.16	p < .001	,168

Table G-5: Test of Between Subjects – Main Effects (Recall)

Knowledge	Dependent Variable	df	MS	F	Sig.
Novices IM	Recall	1	4.61	15.9	P<.001
Novices PF	Recall	1	19.8	68.4	p < .001
Experts IM	Recall	1	5.66	11.42	P<.001
Experts PF	Recall	1	.893	1.80	.183

Table G-6: Test of Between Subjects – Two Way Interaction (Recall)

Knowledge	Dependent Variable	df	MS	F	Sig.
Novices (IM x PF)	Recall	1	1.79	6.21	.015
Experts (IM x PF)	Recall	1	5.63	11.41	p < .001

Table G-7: Test of Between Subjects – Two Way Interaction (Judgment)

Knowledge	Dependent Variable	df	MS	F	Sig.	Eta Squared
Novice IM x PF						
	A_{ai}	1	.066	.259	.612	,003
	P_i	1	9.55	46.83	p < .001	,384
	A_b	1	51.12	177	p < .001	,702
	A_{ad}	1	36.86	177	p < .001	,703
Experts IM x PF						
	A_{ai}	1	4.15	14.95	p < .001	,166
	P_i	1	3.34	25.39	p < .001	,253
	A_b	1	.036	.173	.678	,002
	A_{ad}	1	.142	1.50	.224	,020

Notes: