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THE EFFECTS OF VISUAL COMPLEXITY IN PRINT ADVERTISING DESIGN ON LOOKING TIME, AROUSAL, AND RATINGS OF INTERESTINGNESS AND PLEASINGNESS

By

Edward Charles Scheiner

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Mass Media Ph.D. Program
College of Communication Arts & Sciences

1987

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ABSTRACT

THE EFFECTS OF VISUAL COMPLEXITY IN PRINT ADVERTISING DESIGN ON LOOKING TIME, AROUSAL, AND RATINGS OF INTERESTINGNESS AND PLEASINGNESS

By

Edward Charles Scheiner

This study examined the application of a Theory of Collative Motivation developed by D. E. Berlyne to print advertising design.

It was predicted that the more visually complex an ad design is, the longer it would be examined, the more arousal it would produce in a viewer, and the more interesting but less pleasing it would be perceived as being.

Seventy-two subjects individually viewed nine test ads each. Each subject saw three ads for each of three products, at each of three complexity levels. Subjects viewed the ads as slides projected on a screen at their own pace while a GSR measure was taken. They then rated each advertisement on complexity, interestingness and pleasingness.

Advertisements with fewer copy blocks, and type variations were perceived as less complex than ads with more of these characteristics. However, there was also an unplanned significant difference in perceived complexity between ads for the three products. The more visually complex ads were viewed longer, supporting the first hypothesis.

A second hypothesis, that exposure to more complex ad designs would be associated with elevated arousal levels was not supported.

While there was a significant difference in judged interestingness between ads for the three products, there was not between ads representing different levels of complexity, failing to support the third hypothesis which predicted the latter effect.

High complexity ads for all three products were judged less pleasing than low complexity versions as predicted by the last hypothesis. However, differences between ads for the three products showed the ones which were perceived more complex were also perceived as being more pleasing.

A new interpretation of Berlyne's theory is suggested when applied to stimuli containing an intentional meaning. An "Ah Ha" Theory is proposed. In this view, interestingness may represent the amount of difficulty presented by a design in decoding its intended meaning while pleasingness might represent the magnitude of psychological reward gained as a result of successful decoding.

Dedicated to Marion Laube

Her memory provides eternal inspiration

ACKNOWLEDGMENTS

There are many people who deserve recognition for their support in the completion of this report but none near so much as my spouse, Kathy Scheiner, who throughout this effort motivated, inspired, comforted, and indulged me. For her exceptional understanding, patience and consistent support I am eternally grateful.

Of course, I would like to also acknowledge the support of my Guidance Committee members. Most especially Dr. Gordon Miracle, Chairman, and Dr. Gretchen Barbatsis, Dissertation Advisor. Dr. Miracle, from the outset, has consistently been available for advice, has provided persistent encouragement and as Chairman of my committee, been exceptionally supportive. His extensive experience in administration, research, and counseling have been very evident in his recommendations and inspiration. I am indebted as well to Dr. Gretchen Barbatsis who's knack of getting at the essential greatly helped in keeping this effort within manageable proportions. Her insight continously directed me in the most efficent direction.

Dr. Bruce Vanden Bergh and Dr. Rose Zacks, as other members of my Guidance Committee, have also been helpful.

Dr. Vanden Bergh has shown great tolerance and fairness despite the prolonged completion of this work. Dr. Zacks, who joined my committee most recently, has provided a valuable perspective from the field of Psychology which is greatly appreciated. For her critiques, suggestions, and advice I am very grateful.

I would also like to mention that I drew much inspiration from Dr. Sandra Moriarty, who initially served as my Dissertation Advisor before she left Michigan State University. Dr. Moriarty shared many professional interests with me and constantly served as a catalyst in advancing my research activity. Her companionship and professional tutoring has earned my greatest respect.

Finally, I express my gratitude to the administrative staff in the Department of Advertising. Besides their support of my role on the Department faculty, they had a way of brightening the darkest days with their enthusiasm and cheerfulness. They always brightened my spirits. In particular, I would like to acknowledge the professional performance and amiable presense of Nancy Gee, office manager, who has set the tone for the Department of Advertising staff during my entire stay at Michigan State University. Other staff members are too numerous to mention them all, but I must mention that I have admired ALL of them while I have been at M.S.U. Never have I encountered rude or unresponsive treatment. I am very grateful.

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CHAPTER I

INTRODUCTION

Problem Statement

Stephen Fox, author of a recent history of advertising, called it a "permanent quarrel" and traces its roots to the earliest days of the twentieth century, when artists and graphic designers first became involved with the creation of advertisements (Fox, 1984, p.40). The quarrel Fox refers to is one concerning the relative importance of words and design (content vs. form) in print advertisements. The controversy has continued throughout this century and remains today.

It may seem facetious at first to ask whether the design of advertising matters even one iota in determining advertising effectiveness. Of course it matters, is the obvious reply by some. Or is it so obvious? While it seems that design must have some importance, this assumption is not universally acknowledged.

For example, David Ogilvy, one of the most successful advertising people of this century, pokes the following fun at the importance of typography in advertisements:

> Once upon a time I was riding on the top of a Fifth Avenue bus, when I heard a mythical housewife say to another, "Molly, my dear, I would have bought that new brand of toilet soap if only they hadn't set the body copy in ten point Garamond.

Ogilvy suffixes his humor with his admonishment against the importance of the form or design of advertisements:

> Don't you believe it. What really decides consumers to buy or not to buy is the content of your advertising, not its form. (Ogilvy 1963)

Even those who grant design is important seem unsure about the value of design and its role in modifying an advertisement's effectiveness. For example, Roy Paul Nelson, author of a leading textbook on advertising design, has no more than this to say about the value of good design:

> The real designer will not deny that undistinguished design can do a selling job. Nor will he argue that good design necessarily sells better than poor design. The product, if it is desirable enough, can sell itself. But the designer will insist that design considerations can't hurt an ad's chances. And he'll point out that the satisfactions of producing tasteful advertising far outweigh those of producing vulgar advertising. (Nelson, 1977, pp. 11-12)

Are we to believe that the chief values of good design are that it "can't hurt an ad's chances," and that it is more satisfying to produce? While an affirmative response to this question probably has its share of proponents, there is far too little empirical evidence available to draw objective conclusions.

At least three studies (Morrison and Dainoff, 1972; Hendon, 1973; and Rossiter, 1981) have suggested an increasing importance for advertising design. These

authors have suggested that Federal Trade Commission rulings limiting options in constructing advertising content will place an increased burden on advertising design in achieving advertising effectiveness. Hendon (1973) describes this view best by claiming:

> In June 1971, the FTC passed a regulation requiring all U.S. advertisers to substantiate each claim made in their advertising messages. If the heretofore sacrosanct privilege of "puffery" is removed from the advertiser's list of controllable variables, it is hypothesized that a movement will begin which de- emphasizes content in advertising messages and which again emphasizes the graphic aspects of the message. (Hendon, 1973, p.39)
>
> If the 1971 FTC ruling has the effect of reducing the content of competing advertising messages to the level of sameness, then the mechanical or graphics elements in the message will become the only tool advertisers can safely rely upon to perform the job of making advertising messages more memorable, just as the mechanical elements did when they were the object of serious research in past decades. (Hendon, 1973, p.43)

While there has been a great deal written about the design of print advertisements, most of the available literature is based on conventional wisdom developed through experience rather than through any scientific evidence. In comparison to other topics in advertising, graphic design has been a neglected step-child of scholarly research. This situation seems even more true today than it was three or four decades ago. Much of what research has been conducted in the area of graphic design in advertising was carried out by psychologists prior to 1940 (e.g., Brandt, 1925; Nixon, 1927; Davis, 1933; Ferguson, 1935; Schiller, 1935).

It is not surprising then that there are no major theories which explain the role of design in advertising effectiveness. While some studies have been conducted on behavioral responses to various design characteristics, these have been mostly descriptive. A few of these studies have discovered regression algorithms (a set of regression coefficients representing various graphic characteristics of stimuli used to predict a dependent variable such as readership) which have shown moderate ability to predict readership based on some design characteristics. However, none of these studies has even suggested an explanation for their findings. Without theoretical constructs, an adequate understanding of how graphic design relates to other advertising variables will be difficult to achieve. The development of theories can help guide future research in directions most useful to a greater understanding of the role of graphic design. Without a theoretical umbrella, empirical studies are sometimes undertaken almost randomly.

Indeed, much of the research which has been conducted to date in the area of advertising design can be classified as "fly swatter" research, studying isolated aspects of the subject without attempting to fit them into a broader theoretical context. For example, a number of studies have examined the graphic characteristics of advertisements and associated readership scores but fail to even suggest a reason for the results reported (Assael, Kofron and Burgi,

1967; Diamond, 1968; Holbrook and Lehmann, 1980; Twedt, 1952; Valiente, 1973).

Commercial research organizations also provide an abundance of data about responses to advertisements possessing various physical characteristics such as different column widths, use of white type against a dark background, use of color, advertisement size, etc. For example, Daniel Starch, founder of a research organization with reportedly over 2,000 subscribers (Weir, 1981), has published at least three books reporting consolidated results of many years of research (Starch, 1925, 1927, 1966). The Starch organization also publishes periodic reports. While such research is valuable in describing past responses to advertisements with various graphic traits, it is inadequate in explaining <u>why</u> particular results are obtained.

Although there exists a wide body of knowledge derived from psychology on visual perception which should be applicable to advertising design (e.g., Dember, 1960; Forgus, 1966; Haber and Hershenson, 1980), much of what we know derives from the study of simple and isolated stimuli, often with laboratory animals as subjects. Certainly this knowledge is valuable in understanding perceptual processes. Yet, much more needs to be done in seeking practical applications of this knowledge and understanding. As Shane (1980) describes the situation:

> The field of communication has not made any great strides in the investigation of visual stimuli perception. One reason may be the tendency of researchers to work on microscopic levels. Investigators are still attempting to comprehend the most basic effects of the simplest forms and patterns. They have avoided studying a complex visual display with a multitude of design variables, such as a two-page magazine ad spread. Arguments of empirical rigor aside, microscopic conclusions should build the foundation for a macroscopic view, but so far the builders have been using grains of sand rather than bricks and mortar.(pp.2-3)

However, Shane forgets to mention that the challenge presented by this comment is formidable. Visual characteristics such as illustration style, tonal variation, organization of elements, associations among elements, complexity, dynamics, etc., tend to defy objective measurement and isolation from other characteristics in the same stimulus.

Theoretical Approach

One theoretical approach which seems useful in addressing this challenge comes primarily from the works of perceptual psychologist Donald E. Berlyne. The basic premises of his theory are outlined in his book Conflict, Arousal and Curiosity (Berlyne 1960). In addition, Berlyne expanded and refined his theory in over a dozen published research reports. Numerous other scholars have replicated and expanded Berlyne's findings. Berlyne's Theory of Collative Motivation offers an explanation for psychological and behavioral responses to characteristics of visual

stimuli which Berlyne called collative properties. These properties include novelty, surprisingness, incongruity, and complexity. The theory suggests that such properties create psychological conflict in viewers and that this conflict in turn raises the viewer's arousal level. Such an increase in arousal level is thought to be discomforting and a drive to reduce it will result. Such arousal can be reduced and conflict relieved by prolonged viewing of the stimulus in an effort to reduce the uncertainty which it presents. Stated more simply, Berlyne's theory holds that people will tend to look longer at complex visual stimuli than they will at more common or simple ones because viewing novel or complex stimuli creates conflict and a distressing increase in arousal which extended examination can reduce. While Berlyne proposed that all of the collative properties elicit similar responses, most of the empirical work in support of the his theory has used visual complexity, and occasionally novelty, as the independent variable(s). Other aspects of the theory predict that stimuli with collative properties are more likely to attract attention (Berlyne 1958b), as well as hold it (Berlyne 1958a, 1958c), to be subjectively rated interesting, and to be subjectively rated unpleasant (Berlyne and Lawrence, 1964).

Attracting and holding attention are major objectives in designing advertisements. It may also be possible that the more pleasing a viewer perceives an ad to be the more pleasing they will view the product to be. Gresham and

Shimp (1985), for example, have found at least initial evidence that affective response to advertising may influence attitudes toward advertised brands. Of course, the opposite is also possible. Negative evaluations of how pleasing an ad is may also be transferred to evaluations of the product advertised. The effects of collative variablity on attention and perceptions of interestingness and pleasingness should, therefore, be of strong interest to those who design advertisements. Crow (1980) points out the need for testing applications of psychological theory such as Berlyne's to practical applications in graphic communications:

> One of the frustrations facing those who would seek to understand relationships between graphic communications and their effects is the dearth of laws, theoretical models or even fundamental principles upon which to draw.
>
> Solid foundations exist, much of them in the literature of applied psychology. Our understanding of human perception and information theory is remarkable. Yet, the gap between theory and practical application still seems extraordinarily wide. (Crow, 1980)

It is in this light that the need is seen to test the application of Berlyne's work to advertising design.

Like so much psychological research, nearly all of the work by Berlyne and his followers has been conducted using stimuli of the type so typical to laboratory research in perceptual psychology -- polygons, stars, colored letters, nonsense syllables, and simple line drawings. A few studies based on Berlyne's work have used photographs of objects and natural scenes, but without any accompanying linguistic

content (Leckart, 1965; Leckart and Bakan, 1965; Wohlwill, 1968). While a few attempts have been made to apply Berlyne's theory to mass media design (Morrison and Dainoff, 1972; Price 1972), these studies fall far short of adequately testing the theory for its possible application to advertising design.

Other theoretical approaches could also be considered; such as variety seeking (Fiske and Maddi, 1961), visual imaging ability (Rossiter and Percy, 1978), and involvement/brain hemisphere theory (Krugman, 1977). However, Berlyne's theory has been more extensively studied and there is a formidable body of published research results relating to his paradigm. For example, most of the 22 studies by Berlyne, both alone and in collaboration with others, as well as many other studies cited in the references section of this document pertain to Berlyne's theory. Such wide publication in refereed journals indicates a worthiness of this research which is recognized by many other scholars. Berlyne's concepts are also much more firmly founded in empirical research findings. In contrast, Scheiner, in a 1984 unpublished review of Krugman's paradigm reported that "while Krugman's writings seem rich in theoretical rhetoric, they offer relatively little empirical support for his model" (Scheiner, 1984). For example, a review of nine published works by Krugman (1962, 1965, 1966-67, 1970, 1971, 1972, 1975, 1977, 1980; Krugman and Hartley, 1970) pertaining to his theory found

that only four contained reports of original research (previously unreported), that four did not cite any supporting literature, and none contained empirical evidence in direct support of his model.

As pointed out earlier, there is a void in theoretical constructs available to explain responses to visual characteristics of advertising. Most of the few approaches (referred to above) proposed, while intuitively appealing, lack the extensive empirical study which Berlyne's theory has received.

Purpose

The purpose of this dissertation, then, is to examine the generalizability of Berlyne's theory of collative motivation to advertising design. More specifically, this research explores the possibility that collative variability of typography in advertising design elicits responses similar to those found to result from variations in visual complexity in less meaningful stimuli which provide the foundation of Berlyne's theory. In addition, the relationship between typographic complexity in print advertisements and evaluations of interestingness and pleasingness are compared to previous findings about such a relationship with simpler stimuli.

The research reported here does not attempt to overcome all the difficulties inherent in studying multiattribute

designs at once. Instead, it is a step in the direction of unifying some isolated findings and theories based on very simple visual stimuli and testing their application to advertising design and the responses it elicits.

While the results of the present study should be of interest to advertising practitioners, they should be of even greater academic interest in deepening our understanding of <u>why and how</u> graphic traits in advertising design affect viewer responses.

The following chapter will review previous findings which are pertinent to the purposes of the research reported here, suggest how these findings support the application of Berlyne's theory to advertising design, and present a number of specific hypotheses to be tested. Studies which examine the tenets of Berlyne's theory will be reviewed. These include findings which provide evidence that visual complexity bears a significant relationship to exploratory behavior and subjective evaluations of interestingness and pleasingness. On the basis of prior research, then, a number of hypotheses will be presented.

Summary

This Chapter has discussed the importance of print advertising design and the difficulties faced in its study. The lack of a sufficient theoretical framework was pointed out and it was explained how a theory of perceptual

curiosity formulated by Donald E. Berlyne might explain some prior findings and provide a theoretical foundation for further study of advertising design.

CHAPTER II

REVIEW OF PRIOR RESEARCH AND HYPOTHESES

Findings in Search of an Application

In addition to design principles gleaned from a general analysis of scores obtained by the Daniel Starch organization over the years which have been found to be associated with desirable viewer responses -- using narrow columns of text rather than wide measures; using short paragraphs; using ample space between paragraphs; using geometric rather than jumbled layouts; using photographs rather than drawings; devoting five eights of the page to a major illustration, and never putting text in reverse type (Weir, 1981) -- at least five academic studies have analyzed factors which seem related to how well viewers later recognize advertisements as ones they have seen before. As mentioned in Chapter I, these studies, which are reviewed in Scheiner (1985), describe physical characteristics of advertisements which seem to be associated with viewer responses, primarily the ability to recognize the ads later. The characteristics which most commonly had a significant relationship to later recognition in all of these studies were ad size, the amount of space devoted to illustration, and the number of colors used.

Scheiner (1985) found all three of these variables to be significantly correlated with subjective judgments of complexity in the design of 129 previously published advertisements. This suggests the possibility that it may be the broader concept of visual complexity which might explain the major findings of studies such as those by Assael, Kofron and Burgi (1967), Diamond (1968), Holbrook and Lehmann (1980), Twedt (1952), Valiente (1973).

The Theory of Collative Motivation

Perceptual psychologist Donald E. Berlyne began writing about attentional processes in the early 1950's. His research examined attention and novelty (Berlyne, 1950a), attention and stimulus intensity (Berlyne, 1950b), attention and changes in stimuli (Berlyne, 1951b), and attention and perception (Berlyne, 1951a). His focus then seemed to turn to the study of human curiosity (Berlyne, 1953, 1954a, 1954b, 1955). By the late 1950's Berlyne began examining aspects of perceptual conflict (Berlyne, 1957a, 1957b, 1957c, 1961). About the same time he authored a number of studies on visual complexity (Berlyne, 1958a, 1958b, 1958c). He often related his findings to both behavior theory (Berlyne, 1951a, 1951b, 1957c) and information theory (Berlyne, 1957b, 1957c). This early work began to take focus in the late 1950's and Berlyne (1958a) at this time developed a set of pairs of figures which represented "more

irregular" and "less irregular" visual stimuli. These stimuli, along with an additional set introduced later (Berlyne, 1963a), which Berlyne said may be equated with "more complex" and "less complex" stimuli, have been used in a multitude of studies examining various human responses to visual complexity such as duration of exploration (Berlyne, 1957b; 1958a; 1958c; Smock and Holt, 1962; Berlyne and Lewis, 1963; Minton, 1963; Berlyne and Lawrence, 1964; Day, 1965; Clapp and Eichorn, 1965), exploratory choice (Berlyne, 1963a; Berlyne and Lewis, 1963; Hoats, Miller and Spitz, 1963; Day, 1965), verbal evaluative ratings and rankings (Berlyne, 1963a; Day, 1965), GSR incidence (Berlyne, Craw, Gelman, and Mandell, 1963) and duration of EEG desynchronization (Berlyne and McDonnell, 1965). At the turn of the decade, Berlyne brought together the concepts he had been developing over the prior 10 years and published a book whose title, Conflict, Arousal, and Curiosity, reveals the major components of his theoretical construct (Berlyne,1960).

While Berlyne coined some new terms to describe certain concepts in the paradigm he had laid out, he did not himself bestow a name which he used consistently to describe his theoretical construct. He had at different times used different names for this theory such as a Theory of Attention (Berlyne (1951a), a Theory of Human Curiosity (Berlyne, 1954b) or a Theory of Collative Motivation (Berlyne, 1960, 1963a). Robeck (1970) refers to Berlyne's

notions as a theory of attention or, more specifically, a theory of arousal, without making it clear whether these refer to the same paradigm or not. Nevertheless, it will be referred to here as the theory of collative motivation as this term describes the concept most closely related to the central focus of the present research.

At the heart of Berlyne's work are visual stimulus characteristics which he termed collative variables. These include the attributes of novelty and change, complexity, conflict, surprisingness, and uncertainty. He explained the selection of this term in this way:

> For want of a more satisfactory term, we shall call [these characteristics] collative variables since, in order to evaluate them, it is necessary to examine the similarities and differences, compatibilities and incompatibilities between elements -- between a present stimulus and stimuli that have been experienced previously (novelty and change), between one element of a pattern and other elements that accompany it (complexity), between simultaneously aroused responses (conflict), between stimuli and expectations (surprisingness), or between simultaneously aroused expectations (uncertainty). (Berlyne, 1960)

Visual stimuli with strong collative properties, Berlyne asserted, present a viewer with a degree of uncertainty which brings about conflict between possible responses to the stimuli containing the collative characteristics. Berlyne described this conflict as occurring:

> ...between perception of one part and expectations or redintegrative perceptual responses aroused by other parts, between verbal or other

> classificatory responses, or between ocular and other orientating movements. (Berlyne, 1957c, p.337)

Berlyne equated the uncertainty presented by stimuli with collative properties to the information theory concept of Entropy (a concept first proposed by Shannon and Weaver (1959) and occasionally used, as by Pierce (1972), to refer to uncertainty contained in the transmission of data or information). The conflict brought about by stimulus Entropy is increased when the range of alternative response tendencies is increased and when all response tendencies are about equally likely to occur. Uncertainty would also increase as a result of those factors which Berlyne said increase the degree of visual complexity. Complexity, according to Berlyne, increases directly with the number of distinguishable elements and the dissimilarity between the elements and inversely with the extent to which elements are grouped together perceptually.

The uncertainty created by visual patterns with strong collative properties increases the state of psychological conflict within the viewer. Berlyne used the concept of conflict rather broadly and suggests that some degree of conflict must accompany virtually every moment of normal waking life in higher mammals. However, he contended that the degree of conflict present at any given moment can vary widely, and tends to increase with exposure to stimuli with strong collative properties.

Berlyne went on to proclaim that the degree of conflict is correlated with psychological arousal. He compared arousal of this sort to a psychological drive state, claiming that both are associated with energizing effects. The difference, he explained, is that for any individual under given circumstances there seems to be an optimum level of arousal and the accompanying drive is directed at achieving or maintaining this level.

When arousal is escalated above its optimum level by exposure to stimuli with strong collative properties, a drive to reduce arousal is evoked. One method of reducing arousal is to reduce the conflict or uncertainty which inflated it. This can be achieved by the acquisition of additional information about the stimulus, which reduces the uncertainty of competing response tendencies. Additional information about a stimulus may allow the viewer to cognitively classify or catalog all the elements contained in the visual pattern, reducing the uncertainty of the nature and relative associations of visual elements. Therefore, the drive evoked by elevated arousal is directed at prolonged examination of the stimulus to reduce the uncertainty which induced the increase in arousal. Berlyne likened this drive to others which underlie consummatory behavior such as hunger and thirst. Exploratory behavior, then, is said to result from exposure to novel or complex visual patterns.

Berlyne did make a distinction between two types of exploratory behavior. "Diversive" exploratory behavior, he explained, is directed at the relief of boredom and is undertaken as a form of entertainment. This form of behavior may be characterized as a process of monitoring our environment, a sort of scanning procedure. This may be characteristic of how we often skim through a magazine, scanning pages of both editorial and advertising material in the form of casual browsing rather than searching for specific information.

The present research, however, is more concerned with what Berlyne termed "Specific" exploratory behavior. Specific exploration is a directed effort to reduce arousal caused by conflict elicited by a specific stimulus. It aids in resolving the dilemma of the competing response tendencies evoked by a stimulus pattern with collative properties (perhaps encountered while engaging in diversive exploratory behavior). It is this specific exploration of visual stimuli which Berlyne referred to as perceptual curiosity. In a succinct manner, Berlyne summed up his concept of these phenomena thusly:

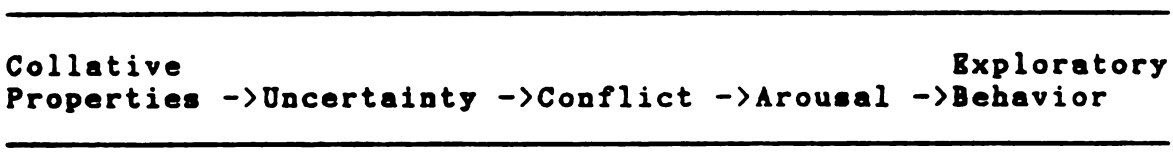
> Specific exploratory behavior...apparently occurs in response to an increase in arousal that is due to conflict stemming from incomplete information. Such a state of heightened arousal is termed "perceptual curiosity," and its intensity is held to increase with collative properties, including those that are subsumed under "complexity" and "incongruity."...prolonged or renewed exposure to a curiosity-inducing stimulus pattern is held to reduce perceptual

> curiosity to a threshold level, with a consequent rewarding effect commensurate with the extent of the reduction. (Berlyne, 1963a)

While Berlyne's concept of curiosity is congruent in some ways with concepts of cognitive curiosity such as that put forth by Maloney (1962), it is confined to a specific stimulus and its characteristics rather than to any tangential objects or ideas. Berlyne characterizes perceptual curiosity as similar to a psychological drive which compels an immediate response upon exposure to a stimulus containing uncertainty. Maloney (1962), on the other hand, discusses curiosity as inducing long range information gathering to test beliefs.

In sum, Berlyne's theory predicts that as collative properties assume increased values a viewer of stimuli possessing these properties will experience an increase in uncertainty resulting from the possibility of competing response tendencies. This uncertainty will raise internal conflict and cause an increase in arousal beyond an optimal level. This, in turn, will ignite a drive to lower arousal which triggers exploratory behavior. This exploratory behavior redirects arousal toward its optimal level and is a pleasing experience. Most pertinent to the research reported here, Berlyne's theory suggests that viewers will tend to look longer at more complex visual patterns. Figure 1 graphically represents the process presented by Berlyne's theory of collative motivation.

Figure 1. The Process of Perceptual Curiosity



Complexity and Exploratory Behavior

Numerous studies have shown a positive relationship between various forms of complexity and exploration choice and/or duration (Berlyne, 1963; Berlyne and Lawrence, 1964; Berlyne and Lewis, 1963; Cantor, Cantor and Ditrichs (1963); Evans, 1970; Fantz, 1958a, 1958b, 1961; Gaschk, Kintz and Thompson, 1968; Leckart, 1965, 1966; Leckart and Bakan, 1965; Minton, 1963; Moffett, 1969; Morrison and Dainoff, 1972; Wohlwill, 1968). These studies provide strong evidence in support of Berlyne's basic premise that subjects tend to examine visually complex stimuli for longer periods than simpler stimuli.

Using simple line drawings of incongruent pictures of animals, surprising progression, and varying degrees of entropy created through manipulated redundancy, Berlyne (1957b) had 16 undergraduate students press keys to produce as many tachistoscopic exposures of each stimulus as desired. The number of exposures elicited was taken as an indication of curiosity intensity. Stimuli with greater collative properties (incongruity, surprisingness, and higher levels of entropy) were found to increase the number of exposures selected. In other words, subjects choose more exposure to stimuli with greater collative properties.

Berlyne (1958a) referred to these collative variables as jointly representing "complexity."

Extending the findings of the above study, Berlyne (1958a) used similar stimuli, this time with pairs of figures shown simultaneously, to measure exploratory responses to variations in both novel and complex stimuli. Employing 20 undergraduate subjects in two separate experiments in which direction and duration of gaze at each pair of figures was recorded during 10-second exposures, the findings revealed that for every single pair of stimuli mean fixation time was greater for the "more complex" figure than for the "less complex" one. This tendency was found to be significant at the 0.01 level. Berlyne (1958c) replicated this study later using 2-minute exposures rather than 10-second exposures and reported "remarkably close" results, again showing consistently greater exploration of the more complex figure of a pair.

Although only a single subject was used by Fantz (1958b), he found through eye camera records of gaze direction a preference for a primate infant to spend more time examining a checkerboard pattern than a square of solid color. Extending this line of inquiry to human infants, Fantz (1958a) found a clear preference to examine more complex patterns for longer periods than simple patterns among 22 eight- to 12-week olds. This finding did not occur so consistently, however, for infants less than eight weeks old. Fantz (1961) again found that human infants

tended to look more at complex shapes than at simpler ones as measured by an observer. Using 30 infants aged one to 15 weeks, he found, for example, that the subjects spent nearly twice as long examining a bullseye pattern than a plain colored circle.

Cantor, Cantor and Ditrichs (1963) used 60 preschool children who viewed six triads of figures representing high, medium and low complexity for as long as they wished. Their apparatus allowed measurement of the time spent by each subject in viewing each member of the triads shown. The results showed a significant tendency to spend more time on average observing the high- as opposed to the medium- and low-complexity stimuli. The difference in viewing time between medium- and low-complexity stimuli, however, was not significant.

In two separate studies, (Caron and Caron 1968, 1969) 3-1/2-month-old infants were presented with varying and repeated exposures of checkerboard patterns varying in the number of squares. In both studies it was found that visual fixation of each pattern declined significantly both during repetitious viewing and upon subsequent reexposure with the amount of decline varying inversely with the complexity of the stimulus (number of check patterns). So, it appears that while repeated exposures to a stimulus will reduce viewing time, this effect seems to be less for more complex material, at least among infants.

In four separate experiments, Moffett (1969) tested infant responses to complexity which was varied in terms of the number of parts in a visual pattern. That is, by varying the number of black lines and the associated white rectangular spaces created by the lines the author created stimuli which varied in such characteristics as regularity of arrangement, number of line crossings, number of lines and number of parts (white spaces created by the lines). The results from these experiments showed that human infants (10 in each study aged nine to 19 weeks) looked longer at patterns with a greater number of lines, whether the lines were arranged regularly or not. The findings also suggested that the number of white spaces created by the lines was an important determinant of visual attention as well. Moffett reports that his subjects "invariably spent longer looking at the most complex patterns" (Moffett, 1969, p.179).

Berlyne's theory suggests that exposure to stimuli with collative properties heightens arousal which in turn elicits prolonged examination aimed at reducing such arousal. But, what if a subject is already in a heightened arousal state when a complex stimulus is encountered? Berlyne and Lewis (1963) examined this situation by exogenously inducing heightened arousal through an electrical shock-expectation treatment, a memory test or white noise sound prior to obtaining looking time measures. Regardless of prior arousal level, subjects (64 undergraduate students) tended

to look significantly longer at the more complex member of a pair of figures in 17 of 18 pairs. It appears that the amount of time subjects choose to view more complex stimuli is even more profound when they are already in a heightened arousal state before initial viewing as compared to being in a more normal arousal state prior to viewing. Berlyne and Lewis suggested that already heightened arousal may detract from the efficiency of the process of reducing uncertainty during examination.

Berlyne and Lawrence (1964), using a similar set of stimuli plus additional, yet more complex figures, provided further support that more complex figures tend to be examined longer. Using 60 undergraduate subjects who had seen all stimuli (both high and low complexity members of nine pairs) sequentially for as long as they wish, the results showed longer viewing times for the more complex figures in most cases.

Employing subjective judgments of complexity rather than <u>a priori</u> stimulus designs and photographs rather than simple line drawings, Leckart (1965) also studied the effects of stimulus complexity on looking time. Allowing subjects to view photographs which had been classified as high, medium or low in complexity on the basis of previous subjective judgments by a different group of subjects, Leckart found a significant positive relationship between complexity and looking time. Leckart and Bakan (1965) used a similar method and reported similar results.

The studies reported above in which the subjects controlled the amount of exposure time had most often instructed subjects to view stimuli for as long as they wished with no other criteria provided. Brown and Farha (1966) had 150 subjects view 32 patterns either for as long as they wished, for as long as they found the stimuli interesting or for as long as they found the stimuli pleasing. Under all three instructional sets they found subjects tended to look at more complex figures for longer periods of time than less complex figures. So, it appears that instructions to subjects may not significantly influence the responses to collative variability

Faw and Nunnally (1967) performed an exploratory behavior study in which eye movements were photographically recorded while 48 undergraduate subjects viewed pairs of figures in which the two members of each pair represented different levels of complexity or "affective tone" (a measure based on prior subjective evaluations of pleasantness). They found that both positive affective tone and higher complexity elicited greater portions of viewing time. Although their research design was not constructed to test the interaction of these two variables, the authors' subjective interpretation of the results suggests that affective tone might be more important than complexity in attracting focal dominance. This result seems far from conclusive, however.

The effects of complexity on exploratory behavior apparently apply to objects and pictures of objects as well as simple figural drawings and patterns. Gaschk, Kintz and Thompson (1968) had 14 subjects rate 59 objects on a 7-point complexity scale. From these ratings 10 objects were chosen at the high, middle and low levels of complexity. Thirty-five millimeter slides were then made of these 30 objects. Fifteen subjects viewed these slides for as long as they wished while a different group of 15 subjects were allowed to examine the actual objects as long as desired. Findings revealed that both inspective manipulation time, the amount of time subject spent physically examining the objects, and free looking time increased as a function of complexity. These authors also found that, except at low complexity levels, inspective manipulation tended to be longer than free looking time for similar objects.

Wohlwill (1968) attempted to test Berlyne's concepts with what he claimed to be more meaningful and aesthetically relevant stimuli. Using slides of scenes from the geographic environment and works of non-representational modern art which had been subjectively rated on complexity, he found exploratory behavior (the number of times a subject chose to view each slide briefly) to be a linear increasing function of complexity.

Even with reading material, the positive relationship between complexity and exploratory behavior seems to exist. Taking the complement of a paragraph's average Cloze score

(Taylor, 1953) as a proxy for conceptual complexity Evans (1970) reported that increased levels of complexity results in increased viewing time.

In sum, the preceding studies provide substantial evidence, through repeated testing employing diversified methodology, of the positive relationship between complexity and viewing time of visual stimuli which lies at the heart of Berlyne's theory. It must be noted, however, that most of the studies reviewed used stimuli which lacked much accompanying message content and generalizations of these findings to the kinds of stimuli inherent in mass media communication can only be made very cautiously. It seems possible that factors such as affective tone (as Faw and Nunnally (1967) hint) or cognitive factors related to associated meaning of stimuli may alter, interact with, or smother the effects found in the preceding studies.

Complexity and Evaluations of Interestingness and Pleasingness

A number of studies, mostly conducted in the 1960's and early 1970's, have examined the relationship between visual complexity and verbally expressed judgments of pleasingness and interestingness. While some anomalies have been discovered, most studies have found significant associations among these variables.

Using square areas subdivided into rectangular polygons, Terwilliger (1963) objectively defined figural complexity on the basis of (1) the proportional areas of the

parts of a pattern, (2) the number of different parts, and (3) the number of symmetrical axes in the pattern. Subjects then evaluated the patterns in terms of pleasantness. The results of this study support the position that pleasantness decreases as the absolute magnitude of stimulus complexity increases.

Berlyne (1963a) had separate groups of subjects use 7-point scales to independently rate a set of patterns, randomly arranged by complexity level, on "interestingness," and "pleasingness." He found a significant tendency to rate the more complex patterns more interesting but less complex patterns more pleasing, although there were minor differences among some categories of stimuli.

Using a similar set of patterns, Berlyne and Lawrence (1964) had subjects rank-order the stimuli according to their degree of liking for them. They found verbally expressed preference was not positively related to the amount of time subjects had spent looking at the patterns (which another experiment reported as part of the same study had found to have a positive and significant relationship to visual complexity). In fact, the results showed a tendency for subjects to prefer less complex patterns, in keeping with Berlyne's previous study (Berlyne, 1963a)

Day (1965, 1967), in two separate studies, found evidence indicating that pleasingness evaluations over a broad range of complexity may be a bimodal function of the latter variable. Using a series of random-shaped polygons

varying in number of sides in approximately even logarithmic steps from four to 160, Day (1967) found pleasingness evaluations to peak at both 6-sided and 28-sided levels then to fall rapidly with increased complexity. He found interestingness evaluations to rise to a peak at the 28-sided figure and to remain high throughout higher levels of complexity. In summarizing his findings from both studies, (1965, 1967), Day concludes that "pleasingness appears to be high for low levels of complexity but low at extremely high levels of complexity. Interest seems to increase with complexity to a peak and to remain fairly high with additional complexity" (Day, 1967).

Berlyne, Ogilvie, and Parham (1968) used the Shepard-Kruskal multidimensional scaling technique to evaluate judgments of complexity, interestingness and pleasingness. They found distance measures regarding these three properties significantly intercorrelated. On the basis of their results, they concluded that judged complexity is a major determinant of judged interestingness and judged pleasingness. They also suggest that subjects tend to agree on the relative locations of stimulus patterns in the spaces that govern interestingness and pleasingness judgments, though they also point out that there may be differences in the specific regions they find pleasing or interesting.

Robeck (1970) found further support of the relationship between visual complexity and judgments of interestingness, but not pleasingness. Using polygons varying in the number of contour angles and 7-point evaluation scales, he found figures with more contour angles to be judged significantly more complex and more interesting but not less pleasing than figures with fewer contour angles.

In sum, judged pleasingness and interestingness have frequently been found to vary with complexity. But the curves relating these variables do not form a consistent pattern, perhaps partly due to the range of complexity over which they are measured. Pleasingness and similar measures are often found to vary nonmonotonically in relationship to complexity, often producing either an inverted U-shaped curve or else a bimodal curve.

Judged interestingness, on the other hand, fairly consistently seems to rise monotonically with complexity, at least until relatively high levels of complexity are reached where the curve tends to level off.

Berlyne suggested that perceptions of interestingness and pleasingness are related to arousal modifying processes. His conception of the relationship between interestingness and pleasingness and arousal processes is summed up as follows:

> It would seem that ratings of <u>interestingness</u> reflect internal processes closely related to <u>arousal-raising</u> stimulus properties (Berlyne, 1960); Berlyne, Craw, Salapatek and Lewis, 1963). Judgments of interestingness may therefore represent something like the amount of arousal

> increase that is promptly cancelled by inspection of a pattern. Judgments of pleasingness seem, on the other hand, to reflect internal processes dependent on arousal-reducing or arousal-restraining stimulus. (Berlyne, 1963)

The reader is again reminded, however, that the studies of verbal evaluations of visual stimuli just reviewed, as with the studies on exploratory behavior discussed earlier, have normally employed only patterns and figures which were not designed to transmit a message or feeling, most often polygons of various types. The relationship between visual complexity and judged pleasingness and interestingness with more sophisticated stimuli such as a full page magazine advertisement has not been adequately evaluated. If relationships between these variables in advertising design are found to be similar to those reported above using simple visual stimuli, the application of Berlyne's theory of collative motivation to advertising design would gain stronger support.

HYPOTHESES

The theoretical hypotheses are, then, that the more visually complex a print advertising design is, the longer viewers will tend to examine it and the more interesting and less pleasing they will perceive it as being. As Berlyne's theory also suggests that while viewing a complex stimulus arousal should be heightened, this effect is also hypothesized. Stated as research hypotheses, these propositions are as follows:

H1 The greater the visual complexity of a print advertisement design, the longer viewers will tend to examine the design upon initial contact with it when allowed to do so as long as they wish.

H2 The greater the visual complexity of a print advertisement design, the greater a viewer's peak arousal will be while viewing the ad design for the first time.

H3 The more visually complex a viewer perceives a print advertisement to be, the more interesting they will perceive the overall advertisement design to be.

H4 The more visually complex a viewer perceives a print advertisement to be, the less pleasing they will perceive the overall advertisement design to be.

The following Chapter describes the methodology employed in testing these hypotheses.

Summary

Some previous findings, both commercial and academic, which discuss viewer responses to some visual characteristics of advertisements were reviewed. The possibility that some of the characteristics which seem to result in increased readership could be related to visual complexity was raised.

A theory of collative motivation developed by D. E. Berlyne was described and literature which supports the

theory was reviewed. Studies which have found a relationship between visual complexity and subjective ratings of interestingness and pleasingness were also discussed.

Finally, a number of hypotheses were presented relating to the behavioral and affective responses elicited by variations in the visual complexity of an advertising design.

CHAPTER III

OPERATIONALIZATIONS/METHODOLOGY

Introduction

A major barrier to visual communication research is the difficulty of isolating and manipulating individual variables in measurable and objective ways. The types of manipulations are also nearly endless. To test the hypotheses put forth in Chapter II, then, calls for procedures which provide maximum control of extraneous variables while allowing manipulation of the independent variable, visual complexity, in a clearly defined and relevant manner. To achieve the high degree of control demanded by this requirement a laboratory experiment seemed most appropriate. While surrendering much generalizability, experimental procedures best provide the degree of control required to study the effects of visual variables in isolation in ways which allow careful comparisons of responses to variable manipulations.

This chapter will describe and explain the specific measures, materials, subjects and procedures used in testing the hypotheses given in Chapter II. Various methods of

measuring visual complexity will be discussed and a rationale will be presented for selecting the types of measures used in this study. A description of the materials used will be provided along with an explanation of steps taken in developing these materials which are intended to minimize and/or account for the effects of extraneous variation. Details will be provided on the selection, assignment and number of human subjects to be tested.

Measures of Visual Complexity.

As mentioned in the previous chapter, a major reason for the niggardly efforts aimed at studying the effects of visual communications may be the difficulty in isolating, measuring and manipulating design variables in ways suitable for study. The present study is not exempt from this challenge. This section will review methods which have been used in the past to operationalize the concept of visual complexity and describe the method of doing so in this study.

Objective Measures of Complexity. Much of the research related to Berlyne's theories has used *a priori* measures of complexity based upon information theory variables, such as in the case of the pairs of figures used by Berlyne in the many studies mentioned in Chapter II. These figure pairs represent, among other variables, the heterogeneity of elements and the number of independent units. As these two

characteristics of visual stimuli tend to increase the number of alternatives possible and increase the likelihood of dissimilarity between elements, Berlyne relates them to the information theory concept of entropy (the opposite of redundancy), or the degree of uncertainty. Figures created on the basis of such information theory concepts, then, have been a common way to represent varying levels of figural complexity.

The other major method of objectively defining visual complexity employs polygons varying in the number of sides (and hence the number of contour angles). Studies which have used such stimuli include Robeck (1970), Day (1967), Aitken (1974), Eisenman (1966), and Vitz (1966). The use of polygons with varying numbers of sides is based strongly on the findings of Attneave (1957), who discovered that 90 per cent of the variance in judged complexity is explained by (a) the number of independent turns (angles or curves) in the contour of a figure, (b) symmetry and, (c) the arithmetic mean of algebraic differences, in degrees, between successive turns in the contour. For asymmetrical shapes, the number of turns (which relates directly to the number of sides) variable alone showed a positive correlation of 0.93 with judged complexity.

A few studies have also used checkerboard patterns either varying in the check square pattern or in comparison to solid colored stimuli. Such stimuli were used by Terwilliger (1963), Cantor and Thomas (1977) and Caron and

Caron (1969). This type of stimulus has been used more often with infants or laboratory animals where visual acuity may be lower.

Subjective Measures of Complexity. Although objective manipulations of the types mentioned above have been more often used to define different levels of visual complexity, subjective measures have been used as well. These are normally based upon phenomenological judgments by test subjects or by separate groups similar in characteristics to test subjects. Subjective measures of complexity have been used to verify objective manipulations and to compare responses to viewing stimuli which do not lend themselves to a priori objective manipulation or classification of complexity to responses elicited from more objectively defined stimuli.

As mentioned, Attneave (1957) used subjective measures to determine which characteristics of polygons are most closely related to perceived complexity. Robeck (1970), too, used subjective judgments to verify the assumptions that figures with more contour angles are judged more complex. Day (1964) validated the a priori assumptions of differences in complexity levels of Berlyne's figural pairs (which were based on information theory variables) by obtaining subjective judgments of the figures. Agreement among Day's subjects was very strong and indicated that material labeled more complex by Berlyne on informational

theoretical terms was also judged phenomenologically as more complex.

Leckart and Bakan (1965) used subjective ratings to define complexity levels of photographs and found looking time responses to increase with greater levels of complexity, in keeping with other findings from studies which used more objective measures of complexity to classify the stimuli used. As a result, they report:

> Of special interest . . . is the demonstration that phenomenological reports in the form of judgments can be utilized for the quantification of stimuli where more objective methods such as those based on information theory are not applicable.(Leckart and Bakan,1965)

Wohlwill (1968) also used subjective judgments to measure visual complexity. Stimuli in his study were slides of the geographic environment and non-representational art. Again, looking time and affective responses were found to be similar to those elicited by stimuli representing more objective measures of visual complexity.

Multiple Measures of Complexity. Some studies have employed both objective or *a priori* assumptions and subjective judgments of visual complexity. Generally, these studies have attempted to manipulate or select stimuli representing varying degrees of complexity prior to experimental treatments and then to verify their selection or manipulation by obtaining subjective ratings of the stimuli following the experimental procedures.

For example, Robeck (1970) manipulated symmetry and the number of contour angles in geometric figures to evaluate the effect of these variables on eye-fixations. As his hypotheses were based on the premise that figures with more contour angles are more visually complex, he also obtained subjective judgments of perceived complexity with the figures used. As mentioned above, he did find support for his assumption that figures with more contour angles would be judged more complex.

Morrison and Dainoff (1972) used a priori selection to pick a set of high, medium, and low complexity magazine ads, however, they do not report any basis for their selection other than their own assumptions. After measuring looking time responses to these advertisements though, they did obtain a number of evaluative ratings, including perceived complexity. While they do report a positive relationship between judged complexity and looking time, they do not report the correspondence between their a priori selection of complexity levels and judged complexity ratings obtained.

Price (1972) attempted to manipulate visual complexity in newspaper page design through variation in page layout. His rationale suggested that vertical page layout contains more angles than a horizontal layout and would therefore be considered more complex. However, when he had his subjects rate the stimuli (newspaper pages) following the administration of other procedures, he found little

difference in judged complexity between the two styles of page layout.

In sum, there seems to be much value in using both *a priori* criteria to create stimuli of varying complexity and *a posterori* measures of judged complexity to verify the manipulations employed. *A priori* manipulation increases the likelihood of having a broad and evenly dispersed range of complexity to use in testing. It also provides much more useful results by suggesting how visual complexity can be manipulated to replicate the results obtained in the future, which was a major purpose of Price's (1972) study. Subjective judgments of the stimuli by the actual subjects used in the study following other experimental procedures, on the other hand, allows verification of *a priori* manipulations while providing an alternative measure to use as an independent variable based upon perceptions of the actual subjects studied.

Measuring the Complexity of Print Advertisements.

There are many ways in which collative variables, including visual complexity, might be varied in the design of a print advertisement. Certainly the nature of the illustration included in an advertisement could have a strong effect on the complexity of the overall design. However, the enormous latitude of variation possible between illustrations of widely disparate content offers a universe

too broad to carefully manipulate in a single study. In assessing illustration complexity one would have to consider at least such aspects as shape, size, tone, texture, amount of contour, color, contrast, proportion of elements, degree of embellishment, lighting effects, and perhaps symmetry.

The other major ingredient of advertising design, typography, provides a more limited, if still quite large, universe of possible variation. However, it seems much easier to vary individual characteristics of typography without severely altering other aspects of its appearance. Typographic design is also more remotely related to content than is an advertisement's illustration(s), which provides a greater degree of separation between form and substance. That is, the visual variation in typography does not seem as limited by content. For example, the visual appearance of type used in an advertisement for a man's razor is much more likely to be similar to that used in an automobile ad than would be illustrations for these two types of ads, while at the same time, type for two ads of similar products might vary widely. Although many suggest that the particular typeface selected might have some particular appropriateness for certain content, (Cf. Poffenberger and Franken, 1923; Davis and Smith, 1933), except for the view that symmetrical arrangement of type blocks is perhaps more formal, there are not many well established conventions suggesting the appropriateness of other type variations for particular types of content.

Typography also allows manipulation of some visual characteristics which Berlyne and others have attributed to visual complexity. Berlyne (1960) claims that visual complexity increases directly as the number of elements in a visual pattern increase and as the heterogeneity of elements increases. Therefore, one might expect an increase in visual complexity with an increase in the number of copy blocks and in the heterogeneity of copy blocks created through variation in size or style of type.

In light of the foregoing, it appears that typographic variation offers a convenient and effective way to vary complexity in advertising design in ways suggested by earlier research. It also permits greater control of illustration complexity which is much more difficult to define or manipulate objectively. Therefore, three typographic variations have been selected for use in creating an independent variable used to operationally manipulate visual complexity in this study. These variables are (1) the number of copy blocks, (2) the number of type sizes and, (3) the number of type styles. Low complexity ads were created with one copy block, one type size and one type style. Medium complexity advertisements contained two each of these characteristics, and High complexity ads contained three each. More specifically, advertisements created to represent low complexity contained one copy block of 14 point Times Roman type. Those ads created to represent medium levels of complexity contained

two copy blocks, one of 18 point Floridian Script and one of 10 point Times Roman. High complexity ads contained three copy blocks, one with 10 point Times Roman, one with 14 point Helvetica and one with 18 point Floridian Script. Times Roman, Helvetica, and Floridian Script are typefaces representing three distinct races of type; Roman, Sans Serif, and Cursive, respectively. While there may be differences in perceived complexity for the three different typefaces, the research design employed does not include a comparison of one style with another. That is, for example, all ads with only one type style only contain Time Roman for body copy. This manipulation is based upon Berlyne's information theory concepts of number of elements and heterogeneity of elements.

Selection Of Text

If the copy in ads which contain type were to be real text, some subjects might actually read the copy due to interest in the message content while others would not. There would be no reliable method of determining which subjects might have actually read the copy and which had not, therefore, relinquishing a degree of control. Furthermore, the present study is aimed at isolating design from content to the greatest extent possible. For these reasons, dummy copy was created using a method first proposed by Shannon (1948).

Text was created by randomly selecting a letter from actual ad copy in a national consumer magazine, proceeding to the next ad in the same publication and adding the character which followed the first letter selected and adding it to the copy being created. Then, proceeding to the next ad in the publication, this two character combination was searched for and the character following it was added. This process continued, always searching for the last two-letter combination of the copy being created and adding to the new copy the character which followed that combination in the next magazine ad. For this purpose, spaces and punctuation were considered to be characters. This procedure was continued until 550 characters of copy were created. These 550 characters were then expanded to 2,744 characters by randomly copying and relocating blocks of the original copy on a word processor. The resulting copy, shown in Appendix A, provides text which closely matches the probability of character triads found in actual ad copy. This text <u>appears</u> quite similar to ad copy, yet is devoid of message content.

The 2,744 characters of dummy copy were then typeset on Compugraphic phototypesetting equipment to specifications needed to create the typographic variations required for the research. All type was set flush left, ragged right on either a 13, 20, or 41 pica line length. Full size typeset examples of all type variations used are contained in Appendix B.

Materials

The visual stimuli used in the proposed research consisted of 36 different ad variations created specifically for the purpose. All ads are rough, black-and-white line drawing executions to avoid any effects from color, tone or texture. These ads are all for fictitious brands of low-involvement product classes. That is, products used in the ads are those which typically have many brands available in the product class, which are purchased fairly frequently and which are relatively low in cost. Low-involvement products were selected to minimize subjects' desire for more information about a complex product or cognitive activity aimed at analysis of product features. An attempt was made to select products which are likely to be purchased by students, who were used as subjects in this study, and which are not purchased only by one sex. To avoid undue influence through strong human interest, no illustrations of people or animals were used.

All ads contain a simple illustration of the product, a headline, and a subheadline/slogan. All headlines were set in either Helvetica 36 point Medium or 36 point Helvetica Bold. Subhead/slogans were all set in 24 point Helvetica Medium.

Nine of these ads were used as acclimation stimuli. These were used as the first nine ads in the continuous series of 18 ads subjects viewed. The purpose of these nine

ads was threefold. Pretests have shown that subjects tend to view the first few ads (usually no more than four) in a series for much longer periods of time than they do ads in the rest of a series. This is particularly true with black-and-white rough ads such as used in this study which most subjects are not used to viewing. The first purpose, then, of the acclimation ads was to provide a series of ads which allowed subjects to become accustomed to the viewing situation and the unusual nature of the ads. The second purpose of these ads was to provide all subjects a common frame of reference immediately prior to viewing the test ads. All subjects saw exactly the same set of nine acclimation ads and therefore all had a similar frame of reference before viewing the test ads. Also, the test ads which follow contained different layout versions of ads for the same product - so the acclimation ads did also to prepare the viewer for this occurrence. The acclimation ads were designed to be similar enough to the test ads that subjects were not able to notice the difference. Examples of these ads, which are for Jubilee detergent, Noble potato chips, and Hearty salad dressing, are shown in Appendix C.

In addition to the nine acclimation ads, each subject saw nine test ads. All subjects saw three different layouts of ads for Royal bar soap, Smile toothpaste, and Aapri suntan lotion. While all subjects viewed the same three layout variations (different arrangements of the same illustration, headline and subhead/slogan), the text type

was different on the layouts seen by different groups of subjects. This required the creation of 27 different test ads (three brands - Royal (R), Smile (S) and Aapri (A); three layout arrangements (A), (B) and (C) for each product; and three type variations per layout consisting of a high complexity version (H) with three copy blocks, a medium complexity version (M) with two copy blocks and a low complexity version (L) with only one copy block. These 27 ads and their characteristics are described in Exhibit 1. Examples of the actual ads are shown in Appendix D.

Thirty-six groups of two subjects each were used to average any effects resulting from different layouts (different arrangements of design elements) and different orders of presentation of the three layout variations for each brand advertised. Each group viewed exactly the same nine acclimation ads as the first nine ads in the series they saw. This did, as mentioned, provide all subjects with a common frame of reference immediately prior to viewing the test ads. Each group then saw nine test ads which followed the acclimation ads in an uninterrupted series. Each of the thirty-six groups saw the same three layout variations for each of three different advertised products. However, different groups saw different type treatments for each layout variation, representing high, medium, and low complexity stimuli and in different orders. By averaging scores across all thirty-six groups, any differences in visual complexity created by different layout arrangements

Exhibit 1. Designations and Descriptions of Test Ad Versions.

Design-ation	Product	Layout Version	Complexity Level	Copy Blocks	Size & Style of Type
RAH	Royal	A	High	3	10 point Times Roman 14 point Helvetica 18 point Floridian
RAM	Royal	A	Medium	2	10 point Times Roman 18 point Floridian
RAL	Royal	A	Low	1	14 point Times Roman
RBH	Royal	B	High	3	10 point Times Roman 14 point Helvetica 18 point Floridian
RBM	Royal	B	Medium	2	10 point Times Roman 18 point Floridian
RBL	Royal	B	Low	1	14 point Times Roman
RCH	Royal	C	High	3	10 point Times Roman 14 point Helvetica 18 point Floridian
RCM	Royal	C	Medium	2	10 point Times Roman 18 point Floridian
RCL	Royal	C	Low	1	14 point Times Roman
SAH	Smile	A	High	3	10 point Times Roman 14 point Helvetica 18 point Floridian
SAM	Smile	A	Medium	2	10 point Times Roman 18 point Floridian
SAL	Smile	A	Low	1	14 point Times Roman
SBH	Smile	B	High	3	10 point Times Roman 14 point Helvetica 18 point Floridian
SBM	Smile	B	Medium	2	10 point Times Roman 18 point Floridian
SBL	Smile	B	Low	1	14 point Times Roman
SCH	Smile	C	High	3	10 point Times Roman 14 point Helvetica 18 point Floridian
SCM	Smile	C	Medium	2	10 point Times Roman 18 point Floridian
SCL	Smile	C	Low	1	14 point Times Roman
AAH	Aapri	A	High	3	10 point Times Roman 14 point Helvetica 18 point Floridian
AAM	Aapri	A	Medium	2	10 point Times Roman 18 point Floridian
AAL	Aapri	A	Low	1	14 point Times Roman
ABH	Aapri	B	High	3	10 point Times Roman 14 point Helvetica 18 point Floridian
ABM	Aapri	B	Medium	2	10 point Times Roman 18 point Floridian
ABL	Aapri	B	Low	1	14 point Times Roman
ACH	Aapri	C	High	3	10 point Times Roman 14 point Helvetica 18 point Floridian
ACM	Aapri	C	Medium	2	10 point Times Roman 18 point Floridian
ACL	Aapri	C	Low	1	14 point Times Roman

or different orders of presentation should be minimized. This procedure was primarily used to counterbalance brands and layout versions while minimizing the possibility that subjects would discover the variables and types of responses being studied.

All ads, both acclimation and test versions, were photographed on 35mm Ektachrome Tungston film to produce standard 2 X 2-inch slides. All ads were shot against a solid black background vertically on an horizontal format. Subjects viewed all ads as slides.

Measurement Instruments

Looking Time (LT) and Arousal (AR). Both Looking Time, the length of time a subject chose to view each ad, and Arousal, relative increases in skin electrical conductance, were measured using a Stoelting Company portable polygraph instrument. Although designed as a polygraph, capable of simultaneously measuring respiration and blood pressure as well as electrical skin responses, the instrument was used to record only the latter measure for this study.

The Stoelting instrument makes recordings on chart paper which advances at a constant speed of six inches (15.24 cm) per minute. By electromechanically marking the paper each time a subject advanced a slide the length of time spent looking at each ad was recorded. The distance between marks can be directly converted to a time interval using the formula 1/10" = 1 second. This procedure was used

to acquire a measure of the amount of time subjects viewed each slide.

Simultaneously, subjects' electrical skin responses was recorded by the instrument through non-invasive probes attached to two fingers of their right hand by Velcro fasteners. A small amount of electrode gel was applied to the metal probes before attaching them to the subjects' fingers.

Responses were continuously recorded, then, by a moving pen on the chart paper as it advanced. The marks made on the moving chart paper to record viewing time each time a slide was advanced (referred to above) permitted association between an advertisement being shown on the screen and changes in the subjects' electrical skin responses occurring at the same time. The tracings made by the recording pen during viewing of each slide was used as an indication of arousal as explained below.

Although electrical skin resistance may be seen as an imperfect measure of arousal, it has often been used for this purpose. Berlyne himself used Galvanic Skin Response (similar to the measure to be used in this study) in three studies (Berlyne, 1961; Berlyne and Lewis, 1963; and Berlyne, Craw, Salapatek and Lewis, 1963) examining arousal responses to viewing complex stimuli. While admitting that such a measure is short of perfect, Berlyne reported that

increases in skin conductance is widely accepted as an index of arousal level (Berlyne, 1961).

Sophisticated, multiple measures and analysis of arousal did not seem necessary for the present research. Any indication of elevated arousal associated with viewing more complex advertisements would provide at least some evidence that Berlyne's theory may be applicable to responses to advertisement design. For this study, however, it was sufficient to determine whether there was even the slightest indication of change in arousal directly associated with the complexity level of advertising designs being viewed which are significantly above the chance level.

The Stoelting instrument used in this study provides only relative measures of skin conductance. That is, pen movements did not provide measurements in objective units of skin electrical conductance. Rather, pen movements simply indicated relative increases or decreases. As base arousal levels of individuals immediately prior to testing were expected to vary (indeed, they may vary for the same individual at different times of the day), absolute measures of arousal would be misleading and would be influenced by prior (base) arousal levels. What is important to this study is the relative arousal level of subjects while viewing stimuli of varying visual complexity. Therefore, only the single highest peak of skin conductance indicated by the peak needle deflection occurring during the period a subject was exposed to a slide of a particular advertisement

was used as an indication of arousal level. Hypothesis H2 in Chapter II predicts that this peak, on average, will be greater for more complex ad designs than it will be for less complex advertisement designs. The measure used then was the single greatest distance the pen traveled from the edge of the chart paper in the direction indicating increased skin conductance during the entire period a particular advertisement was on the screen, measured in one-tenths of an inch.

One exception to this procedure was a case where the pen began a decline toward lower skin conductance prior to the first appearance of an advertisement and continued to decline for the entire period that an ad was on the screen. In such a case, it seemed logical to assume that no increase in arousal was induced by viewing the associated advertisement and the score which was recorded was the pen position at the end of the period the ad was on the screen. In such a case this was the pen position indicating the least skin conductance during viewing of that particular advertisement.

Pretests have indicated a tendency for responses to any particular advertisement to last for a second or more after the slide disappears from the screen. When slides are shown contiguously in time, it is occasionally difficult to determine if early responses to an advertisement are induced by that ad or the previous one. To minimize the effects of this tendency, two actions were taken. First, the Stoelting

instrument was used in "Automatic" mode in which the instrument automatically moves the pen toward a neutral position following large deflections. While this restricts measurements of peak duration, it still allows recording of peak magnitude while limiting carry over of response recordings from one slide to the next. Additionally, a period of about five seconds (as long as it took each subject to slowly count to five) in which no ad appeared on the screen (the screen was black) occurred between advertisements in the series. This period allowed time both for the instrument to recover from pen movements measuring responses to the preceding advertisement and for subjects to return to a more consistent arousal level prior to viewing the following ad.

Subjective Complexity, Interestingness and Pleasingness

Following the initial viewing of the nine acclimation ads and nine test ads, subjects were asked to provide subjective ratings of all 18 ads on three separate scales during three separate reviewings of the series of test ads they viewed previously. Pretests have shown some tendency for subjects to rate ads similarly on complexity, interestingness, and pleasingness when asked to rate all three dimensions simultaneously. To avoid this possibility, subjects viewed the series of 18 ads once while they rated how complex each advertisement appeared to them, once again while they rated

how interesting they felt each advertisement was and one final time during which they rated each ad as to how pleasing they felt the ads were. As the complexity rating is the most essential to the present study, judgments of this characteristic were always taken first. To minimize any effect resulting from the order in which Interestingness and Pleasingness ratings were taken, half the subjects judged interestingness first followed by pleasingness while the other half of the subjects judged these two characteristics in the reverse order.

In all three instances, subjects were asked to rate each advertisement on the appropriate characteristic on a scale of 1 to 100. Due to the controls applied to test advertisement designs, extreme differences are absent. As a result, pretest procedures showed that subjective ratings on semantic differential scales seldom received scores at the scale extremes. With little use of the extreme ends of a 5 or 7 point scale, variation in subjective evaluations was minimized. Therefore, the 1 to 100 scale was selected for use. This scale permits a much wider range of possible variation and accommodates as well the tendencies of some subjects to rate all ads relatively high or low on the characteristics being measured. Examples of the forms used to record scores for these measures and the instructions to subjects on their use which appear on these forms are contained in Appendix E.

Subjects.

Undergraduate students enrolled in an introductory junior level course in public relations were used in this study. Enrollment in this course, which serves the entire community of a large midwestern university, typically consists of 60 percent non-ad majors or prospective ad majors. The study was completed using a total of 72 subjects, 2 subjects in each of thirty-six groups. The entire group of subjects included 44 females and 28 males. There were 42 seniors, 29 juniors and one sophomore. Twenty-seven of the subjects were advertising majors, 25 were other communication majors and 20 were other non-communication majors. Subjects' ages ranged from 19 to 35, however, 63 of the 72 subjects were between the ages of 20 and 23, inclusive.

While the expected effects may be small, which suggests the need for a large sample size, the size used was much greater than sample sizes typically used in similar studies upon which the hypotheses are based. Additionally, exceptionally tight controls of extraneous variables were incorporated into the research design. Of course, larger sample sizes are always desirable when possible. However, two major limitations to the sample size applied. First, subjects needed to be tested individually during a twenty minute testing period. Second, it was not appropriate to test subjects for many hours each day. Fiske and Maddi

(1961) suggest that, aside from environmental factors which may influence arousal, the sleep-wakefulness cycle influences prevailing arousal levels during particular segments of this cycle. Equating arousal and alertness, these authors suggest that:

> After waking, higher organisms typically show an increasing degree of alertness, then a relatively long period with a gradual rise and later a gradual decline, and finally, a sharper decline toward drowsiness and a return to the sleeping state. (Fiske and Maddi, 1961, p.39)

This suggests that arousal levels may vary considerably in relation to a persons sleep cycle. To minimize differences in base arousal levels of subjects in this study, testing occurred only during a limited number of hours each day and always during the same daypart (10:00 a.m. to 2:30 p.m.). This requirement limited the number of hours each day that subjects could be tested, further limiting the total number of subjects which could be tested within a limited time period with limited resources.

The Laboratory Setting.

Experimental research procedures were conducted in a suite of three rooms. Two classrooms designed to seat 25 and a small conference room between them were used. The wall between the conference room and each classroom contained a large window with one-way mirror glass and a door. Each classroom also had a door into a common hallway.

Appendix F contains a floor plan of the rooms and equipment used in this research.

The one-way mirror allowed the Stoelting instrument operator to see the projection screen from inside the conference room while subjects were unable to see the instrument or the operator in the conference room. Subjects were left alone in the classroom to view the advertisements as explained below. However, pretests have demonstrated the value of being able to view the subjects and the projection screen during testing so that the experimenter would be aware of any unplanned circumstances.

The subjects were seated in a comfortable, upholstered chair with tables positioned on both sides for the subject to rest their arms. The slide advance remote control button was placed by the subjects left hand. The subject's right hand was connected to the Stoelting instrument by a cord from the finger probes to the instrument in the conference room behind the subject. The slide projector was positioned above and behind the subject, projecting over the subject's head.

Procedures

Experimental procedures for individual subjects were carried out in a single session, during which five measures were obtained. Subjects were scheduled to arrive for participation at 20 minute intervals. When subjects arrived

in the hallway outside the classroom they were given a sheet which explained the experimental procedures and they were asked to sign a consent form. Examples of these forms are contained in Appendix G. They were told that they were participating in an experiment aimed at examining emotional responses to advertisements which vary in the quality of their execution and that they would not be required to remember anything they saw. They were told that their responses would be compared to those of other subjects who viewed the same advertisements, but which were produced with much less or much more detail and quality of execution. It was explained to the subjects that if the results showed a strong correspondence between the way people respond to roughly executed ads and the way they respond to highly finished ads, in the future advertisements might be tested for responses in a rough form, saving the time and expense of creating more finished versions to test. The purpose of this explanation was to minimize speculation on the part of the subject that they would later be asked to recognize the advertisements they viewed. Without an alternative purpose given to subjects in looking time experiments, Leckart, Gehres and Thornton (1970) found up to 30% do not believe they will not be tested for memory of what they view even when specifically told that the procedure does not involve a memory test. Leckart, Gehres and Thornton (1970) recommend the utilization of sham GSR instructions (telling subjects that the purpose of viewing the stimuli is to measure their

electrical skin conductance responses) to reduce subjects' uncertainty concerning the experimenter's purpose. As arousal is an important concept in Berlyne's theory and the GSR measure is widely used as an indication of arousal, an actual GSR measurement was taken rather than the sham procedure recommended by Leckart, Gehres and Thornton (1970).

After reading the instructions and signing the consent form, subjects were invited into the classroom containing the slide projector and seated in front and below the projector. The two finger probes were attached to the subject's right hand and instructions on how to use the slide advance button were given. The experimenter then explained to the subjects that they would hear further instructions in a moment by tape recording and that they would be left alone in the room to view the slides at their own pace. A tape recording with instructions was then started, the room lights extinguished and the experimenter left the room via the door to the hallway. The experimenter then proceeded down the hallway through the second classroom and into the conference room where the subject could be viewed and the Stoelting instrument operated.

The recorded instructions to the subject fulfilled two needs. First, this procedure allowed the experimenter time to travel down the hall, through the second classroom, and into the conference room behind the subject in time to start the chart paper advance on the Stoelting machine before the

subject began viewing the acclimation advertisements. Second, the instructions, given in a soothing voice while the subject sat quietly in the dark helped relax the subject prior to viewing the advertisements. This is also in keeping with the major point of the recorded message - that subjects should find a comfortable position before beginning the viewing sequence but should remain as stationary as possible during viewing. Pretests have shown that bodily movements can cause artifact responses which produce undesired pen movements. By emphasizing to subjects the importance of sitting very still, this problem was largely eliminated.

The recorded instructions also told the subject that each advertisement would be followed by a black screen and that they should relax and count to five at these times before advancing the slide projector to view the next slide. This period allowed responses from the previous ad to fade prior to the onset of the next ad. A transcript of the recorded message is contained in Appendix H.

During viewing, looking time was measured by a electromechanical device which automatically placed a pen mark on the moving graph paper each time the slide advance button was activated. This provided for an objective measure of looking time as the distance between pen marks on the graph paper traveling at a constant speed can be directly converted to a time interval.

When a subject finished viewing all 18 ads the experimenter returned to the classroom where the subject was, turned on the lights, removed the finger probes, reset the slide tray to the first acclimation ad, and gave the subject a sheet on which to rate the 18 advertisements on how visually complex they felt each layout was. Subject's were allowed to advance the slides again at their own pace while they made these ratings. Half of the room lights were extinguished to darken the room somewhat while leaving enough light for subjects to see the rating forms. When a subject finished rating the 18 ads on complexity, the slide tray was again reset to the first ad and the subject was given a second form on which to rate the ads on how interesting or pleasing they felt each advertisement layout was. Following this procedure, the slide tray was reset a final time to the first ad and the subject was given a sheet to rate the ads again, this time on how pleasing or interesting they felt each layout was. Upon completion of this final rating procedure the subject was dismissed, the slide tray repositioned to the first acclimation advertisement, the tape containing the recorded instructions rewound and the room lights turned on again in preparation for the next subject. Copies of the forms used to record subjects' evaluations of complexity, interestingness and pleasingness are contained in Appendix E.

Summary

This chapter began with a review of methods used by others to operationalize the concept of visual complexity. Theoretical, objective, and subjective measures were discussed as well as studies which have used more than one measure. The rationale for using both a theoretically based measure of complexity and a subjective measure of this variable was given.

Detailed descriptions were then provided on the stimuli, equipment, subjects, facilities and procedures used in the this study. Readers were referred to various Appendixes for samples of test material and measurement instruments. The following chapter will present the findings of the research described in this chapter.

CHAPTER IV

ANALYSIS AND RESULTS

As described in Chapter I, this study attempts to compare the findings of Berlyne and others who have studied responses to visual complexity with some similar responses to print advertising designs with varying complexity. If similarities are found to exist Berlyne's paradigms may help explain behavioral and affective responses to advertising designs. Based upon previous work derived from Berlyne's theory, four hypotheses were presented in Chapter II. Chapter III described the method used to test these hypotheses.

Validity of Manipulated Complexity in Advertising Designs

The research presented here relies heavily upon the *a priori* assumption that the typographic variables used represent three levels of visual complexity, particularly as perceived by the subjects who participated in this study. Berlyne's theory suggests that complexity increases with the number of elements in a visual and the heterogeneity of those elements. If this is true of copy blocks in a print advertisement design, the ads with more copy blocks, type

sizes and type styles should be perceived as more complex than those with fewer of these characteristics.

It is valuable to verify this assumption for two reasons. First, the present research is based upon this assumption, employing advertisements designed to represent three levels of visual complexity by varying the number of copy blocks, type styles and type sizes. If this manipulation did not result in perceived differences in visual complexity by the subjects who participated in this study, the results would be quite equivocal. The second reason that it is important to confirm the validity of using typographic manipulations to vary visual complexity is the increased value of the results obtained. If research results indicate the probability of certain responses elicited by varying levels of visual complexity, it would be useful to be able to manipulate visual complexity in ways which would produce or avoid such responses depending upon their desirability. This information could be useful to advertising designers. Such information is not available from the results of studies such as that done by Morrison and Dainoff (1972) which used only subjective evaluations to define visual complexity.

As subjective evaluations of visual complexity were obtained from the actual subjects employed in this study, perceptions of complexity at the three levels of manipulated complexity could be examined.

Table 1 shows the results of a repeated measures analysis of variance on subjective complexity judgments with manipulated complexity level and brand advertised as independent variables.

Table 1. Repeated Measures ANOVA on subjective complexity scores.

SOURCE	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	F	SIG.
Brand (B)	17,337.05	2	8,668.52	38.79	.000
Error	31,734.94	142	223.48		
Complexity (C)	20,479.76	2	10,239.88	31.13	.000
Error	46,705.57	142	328.91		
B X C	1,120.82	4	280.20	1.64	.164

The results shown in Table 1 indicate a significant effect of manipulated complexity level on subjective judgments of complexity ($F = 31.13$, $p<0.001$). Although neither planned nor predicted, there is also a significant effect from the brand advertised (Royal, Smile or Aapri) as well ($F = 38.79$, $p<0.001$). However the interaction between manipulated complexity level and brand advertised is not significant.

Table 2 shows mean subjective complexity scores by brand and manipulated complexity level.

Table 2. Mean subjective complexity scores.

	-----Complexity Level-----			
Product	Low	Medium	High	Mean
Royal	32.73	38.38	42.22	37.78
Smile	31.90	39.47	47.43	39.60
Aapri	41.84	48.66	58.13	49.54
Mean	35.49	42.17	49.26	42.31

Mean subjective complexity scores are 35.49, 42.17, and 49.26 respectively for low, medium and high complexity ads. These means are in the predicted direction and a posteriori contrasts using a Scheffe test show that the differences in means between low and medium, medium and high, and low and high are all significant at the 0.05 level. There is evidence, therefore, that advertisements with more copy blocks, types sizes, and type styles were judged relatively more complex than advertisements with fewer type elements and variations.

Mean subjective complexity scores were 37.78 for Royal, 39.60 for Smile and 49.54 for Aapri. A posteriori contrasts (Scheffe) showed that the difference between Royal and Aapri and the difference between Smile and Aapri were significant at the 0.05 level. However, the difference between Royal

and Smile ads was not significantly different at this level.

Complexity and Looking Time

The studies discussed in Chapter I provide substantial evidence in support of Berlyne's contention that complex stimuli elicit longer examination than do simpler stimuli. On the basis of these studies, the following hypothesis was presented in Chapter II:

H1 The greater the visual complexity of a print advertisement design, the longer viewers will tend to examine the design when allowed to do so as long as they wish.

In order to examine the statistical significance of the relationship between complexity and looking time as well as any indications of an interaction between the effects due to product (brand) and manipulated complexity level a repeated measures analysis of variance was performed on the data. Initial analyses on possible intervening variables such as order of presentation, time of day, and subjects' academic class, major, age, and sex revealed no significant effects except for sex in relationship to looking time. Mean looking time for females was 11.49 seconds while it was 15.28 seconds for males. Therefore, sex was included as a

between-subjects factor in the analysis of variance procedure. Table 3 shows the results of this analysis.

Table 3. Repeated Measures ANOVA on looking time scores.

SOURCE	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	F	SIG.
Sex (S)	2,210.64	1	2,210.64	6.17	.015
Error	25,064.45	70	358.06		
Brand (B)	192.49	2	96.24	8.46	.000
B X S	.87	2	.43	.04	.962
Error	1,592.07	140	11.37		
Complexity (C)	85.45	2	42.72	5.13	.007
C X S	21.55	2	10.77	1.29	.277
Error	1,166.67	140	8.33		
B X C	18.59	4	4.64	.28	.892
B X C X S	196.80	4	49.20	2.94	.020
Error	4,682.45	280	16.72		

The results indicate significant effects of manipulated complexity level ($F=5.13$, $p<.01$), brand ($F=8.46$, $p<.001$), and sex ($F=6.17$, $p=.015$) on the length of time subjects chose to look at the advertisements (Looking Time). There was no significant interaction between any combination of variables except for the combined interaction of complexity level, brand and sex ($F=2.94$, $p=0.02$). As both complexity level and brand represented significant differences in perceived complexity, the null hypothesis of no difference in looking time for varying levels of complexity is rejected and the results support Hypothesis H1 in keeping with previous findings by Berlyne and others. The significant

previous findings by Berlyne and others. The significant effect attributed to sex and to the complexity level by brand by sex interaction was not predicted and there does not appear to be any basis for this effect in Berlyne's theory.

Table 4 shows mean looking time scores for each brand and manipulated complexity level.

Table 4. Mean looking time scores.

	-----Complexity Level-----			
Product	Low	Medium	High	Mean
Royal	12.14	12.50	13.55	12.73
Smile	12.32	12.04	12.91	12.42
Aapri	13.56	13.51	14.13	13.73
Mean	12.67	12.68	13.53	12.96

The marginal means for the three levels of manipulated complexity levels, across all three brands, are in the predicted direction. While the marginal means as well as the mean for Royal advertisements indicate longer looking times for medium complexity ads over low complexity ads and for high over medium complexity ads, advertisements for Smile and Aapri elicited somewhat shorter viewing times for medium over low complexity versions, although high

complexity Smile and Aapri advertisements were viewed longer than either low or medium ads.

Complexity and Arousal

As Berlyne's theory of collative motivation suggests that increased exploratory behavior in response to viewing complex stimuli may be related to shifts in arousal level, the following second hypothesis, based on Berlyne's theory, was presented:

H2 The greater the visual complexity of a print advertisement design, the greater a viewer's peak arousal will be while viewing the ad design.

In order to test this hypothesis, a repeated measures analysis of variance was performed on the data, again testing the effects of both complexity level, brand and sex. Table 5 shows the results of this analysis.

As none of the main effects or interactions are significant, the null hypothesis of no difference in arousal related to these variables cannot be rejected and hypothesis H2 cannot be supported. Table 6 shows the mean arousal scores for the three brands at all three levels of complexity. As this data shows, there was practically no difference in means between cells, thus failing to show any support for Hypothesis H2.

Table 5. Repeated Measures ANOVA on arousal scores.

SOURCE	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	F	SIG.
Sex (S)	12.28	1	12.28	.13	.723
Error	6,792.47	70	97.03		
Brand (B)	18.59	2	9.29	.48	.616
B X S	30.67	2	15.33	.80	.451
Error	2,685.25	140	19.18		
Complexity (C)	9.55	2	4.77	.33	.718
C X S	59.24	2	29.62	2.06	.131
Error	014.93	140	14.39		
B X C	62.67	4	15.66	1.19	.316
B X C X S	20.77	4	5.19	.39	.813
Error	3,694.19	280	13.19		

Table 6. Mean arousal scores.

	-----Complexity Level-----			
Product	Low	Medium	High	Mean
Royal	29.18	30.40	29.93	29.84
Smile	29.91	29.63	30.22	29.92
Aapri	30.20	29.86	30.50	30.19
Mean	29.76	29.96	30.22	29.98

Subjective Complexity and Interestingness

The findings of a number of studies discussed in Chapters I and II suggest that visual complexity and subjective evaluations of interestingness are positively related. As a result, the following hypothesis was presented:

H3 The more visually complex a viewer perceives a print advertisement to be, the more interesting they will perceive the overall advertisement to be.

Separate correlations were computed between subjective judgments of complexity and similar judgments of interestingness for the nine advertisements viewed by each subject. The mean correlation across all 72 subjects was r=0.24. While correlations for 24 subjects were negative (the mean correlation was -0.40) only six of these were significant at the 0.05 level. On the other hand, for the 48 subjects for which the correlations were positive (the mean was 0.56), 30 were significant at the 0.05 level.

Table 7 shows mean interestingness scores for the three brands at the three levels of manipulated complexity. As the analysis above has shown a correspondence between manipulated complexity level and ratings of perceived complexity, hypothesis H3 would predict higher ratings of interestingness for higher levels of manipulated complexity.

As seen in Table 7, this result was not obtained. The mean interestingness scores are 40.38, 44.78, and 42.51 for the low, medium, and high complexity ads respectively, indicating an inverted U curvilinear relationship across all three brands. However, the relationship varies by brand. As there are again noticeable differences in the mean interestingness scores for the three brands there would appear to be an interaction between brand and complexity level.

Table 7. Mean interestingness judgement scores.

	Complexity Level			
Product	Low	Medium	High	Mean
Royal	34.01	40.81	37.83	37.55
Smile	34.43	41.66	41.23	39.11
Aapri	52.71	51.86	48.46	51.01
Mean	40.38	44.78	42.51	42.56

Table 8 presents the results of a repeated measures analysis of variance on raw subjective interestingness ratings using both brand and complexity level as independent variable factors. The results show both a significant effect for brand ($F=17.17, p<.001$) and for the brand by

complexity interaction (F=3.32,p=.011). As complexity level alone does not show a significant effect (F=2.23,p=.11), the null hypothesis for H3 of no effect of complexity on perceptions of interestingness cannot be rejected and hypothesis H3 fails to receive support.

Table 8. Repeated Measures ANOVA on interestingness scores.

SOURCE	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	F	SIG.
Mean	1,171,130.09	1	1,171,130.09	530.79	.000
Error	156,653.23	71	2,206.38		
Brand (B)	15,672.63	2	7,836.31	17.17	.000
Error	64,789.36	142	456.26		
Complexity (C)	1,264.16	2	632.08	2.23	.111
Error	40,292.49	142	283.74		
B X C	2,669.54	4	667.38	3.32	.011
Error	57,098.45	284	201.05		

Complexity and Pleasingness

Based upon some studies discussed in Chapter II, which suggest a negative relationship between perceptions of visual complexity and evaluations of pleasingness, the following hypothesis was presented:

H4 The more visually complex a viewer perceives a print advertisement to be, the less pleasing they will perceive the overall advertisement design to be.

Once again, separate correlations were calculated for each of the 72 subjects between subjective complexity scores and, this time, subjective pleasingness scores. The mean correlation across all subjects was 0.092. There were 37 negative correlations (the mean was -0.381) of which only 8 were significant at the 0.05 level. Of the 35 positive correlations (the mean was 0.592) 22 were significant at the 0.05 level.

During analysis it was noted that there was a strong indication of a positive relationship between subjective ratings of interestingness and similar ratings of pleasingness. Computing separate correlations for these two variables for each subject and, in turn, determining the mean of these correlations resulted in a positive coefficient of 0.571. Sixty-six of these correlations were positive (the mean was 0.639) with 40 of these significant at the 0.05 level. Contrarily, none of the six negative correlations were significant at this level.

Both the positive average correlation between subjective complexity and subjective pleasingness and the strong positive relationship between the latter variable and subjective judgments of interestingness seem opposed to previous findings which suggest negative relationships in both instances. It appears that, despite the precaution of obtaining ratings of pleasingness and ratings of interestingness during separate viewings of the ads,

subjects tended to rate the stimuli similarly on these two dimensions.

Further analysis, however, indicated that the predicted negative relationship between subjective complexity and subjective pleasingness judgments did emerge when a partial correlation between these variables controlling for subjective interestingness was computed. The average partial correlation between complexity and pleasingness ratings controlling for interestingness ratings for all 72 subjects was -0.104. Six of 41 negative correlations (the mean was -0.487) were significant at the 0.05 level while nine of the 22 positive correlations (the mean was 0.402) were significant at this level.

Table 9 shows mean subjective pleasingness scores for all brands and complexity levels. Mean scores were 46.45 for low complexity ads, 46.15 for medium complexity ads, and 40.64 for high complexity advertisements. Although there is only a very slight reduction in the mean for the medium complexity ads as compared to the low complexity versions, there is a larger reduction for the high complexity ads as compared to ads representing lower levels of complexity, as predicted.

As before, the differences in mean marginals for the three brands also show differences, particularly between Aapri and the other two brands. It is important to note that the mean pleasingness score <u>decreases</u> linerally for increasingly complex Aapri ads (which were rated more

Table 9. Mean subjective pleasingness scores.

	-----Complexity Level-----			
Product	Low	Medium	High	Mean
Royal	41.09	42.87	37.96	40.64
Smile	41.98	43.32	37.96	41.09
Aapri	56.27	52.25	46.00	51.51
Mean	46.45	46.15	40.64	44.41

complex than the other two brands). Mean subjective pleasingness scores increase slightly for medium complexity ads compared to low complexity ads but do drop noticeably for the high level of complexity for both Royal and Smile advertisements.

Again, a repeated measures analysis of variance was performed, this time using subjective pleasingness ratings as the dependent variable with brand and complexity level as independent variables. Table 10 shows the results of this analysis. The results indicate significant main effects for both brand and complexity level but no significant interaction.

As the complexity level does show a significant main effect and Table 9 indicates means in the predicted direction, at least between medium and high complexity ads,

the null hypothesis is rejected and at least limited support is found for hypothesis H4.

Table 10. Repeated Measures ANOVA on pleasingness scores.

SOURCE	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	F	SIG.
Mean	1,292,653.33	1	1,292,653.33	684.56	.000
Error	134,068.21	71	1,888.28		
Brand (B	11,230.22	2	5,615.11	10.35	.000
Error	77,052.21	142	542.62		
Complexity (C)	4,729.71	2	2,364.85	6.11	.002
Error	54,921.39	142	386.77		
B X C	1,106.91	4	276.72	1.03	.393
Error	76,515.97	284	269.42		

Summary

This Chapter presented the results of statistical analysis aimed at testing the hypotheses given in Chapter II. The validity of the typographic operationalization of visual complexity was examined first and the results confirmed that relative perceived complexity did increase for those ads with more type blocks, styles, and sizes. However, there were similar differences between ads for the three different brands used as well.

The four hypotheses set forth in Chapter II were then tested. Support was found for H1 which suggests that more complex ad designs are viewed longer than simpler ones when the viewer may examine each for as long as they desire. An unpredicted effect due to the sex of the subject was also noted. Hypothesis H2 which predicted a relationship between the complexity of advertising designs and a viewer's arousal level during viewing failed to receive support. The third hypothesis, H3, which predicted that perceived complexity would be positively related to perceived interestingness was not supported. However, there was a significant difference in perceived interestingness related to the brand of product shown in the advertisements. Hypothesis H4 proposed a negative relationship between subjective complexity and evaluations of pleasingness. Although an average correlation over all subjects showed a very slight positive relationship, relative pleasingness ratings were significantly lower for high complexity ads than for low and medium complexity designs. Also, the average partial correlation, controlling for interestingness, did show a small but, as predicted, negative relationship between complexity and pleasingness. In sum, H4 did receive limited support.

Although all hypotheses did not receive full support, some interesting implications emerge as a result of data analysis. These phenomena as well as a discussion of how

the findings relate to those of Berlyne and his followers will be given in the following Chapter.

CHAPTER V

CONCLUSIONS

Summary of Findings

The findings presented in the preceding Chapter do provide evidence that some aspects of Berlyne's theory of collative motivation may be applicable to print advertising design, particularly for the most supported of his constructs: that complex stimuli tend to be viewed significantly longer than simpler ones when observers may view for as long as they wish. Advertisements used in this study which contained more copy blocks, type styles, and type sizes were judged more complex as Berlyne's theory would predict and, in turn, were viewed for relatively longer periods of time than advertisements with fewer of these characteristics.

Although an unanticipated significant difference was discovered in subjective ratings of complexity for the three different product ads used, looking time was significantly longer for the most complex version than for the least complex one in keeping with predictions based upon Berlyne's theory. A significant difference in the amount of time spent looking at the test advertisements was also noted

between males and females. This difference was not predicted and has not been studied in the past.

No evidence was found, however, to support the notion that arousal is modified in a consistent fashion by viewing advertisements of varying complexity. Neither main effects nor any interactions of brand, complexity level, or sex showed significant relationships to arousal level, at least not with the arousal measure employed in this study.

While there was a significant effect from advertisements for the three different brands and for the interaction of this variable with complexity level on subjective ratings of interestingness, there was no significant effect due to complexity level alone as predicted. Subjective interestingness ratings were relatively higher for medium complexity ads than for either low or high complexity ones, though the differences were small. Larger differences between advertisements for the three brands do correspond to differences in perceived complexity of these brands, however. That is, Royal advertisements with a mean subjective complexity score of 37.78 received a mean interestingness score of 37.55. Similarly, Smile ads with a 39.60 mean complexity score received a 39.11 mean interestingness score. Aapri ads show a 49.54 score for complexity and a 51.01 score for interestingness. These means are shown as marginals in Tables 2 and 7 in Chapter IV.

There was also a difference in the pattern of mean interestingness scores over the three levels of complexity for each of the three brands. These scores for Royal ads (which were judged least complex of the three brands) show a higher relative interestingness rating for medium complexity ads than for either low or high complexity versions, representing an inverted "U" relationship. Smile ads (which were judged more complex than Royal ads but less complex than Aapri ads) show a lower interestingness mean score (34.43) for low complexity versions with nearly equal but higher index scores for medium and high complexity layouts (41.66 and 41.23, respectively). Aapri ads (judged most complex of the three brands) show steadily declining mean interestingness scores of 52.71, 51.86, and 48.46 respectively for low, medium and high complexity versions.

A predicted negative relation between subjective complexity and subjective evaluations of pleasingness received mild support. Although the average correlation between these two variables was positive (r=0.09), less than half of the individual correlations were in this direction. It was discovered that the predicted negative relationship did occur when a partial correlation controlling for interestingness judgments was computed. Also, mean pleasingness scores were lower for high complexity versions compared to lower complexity versions of ads for all three brands, as predicted. Yet, the Aapri advertisements (which were judged the most complex of the three brands) received a

higher mean pleasingness score (51.51) than either Royal (40.64) or Smile (41.09).

Discussion

Visual Complexity. The manipulation of type by varying the number of copy blocks, the number of type sizes and the number of type faces simultaneously did result in perceived differences in visual complexity in the predicted way. This confirms the findings of Scheiner (1985) who analyzed the content of 129 published advertisements and compared physical characteristics of the ads with subjective judgments of complexity. He found correlations of 0.59, 0.36 and 0.13 between complexity ratings and the number of copy blocks, the number of type sizes, and the number of type styles respectively. These three variables do appear to effect perceptions of visual complexity, with an increase in the number of copy blocks, type sizes and type styles resulting in perceptions of increased complexity.

However, an unexpected difference in perceived complexity was noted between the three brands of products shown in the advertisements used. While the difference in complexity ratings between Royal and Smile ads was not quite significant, the Aapri advertisements were judged to be significantly more complex than Royal and Smile ads.

The Royal advertisements (which were judged least complex of the three) are all strongly horizontal in their

orientation. The illustrations are all horizontal and even the advertisements with two and three copy blocks have these blocks of text staggered only slightly, so they are largely horizontal in arrangement. This horizontal orientation might result in lower complexity scores for at least two reasons. First, horizontal compositions are said to be calming and harmonious (Blanchard, 1984; Nelson, 1985). Such associations may be perceived as being low in complexity. The second possible explanation is that horizontal compositions may be less novel than others. Most printed material is seen in horizontal orientation to facilitate left to right reading. As it has been suggested that novelty and complexity are both collative variables which might elicit similar responses (Berlyne, 1960; Berlyne and Lawrence, 1964; Venkatesan, 1973), it is possible that the lack of novelty in the horizontal Royal advertisements were seen as lacking complexity as well.

Two out of the three layouts used for Smile toothpaste ads (which overall were judged more complex than the Royal ads but less complex than the Aapri ads) were diagonal in orientation. The layout in which both the headline and illustration were diagonal was judged more complex than the layout with just the illustration positioned diagonally and the headline in a horizontal orientation. The third layout, which included a horizontal illustration and headline was judged least complex of the three. Again, the higher complexity ratings of Smile ads may be due either to the

implications of the major orientation or the novelty presented by the diagonal orientation. Diagonal compositions are said to imply dynamics, and vitality (Blanchard, 1984; Nelson; 1985). Such characteristics may elicit the perception of being more complex than the restful horizontal layouts for Royal advertisements. Or, the diagonal compositions may be considered more novel and therefore more complex than the horizontal ads.

Vertical compositions are most prevalent in the advertisements for Aapri (which were judged most complex of the three brands). Vertical compositions imply dignity (Blanchard, 1984; Nelson, 1985). While it is easy to imagine that such a composition might be evaluated as more complex than a horizontal one, it would be more difficult to suggest why it should be considered more complex than a diagonal composition. A vertical composition also is not obviously more novel than a diagonal one. There is one more factor to consider in the case of Aapri advertisements, however. These ads all contain a star-burst pattern representing the sun. In two layouts this element overlaps the product illustration, while in another one it is remote from the product illustration. This jagged-edged sun may have added an effect similar to one presented by a multi-sided polygon of the kind used often in previous research. As mentioned in Chapter III, Attneave (1957) found that much of the variance in judged complexity of asymmetrical shapes is explained by the number of

independent turns (angles or curves) in the contour of a figure. The sun-burst pattern contained in all Aapri advertisements certainly contains far more contour angles than illustration elements in either the Royal or Smile ads.

It should be noted, too, that the Aapri package label, unlike those for the other two products, contains two different type faces. It is difficult, however, to assess the extent to which this factor alone may have contributed to overall perceptions of visual complexity of the Aapri advertisements.

In sum, it seems possible that the orientation of the major lines of force in a visual pattern may influence perceptions of visual complexity. This possibility has not been adequately studied in the past. None of the figures used so often by Berlyne in the past contain strong directional lines of force. Most studies which claimed to use polygons have not shown the actual figures used nor mentioned any consideration of an orientation effect. In the only study at all related to the orientation characteristic, Price (1972) hypothesized that vertical newspaper page design would gain greater readership than horizontal designs because of greater complexity inherent in the former style. However, Price's <u>a priori</u> assumption of greater complexity in the vertical format was not supported by his subjects' evaluations which indicated very little difference in perceived complexity for the two page orientations. The comparison of newspaper page design to

full page magazine advertisement design is, of course, incongruent and further research on the subject of horizontal versus vertical (and perhaps, diagonal) orientations in both genre seems warranted.

A Final Note on Visual Complexity

The subjective measures of visual complexity obtained in the present study were, of course, relative metrics based only upon the advertisements evaluated. It is quite likely that the stimuli used in this study represent a range of complexity much higher than that inherent in the types of stimuli used in most previous studies.

One indication of this likelihood is the mean looking time in the present study of 12.96 seconds compared to much shorter looking times in most of Berlyne's work (from 0.2 seconds when controlled by the Experiment to around 5 - 6 seconds when subjects were allowed to view as long as they wish). It is possible that any divergence between Berlyne's findings and those reported here may be attributed to the difference in the range of visual complexity under study.

Complexity and Looking Time

Both manipulated complexity level and brand show a significant effect on how long subjects viewed each advertisement. However, the interaction of these two

variables was not significant, indicating that the effect due to brand is independent of the typographic variation in the text copy.

The effect of brand might be due to the amount of readable text in advertisements for each product in the headline, subhead and package label. For example, the Aapri ads, which were looked at the longest, contain 86 letters in 15 words while the Smile ads contain 51 letters in eight words and the Royal ads have 56 letters in 12 words. The correlation between the number of letters in readable type and the mean looking time score for each advertisement is nearly unity (0.998).

If looking time differences between brands are due largely to the amount of time needed to read the legible text, mean looking time should decrease for repeated exposures to ads with the same text as subjects begin to recognize the copy as something they have read before. Such was the case. Across all three brands, the mean raw looking time was 13.75 seconds for the first version seen, 12.83 seconds for the second version and 12.30 for the third version. This effect was most pronounced for the Aapri ads for which looking times dropped from a mean of 15.34 seconds for the first version seen to 12.40 for the third version.

Two reasons may account for this. First, as previously noted, there was more readable type in the Aapri ads which would have taken longer to read upon first exposure. Second, the Aapri advertisements contain a novel

presentation of the word "soothing" which in the ads contains six letter "o"s (soooooothing). This peculiarity may slow reading upon first exposure but the effect would be minimized upon subsequent viewings. Indeed, the mean looking time for Aapri ads dropped to 12.40 seconds for the third version seen, only slightly above the overall mean for all three ads seen the third time of 12.30 seconds.

The unexpected main effect of sex on looking time and the interaction of brand, complexity level and sex might be explained too if there was a difference in reading speed or other types of abilities between males and females. Further investigation of this possibility is beyond the scope of the present study but suggests the need for future research in this direction.

The text copy (as shown in Appendix B) was not readable and, in fact, subjects were informed prior to viewing the advertisements of this fact. Therefore, reading time should not have been a factor in looking time differences between ads representing different levels of complexity. The significant differences in looking time between ads of low, medium and high complexity, across all three brands are, therefore, interpreted to be a result of the varying number of copy blocks (number of elements) and type sizes and styles (heterogeneity of elements) as predicted by Berlyne's theory. Not only are the differences in looking time related to complexity level statistically significant, but the means are in the predicted direction with prolonged

looking times for ads with more copy blocks, type sizes and type styles, lending credibility to this aspect of Berlyne's theory. It appears that increased visual complexity in print advertisements created through typographic variation, independent of other visual and semantic characteristics of ad content does elicit prolonged viewing of the design.

Complexity and Arousal

Berlyne's contention that the effect just described may be due to a drive directed at reducing arousal which is elevated above a threshold level by encountering complex stimuli is more suspect, however. No significant effects on arousal related to brand, complexity level, sex or the interaction of any of these variables was in evidence in the present study, at least as arousal was measured in this study.

Indeed, upon close scrutiny of Berlyne's empirical evidence regarding this aspect of his theory, previous results must be considered quite tenuous. Berlyne and Lawrence (1964), for example, "failed to confirm that complexity ... variables affect the magnitude of the orientation reaction (measured through GSR responses during a 0.2 second exposure) evoked by brief contact with a figure." This same study reported only a low ($r = 0.093$) and non-significant correlation between GSR responses and free looking time (measured on a subsequent viewing of the

same stimuli). This compares with an average correlation across all subjects of 0.036 in the present study using the same variables but with both GSR response and looking time measured during the same viewing of the stimuli.

The most compelling evidence of a relationship between arousal and complexity of stimuli viewed is provided by Berlyne, Craw, Salapatek and Lewis (1963). In this study, stimuli of varying complexity were presented for three seconds while GSR measures were taken. The study by these scholars differed from the present study in two important ways though.

First, the experimenter interrupted each subject's viewing of a series of 16 stimuli at two different times by reentering the room where viewing was taking place. The study reports that "GSRs ceased to appear not infrequently prior to experimenter's interruptions but revived after." Subjects in the present study were not interrupted during viewing and, as with the Berlyne, Craw, Salapatek and Lewis (1963) study, GSR responses for many subjects ceased to vary after the first few acclimation advertisements were seen.

Strong measures were taken in the present study to minimize extraneous effects on the GSR measure taken in an attempt to isolate only those responses associated with the advertisements viewed. However, the sensitivity of the measure used in this study (or the ones used by Berlyne, Craw, Salapatek and Lewis (1963)) to detect response changes to only very slight stimulus changes has not been well

established. However, for nearly all subjects in the present study a large response was elicited when a slide containing a full color illustration appeared at the end of the series of test slides, indicating that the GSR measure did respond to reactions resulting from exposure to greatly different stimuli. It remains to be established just how minor a change in a stimulus will result in a measurable GSR response.

The second difference between the present study and the Berlyne, Craw, Salapatek and Lewis (1963) experimentis is that half of the subjects in the latter study were "extrinsically motivated" (EM). That is, they were led to believe they would later have to take a recognition test on the stimuli they were viewing. Subjects in the present study, on the other hand, were specifically told prior to participation that they would not be asked to remember anything about the advertisements viewed.

While Berlyne, Craw, Salapatek and Lewis (1963) did find sizeable differences in GSR responses in the predicted direction for extrinsically motivated subjects, they failed to find similar results for the remaining subjects. In summary, Berlyne, Craw, Salapatek and Lewis (1963) conclude:

> There is thus some indication of a greater incidence of GSRs with more complex ... visual patterns, but this effect is only in evidence when subjects are highly attentive. And the effects of complexity variables on the GSR are certainly not comparable with the pronounced effects that these variables have on exploratory behavior. Berlyne, Craw, Salapatek and Lewis (1963)

Considering the differences between the above study and the research described in Chapter II, the results are not seen as incongruent. While the results of the present study do not support Berlyne's theory, they do not conflict with previous empirical evidence. In sum, Berlyne's suggestion of a clear relationship between viewing complex stimuli and changes in arousal (at least as measured by GSR responses) must remain very tentative.

Complexity and Interestingness

Although complexity level alone did not show a significant main effect on subjective judgments of interestingness across all three brands, mean interestingness scores for Royal and Smile advertisements do fit a pattern predicted by Day (1967). Evaluating interestingness judgments of random-shaped polygons varying in the number of sides from four to 160, Day found these evaluations to rise to a peak at the 28-sided figure and remain high throughout higher levels of complexity. The Royal and Smile advertisements used in this study obtained mean interestingness scores of 34.01 and 34.43 for low complexity versions, rising to 40.81 and 41.66 for medium and 37.83 and 41.23 for high complexity versions, respectively (See Table 7 in Chapter IV). That is, for these two brands, interestingness appears relatively low for low complexity ads, rises for medium complexity versions,

and remains close to the same level for high complexity versions.

Aapri ads, on the other hand, which were judged much more complex than both the Royal and Smile ads, obtained high but close index scores for low and medium complexity versions (52.71 and 51.86 respectively) and then lower scores for high complexity versions (48.46). While previous studies suggest that interestingness rises to a point and then levels off, the results associated with the more complex ads for Aapri may indicate the possibility that judgments of interestingness might decline at the highest levels of complexity. If so, the greater complexity of the Aapri ads, resulting in a different pattern of interestingness ratings compared to the other two, less complex ad versions for Royal and Smile would explain the significant interaction between brand and complexity level reported in Chapter IV.

Interestingness and Pleasingness

The relationship between visual complexity and perceptions of pleasingness is, perhaps, the most equivocal aspect of Berlyne's paradigm. Berlyne (1963a) reported a tendency for subjects to rate complex stimuli more interesting but less pleasing than simpler patterns, suggesting a negative correspondence between interestingness

and pleasingness as well as between complexity and pleasingness.

There seems to be growing evidence, however, that responses to stimuli which contain meaningful content indicate a positive relationship between evaluations of interestingness and pleasingness. The use of the term "meaningful" and its derivatives used here and in the remainder of this report refers to stimuli created with the purpose of conveying a message and which are accompanied by at least some printed words.

Price (1972) in his study of newspaper page design found a positive correlation of 0.54 between these two variables (significance was not reported). Morrison and Dainoff (1972) studied the effects of visual complexity in previously published magazine advertisements and they reported a positive correlation of 0.71 between evaluations of interestingness and pleasingness. As reported in Chapter IV, the present study revealed an average correlation of 0.57 between these variables. In sum, findings from these three studies provide strong evidence that, at least for stimuli which contain meaningful material, interestingness and pleasingness evaluations are <u>positively</u> related to each other. However, as will be seen below, this relationship may be complex, with interestingness intervening in the relationship between pleasingness and complexity.

Complexity and Pleasingness

Based upon previous findings, hypothesis H4 predicted that pleasingness would decline as complexity increased. There was, upon first examination, instead a small but positive average correlation between perceive complexity and pleasingness (0.09). As noted earlier, the average correlation between these two variables reversed polarity when perceived interestingness is controlled for producing a negative partial correlation of -0.10. Previous studies have not reported whether similar partial correlations between complexity and pleasingness controlling for interestingness were computed.

In the current study, pleasingness scores were lower for high complexity versions of ads for all three brands than for the low complexity versions as might be predicted by previous work using only figures or photographs as stimuli. However, the Aapri ads, which were perceived as being more complex and more interesting than ads for the other two products, were perceived as relatively more pleasing. So, increased complexity due to the type variations did result in lower pleasingness ratings but increased complexity due to characteristics related to the differences between advertisements for the three different brands had an opposite effect on perceptions of pleasingness. Indeed, although a small positive correlation was found in the aggregate, correlations between perceived

complexity and pleasingness for advertisements representing each brand individually are all negative as predicted by hypothesis H4. It is possible that this difference is due to perceptions of interestingness rather than complexity which would be in keeping with the strong positive relationship found between interestingness and pleasingness and the fact that brand differences had a significant main effect on interestingness ratings while complexity level alone did not. In sum, at least for stimuli created with the intention to convey a message, it seems that perceptions of interestingness intervene in the relationship between complexity and evaluations of pleasingness.

Conclusions - Theoretical

The major purpose of the current study was to determine the applicability of Berlyne's theory of Collative Motivation to the explanation of responses to print advertising design. In sum, sufficient similarities do seem to exist between previous findings in support of this theory and the findings reported here to warrant the use of Berlyne's work as a framework for further study of advertising design. However, while the present study provided some results similar to previous work, evidence has been obtained which suggests that a new interpretation of Berlyne's theory might deserve consideration, particularly as applied to meaningful stimuli such as print

advertisements or other visual patterns intended to convey an intentional meaning.

The present study did confirm Berlyne's contention that the number and heterogeneity of elements in a visual pattern increase perceptions of visual complexity and that stimuli which are more complex visually in this way tend to be examined longer than more simple ones when subjects can view them as long as they wish. Berlyne contended that the latter effect may be related to conflict and associated arousal changes brought about by exposure to complex visual patterns, although his empirical support for this theoretical construct is weak and was not supported by the results of the present study (as evidenced by the lack of any effect associated with arousal level as measured here). It may be that prolonged examination of complex stimuli is instead simply a function of information processing time which might be expected to increase with the increased information presented by more complex stimuli.

Information processing, at least for stimuli which are presumed to have intentional meaning and perhaps for others as well, might be directed at extracting meaning from the stimuli -- at least to the point of being able to articulate or label the stimuli. This might be termed an "Ah Ha" goal, or a point at which the viewer is able to classify or decode some meaning associated with a stimulus. The fact that such a goal is much more likely to be pursued or achieved with stimuli which were created to intentionally

convey a message (such as newspaper pages or advertisements) than with simple figures such as polygons, checkerboards, or the figures used so often by Berlyne might underlie the differences between findings of previous studies which primarily used stimuli of the latter type and the findings of the present study.

Under this "Ah Ha" paradigm looking time might be related to the length of time it takes a viewer to either reach the "Ah Ha" point or abandon this goal. As more complex material contains more information (more elements with higher heterogeneity - or in other words less redundancy) greater complexity would require increased information processing (closely associated with looking) time to reach the "Ah Ha" objective.

Arousal, in this new interpretation, might be related to the <u>importance</u> of searching for an "Ah Ha." This would be congruent, for example, with the findings of Berlyne, Craw, Salapatek and Lewis (1963) who found GSR responses to be related to looking time for subjects who were told they would later be given a recognition test on the stimuli but not for subjects who were not so instructed. In this view, subjects in the present study who were given no particular reason to place importance on finding any meaning in the stimuli shown would not be expected to show differences in arousal level related to the other variables studied. As we have seen, this was the case.

Interestingness, under this "Ah Ha" theory might represent the amount of difficulty in reaching the "Ah Ha" revelation and could be the result of such characteristics as perceptual grouping, amount of linguistic material, concreteness of images, or the orientation of elements. These are the kinds of characteristics which varied between advertisements for the three brands used in the present study other than the type manipulations. In turn, pleasingness may represent a measure of psychological reward for achieving the "Ah Ha" affect, with this reward being greater when it was more difficult to achieve, i.e., when the stimuli was more interesting.

If no meaning (or "Ah Ha") can be easily derived from exposure to a visual pattern, as might occur with simple figures as stimuli, then as interestingness increases, pleasingness might decrease. In other words, when the difficulty of assigning a meaning increases and a search for meaning is largely unsuccessful, the result could be displeasing. Such a process would be in keeping with prior findings with simple figures as stimuli which suggest a negative relationship between interestingness and pleasingness. On the other hand, with stimuli containing an intentional message, where an "Ah Ha" is much more likely to occur, the more difficult it is to achieve, the more rewarding the result might be, at least to some point. This might explain the positive relationship between interestingness and pleasingness found in studies using mass

media print materials as stimuli, including the present study.

While further development of this "Ah Ha" theory lies beyond the scope of the present study, this interpretation of Berlyne's findings does provide an alternative process underlying his constructs and a possible explanation of the differences between previous findings in support of Berlyne's theory of Collative Motivation and those reported here.

Conclusions - Practical

One objective of the present study was to bring the results of previous theoretical work on very elementary stimuli closer to practical application. By advancing the level of study to include stimuli with intentional message content which are more representative of those used in actual communication contexts it was hoped that the results could be more closely related to processes occurring outside an experimental laboratory setting. Although the present study moves an understanding of behavioral and affective responses to visual stimuli in that direction, unfortunately, it seems to pose more questions than it answers.

Evidence has been presented here to suggest that increasing the number of copy blocks, number of types sizes and number of type styles simultaneously in an advertisement

design does increase perceptions of complexity. It also seems that advertisements with three of each of these characteristics are seen as less pleasing than ads with but a single copy block, type size and type style. Neither of these findings should surprise ad designers as conventional wisdom largely suggests that fewer type variations are generally to be preferred (Mandell, 1974; Dunn and Barban, 1978; Bolen, 1981; Bovee and Arens, 1982; Nelson, 1985).

The "Ah Ha" theory suggested in the previous section could have more important implications for practical application, however. While much more support for this concept would be necessary prior to recommending applications, the suggestion that increasing the difficulty of decoding a message may increase the pleasingness of doing so could have valuable practical ramifications. If, as suggested, interestingness is a measure of the difficulty of deriving meaning, a much more precise definition of this variable is needed before useful applications can be set forth.

In sum, implications for practical applications have emerged from the present study but much more work is needed before conclusive useful recommendations can be made. This study has been useful, however, in pointing out some directions for future study. Practical applications of Berlyne's findings, as a result, do seem a step closer than they were prior to this study.

Conclusions - Methodological

The most noteworthy methodological aspect of the current study is that relating to the use of advertisements for three different products rather than just a single ad design. Although it was originally hoped that there would not be effects deriving from differences between these three sets of advertisements, as we have seen, that was not the case. In retrospect, however, it seems quite valuable to have included the three variations.

Comparison of the effects due to differences between ads for each of the three products (frequently referred to as the "brand" effect) with those due to type variations within ads for each product suggest responses to visual stimuli which might not otherwise have been discovered. In particular, a new perspective on the relationship of interestingness to the other dependent variables included in this study has developed as a result. Additionally, the differences in responses to the ads for each of the three products have suggested effects attributable to the orientation of lines of force, the amount of legible text and perhaps the basic shapes of elements in a visual pattern. An unfortunate characteristic of the three ad sets is that the differences are random, making it difficult to conclusively assess the role of the various aspects that differ between ad sets. It remains the challenge of future

research to isolate and study the role of these design characteristics more precisely.

Another methodological concern is the low variablity of the GSR responses (used as a proxy for measurement of arousal level) obtained. Efforts made to exclude extraneous effects on arousal level were apparently very successful. Preceding the exposure situation with a tape recording made in a soothing voice instructing subjects to relax and sit perfectly still, a darkened very quite room and a series of very similar stimuli often resulted in very little variation in GSR responses over the period of time the subjects viewed the nine test advertisements. This is not seen as an idiosyncrasy of the equipment or procedures as most subjects did cause a noticeable GSR response to a colored slide following the last test ad which indicated the end of the series of slides. However, with the extreme controls employed, it is possible that the GSR measure was insufficiently sensitive to detect minor changes in arousal due to responses to manipulated complexity differences in the stimuli used.

Problems and Limitations

The difficulty in objectively measuring and isolating particular characteristics of a visual pattern while keeping other characteristics constant was referred to in Chapter I as a major limitation on research in this area. The current

study was not immune to such restrictions. In order to create the type manipulations used as a key independent variable in this study without making it so obvious that subjects would immediately be able to identify the characteristics under study other aspects of the design in the advertisements were altered simultaneously. Merely rearranging the type blocks may have interacted with other elements so as to change overall design characteristics such as the orientation of lines of force, optical balance and unity of the design. It is difficult to assess which of these traits may have contributed to any effects related to differences in advertisements for the three brands used. However, Chapter I also noted that this study was not an attempt to overcome all such difficulties at once. Although precise analysis of differences due to different ads is difficult, valuable information concerning the effects of these differences in the aggregate was obtained. The causes of these effects, however, can only be speculated at this stage.

The difficulties inherent in studying sophisticated visual displays, such as full page magazine advertisements, should not deter future study of such stimuli. Indeed, the difficulties presented suggest the need for more research, not less. At least until much more study is completed on responses to visual design, we must accept some ambiguities similar to those encountered in this study.

Even the typographic manipulations used, which apparently did largely have the predicted effects, present some limitations. The number of copy blocks, type sizes and type styles were all varied simultaneously. Future research should attempt to assess the effects of these three variables separately. As the type manipulations used represented only three levels of complexity, it would be useful in the future to assess a broader continuum. Additionally, this study was restricted to only three particular type faces all used with a single standard for line lengths and amount of leading (space between lines). Of course, many other type faces and specifications might have been used, perhaps indicating different results.

Finally, only black and white line drawing rough advertisements were used and subjects viewed these stimuli on projected 35mm slides. As with most laboratory experiments which incorporate the kinds of controls used in this study, the question of generalizability must be kept in mind. While such controls are vital in the effort to isolate elementary principles, eventually findings must be obtained from studies conducted under more natural conditions. While still a long way from this goal, the present study does represent a step in this direction in comparison to most previous work on the same subject.

Directions for Future Research

Many needs for future research have already been mentioned. It is not difficult to think of many more. As pointed out in the beginning of this document, the entire field of responses to visual patterns, particularly well developed stimuli such as those representative of mass media channels, has been inadequately studied.

However, the "Ah Ha" theory posed earlier suggests the need for some research particularly relevant to the findings reported here. Specifically, there is a strong need to develop clear operational definitions for the concepts of visual complexity and those characteristics which result in perceptions of interestingness and pleasingness. All three of these variables have often been measured only through subjective evaluations. While some literature exists which suggests physical characteristics of a visual stimulus which result in perceptions of complexity (such as those discussed and used in this study), physical characteristics which result in perceptions of interestingness and pleasingness have not been well defined. Previous research seems to have been carried out under the assumption that the characteristics associated with complexity are the major determinants of interestingness and pleasingness evaluations. The present study provides evidence that this may not be so, at least for stimuli created to convey a message.

Additionally, the role of arousal in association with behavioral and psychological responses to visual stimuli needs further study. Certainly, the suggestion made earlier that arousal may be associated with the importance of deriving meaning from a stimulus needs further scrutiny.

Finally, there seems to be a need to review the entire body of literature surrounding Berlyne's theory of Collative Motivation to assess how well it might fit the new interpretation of such findings in the framework of the "Ah Ha" theory posed here. In conclusion, the findings reported here represent only an initial step toward applying results of previous research related to Berlyne's theory to sophisticated stimuli such as magazine advertisements.

Summary

This study intended to test the applicability of Berlyne's theory of Collative Motivation to advertising design. Typographic manipulations based upon Berlyne's theory did influence perceptions of visual complexity as Berlyne would predict. Advertisements containing more copy blocks (more elements) and more type styles and sizes (heterogeneity of elements) were perceived as more complex than advertisements with fewer of these characteristics.

Those ads which were more complex were also viewed longer than less complex ads, as Berlyne's theory would predict. Medium complexity ads were viewed longer than low

complexity ads and high complexity versions were viewed significantly longer than medium complexity ones.

No significant effects were detected on arousal due to stimuli characteristics, contrary to what Berlyne's theory would predict. While this result does not strongly support Berlyne's theory, it does not conflict with Berlyne's own findings under similar conditions.

The complexity variable alone did not have a main effect on ratings of interestingness, however, there was an interaction effect between complexity level and brand as well as a main effect from brand on interestingness evaluations. This result may deviate from Berlyne's findings which suggest that increased complexity is positively related to increased interestingness. The results suggest that design characteristics other than those which have previously been considered to contribute to visual complexity may influence evaluations of interestingness.

While for each brand the high complexity version was rated less pleasing than the low complexity version, the Aapri ads which were rated most complex were also rated most pleasing. There was also a strong positive relation between judgments of interestingness and pleasingness, contrary to the predictions based upon previous research on meaningless stimuli. It was suggested that, at least for stimuli created to convey a message, interestingness may intervene in the relationship between complexity and pleasingness.

The findings of this study, while congruent with some previous results, suggest additional factors which must be considered when considering meaningful stimuli. These factors were incorporated into a tentative theoretical construct referred to as an "Ah Ha" theory which characterizes complex stimuli as containing more information, therefore, requiring more information processing time which might account for prolonged examination. This theoretical construct additionally suggests that arousal may be related to the importance of assimilating the meaning of a stimuli, that interestingness may represent the difficulty in achieving that goal and that pleasingness may represent the value of the psychological reward received from decoding a visual stimuli, with increased reward associated with increased difficulty in achieving it. While this "Ah Ha" theory remains to be verified, it does suggest a theoretical framework in which to structure future research.

APPENDIX A

Text Used For Copy In All Ads Used In Study.

Appendix A

550 CHARACTERS OF COPY GENERATED FROM MAGAZINE ADVERTISEMENTS

Beciout cres gato to ful that ary hapat olic fle. Monfien deastars mor of buit wisc a. Sh hard webled get. Fulike marme ofters hange you prom.

Thongs all lepace you ene of cone mato diall you asinee put. Cours now watane cranation cruiostoreed you phot lood there.

Thess a whin fre bet moducigook you't why flogrestive whe yourlses greds the ffer. Giver mast be most beare smal wrolat its eakes no radiffe dreen st all on the a beyou len what orseat gin hoci teme. Prop int prood shou cong a corponsooo.

This shestare the wat.

MAGAZINES FROM WHICH COPY WAS CREATED

Better Homes and Gardens	DEC 84
Better Homes and Gardens	SEP 84
Better Homes and Gardens	JUL 84
Better Homes and Gardens	AUG 84
People	NOV 19, 84
People	NOV 12, 84
People	NOV 05, 84
People	OCT 29, 84
People	OCT 08, 84
People	SEP 24, 84
People	OCT 01, 84
People	SEP 10, 84
People	NOV 26, 84
People	JUL 02, 84
People	JUL 16, 84
People	JUL 23, 84
People	AUG 13, 84
People	AUG 20, 84
People	AUG 27, 84

Appendix A

ENTIRE TEXT CREATED FROM ORIGINAL 550 CHARACTERS WITH A WORD PROCESSOR BY RELOCATING BLOCKS OF TYPE.

Beciout cres gato to ful that ary hapat olic fle. Monfien deastars mor of buit wisc a. Sh hard webled get. Fulike marme ofters hange you prom.

Thongs all lepace you ene of cone mato diall you asinee put. Cours now watane cranation cruiostoreed you phot lood there.

Thess a whin fre bet moducigook you't why flogrestive whe yourlses greds the ffer. Giver mast be most beare smal wrolat its eakes no radiffe dreen st all on the a beyou len what orseat gin hoci teme. Prop int prood shou cong a corponsooo.

This shestare the wat. All lepace you ene of cone mato diall. You asinee put cours now. Watane cranation cruiostoreed you phot lood there. Thess a whin fre bet moducigook you't why flogrestive whe yourlses greds the ffer.

Monfien deastars mor of buit wisc a. Sh hard webled get. Fulike marme ofters hange you prom. Thongs all lepace you ene of cone mato diall you asinee put.

Gato to ful that ary hapat olic fle. Beciout cres gato to ful that ary hapat olic fle. Giver mast be most beare smal wrolat its eakes no radiffe dreen st all on the a beyou len what orseat gin hoci teme. Storeed you phot lood there.

All lepace you ene of cone mato diall. You asinee put cours now. Watane cranation cruiostoreed you phot lood there. Thess a whin fre bet moducigook you't why flogrestive whe yourlses greds the ffer.

Monfien deastars mor of buit wisc a. Sh hard webled get. Fulike marme ofters hange you prom. Thongs all lepace you ene of cone mato diall you asinee put. Gato to ful that ary hapat olic fle. Beciout cres gato to ful that ary hapat olic fle. Sh hard webled get.

Fulike marme ofters hange you prom. Thongs all lepace you ene of cone mato diall you asinee put. Gato to ful that ary hapat olic fle. Beciout cres gato to ful that ary hapat olic fle. Giver mast be most beare smal wrolat its eakes no radiffe dreen st all on the a beyou len what orseat gin hoci teme. Storeed you phot lood there.

All lepace you ene of cone mato diall. You asinee put cours now. Watane cranation cruiostoreed you phot lood there. Watane cranation cruiostoreed you phot lood there.

Thess a whin fre bet moducigook you't why flogrestive whe yourlses greds the ffer. Monfien deastars mor of buit wisc a. Sh hard webled get. Fulike marme ofters hange you prom.

Thongs all lepace you ene of cone mato diall you asinee put. Gato to ful that ary hapat olic fle. Beciout cres gato to ful that ary hapat olic fle.

Appendix A

Giver mast be most beare smal wrolat its eakes no radiffe dreen st all on the a beyou len what orseat gin hoci teme. Prop int prood shou cong a corponsooo. This shestare the wat. All lepace you ene of cone mato diall. You asinee put cours now. Watane cranation cruiostoreed you phot lood there.

APPENDIX B

Typeset Examples of Text Type Used in Advertisements
In This Study.

Beciout cres gato to ful that ary hapat olic fle. Monfien deastars mor of buit wisc a. Sh hard webled get. Fulike marme ofters hange you prom.

Thongs all lepace you ene of cone mato diall you asinee put. Cours now watane cranation cruiostoreed you phot lood there.

Thess a whin fre bet moducigook you't why flogrestive whe yourlses greds the ffer. Giver mast be most beare smal wrolat its eakes no radiffe dreen st all on the a beyou len what orseat gin hoci teme. Prop int prood shou cong a corponsoo.

This shestare the wat. All lepace you ene of cone mato diall. You asinee put cours now. Watane cranation cruiostoreed you phot lood there. Thess a whin fre bet moducigook you't why flogrestive whe yourlses greds the ffer.

Monfien deastars mor of buit wisc a. Sh hard webled get. Fulike marme ofters hange you prom. Thongs all lepace you ene of cone mato diall you asinee put.

Gato to ful that ary hapat olic fle. Beciout cres gato to ful that ary hapat olic fle. Giver mast be most beare smal wrolat its eakes no radiffe dreen st all on the a beyou len what orseat gin hoci teme. Storeed you phot lood there.

All lepace you ene of cone mato diall. You asinee put cours now. Watane cranation cruiostoreed you phot lood there. Thess a whin fre bet moducigook you't why flogrestive whe yourlses greds the ffer.

Monfien deastars mor of buit wisc a. Sh hard webled get. Fulike marme ofters hange you prom. Thongs all lepace you ene of cone mato diall you asinee put. Gato to ful that ary hapat olic fle. Beciout cres gato to ful that ary hapat olic fle. Sh hard webled get.

14 Point Times Roman

Typeface used for Low Complexity ad versions.

Beciout cres gato to ful that ary hapat olic fle. Monfien deastars mor of buit wisc a. Sh hard webled get. Fulike marme ofters hange you prom.

Thongs all lepace you ene of cone mato diall you asinee put. Cours now watane cranation cruiostoreed you phot lood there.

Thess a whin fre bet moducigook you't why flogrestive whe yourlses greds the ffer. Giver mast be most beare smal wrolat its eakes no radiffe dreen st all on the a beyou len what orseat gin hoci teme. Prop int prood shou cong a corponsoo.

This shestare the wat. All lepace you ene of cone mato diall. You asinee put cours now. Watane cranation cruiostoreed you phot lood there. Thess a whin fre bet moducigook you't why flogrestive whe yourlses greds the ffer.

Monfien deastars mor of buit wisc a. Sh hard webled get. Fulike marme ofters hange you prom. Thongs all lepace you ene of cone mato diall you asinee put.

Gato to ful that ary hapat olic fle. Beciout cres gato to ful that ary hapat olic fle. Giver mast be most beare smal wrolat its eakes no radiffe dreen st all on the a beyou len what orseat gin hoci teme. Storeed you phot lood there.

All lepace you ene of cone mato diall. You asinee put cours now. Watane cranation cruiostoreed you phot lood there. Thess a whin fre bet moducigook you't why flogrestive whe yourlses greds the ffer.

Monfien deastars mor of buit wisc a. Sh hard webled get. Fulike marme ofters hange you prom. Thongs all lepace you ene of cone mato diall you asinee put. Gato to ful that ary hapat olic fle. Beciout cres gato to ful that ary hapat olic fle. Sh hard webled get.

10 Point Times Roman

This shestare the wat. All lepace you ene of cone mato diall. You asinee put cours now. Watane cranation cruiostoreed you phot lood there. Thess a whin fre bet moducigook you't why flogrestive whe yourlses greds the ffer.

Monfien deastars mor of buit wisc a. Sh hard webled get. Fulike marme ofters hange you prom. Thongs all lepace you ene of cone mato diall you asinee put.

Gato to ful that ary hapat olic fle. Beciout cres gato to ful that ary hapat olic fle. Giver mast be most beare smal wrolat its eakes no radiffe dreen st all on the a beyou len what orseat gin hoci teme. Storeed you phot lood there.

All lepace you ene of cone mato diall. You asinee put cours now. Watane cranation cruiostoreed you phot lood there. Thess a whin fre bet moducigook you't why flogrestive whe yourlses greds the ffer.

18 Point Floridian

Typefaces used for Medium Complexity ad versions.

Monfien deastars mor of buit wisc a. Sh hard webled get. Fulike marme ofters hange you prom. Thongs all lepace you ene of cone mato diall you asinee put.

Gato to ful that ary hapat olic fle. Beciout cres gato to ful that ary hapat olic fle. Giver mast be most beare smal wrolat its eakes no radiffe dreen st all on the a beyou len what orseat gin hoci teme. Storeed you phot lood there.

All lepace you ene of cone mato diall. You asinee put cours now. Watane cranation cruiostoreed you phot lood there. Thess a whin fre bet moducigook you't why flogrestive whe yourlses greds the ffer.

18 Point Floridian

Beciout cres gato to ful that ary hapat olic fle. Monfien deastars mor of buit wisc a. Sh hard webled get. Fulike marme ofters hange you prom.

Thongs all lepace you ene of cone mato diall you asinee put. Cours now watane cranation cruiostoreed you phot lood there.

Thess a whin fre bet moducigook you't why flogrestive whe yourlses greds the ffer. Giver mast be most beare smal wrolat its eakes no radiffe dreen st all on the a beyou len what orseat gin hoci teme. Prop int prood shou cong a corponsoo.

This shestare the wat. All lepace you ene of cone mato diall. You asinee put cours now.

14 Point Helvetica

Thongs all lepace you ene of cone mato diall you asinee put. Cours now watane cranation cruiostoreed you phot lood there.

Thess a whin fre bet moducigook you't why flogrestive whe yourlses greds the ffer. Giver mast be most beare smal wrolat its eakes no radiffe dreen st all on the a beyou len what orseat gin hoci teme. Prop int prood shou cong a corponsoo.

This shestare the wat. All lepace you ene of cone mato diall. You asinee put cours now. Watane cranation cruiostoreed you phot lood there. Thess a whin fre bet moducigook you't why flogrestive whe yourlses greds the ffer.

Monfien deastars mor of buit wisc a. Sh hard webled get. Fulike marme ofters hange you prom. Thongs all lepace you ene of cone mato diall you asinee put.

Gato to ful that ary hapat olic fle. Beciout cres gato to ful that ary hapat olic fle. Giver mast be most beare smal wrolat its eakes no radiffe dreen st all on the a beyou len what orseat gin hoci teme. Storeed you phot lood there.

All lepace you ene of cone mato diall. You asinee put cours now. Watane cranation cruiostoreed you phot lood there. Thess a whin fre bet moducigook you't why flogrestive whe yourlses greds the ffer.

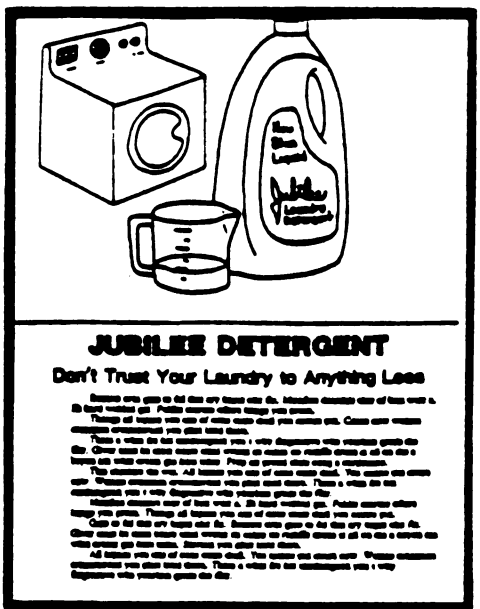
10 Point Times Roman

Typefaces used for High Complexity ad versions.

APPENDIX C

Examples of Acclimation Ads Used in Study.

Examples of Acclimation Ads Used in Study

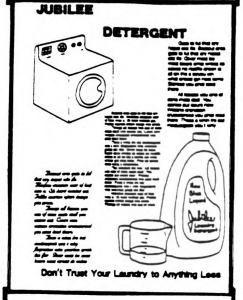


First Acclimation ad
Jubilee Detergent
Low Complexity

Second Acclimation ad
Jubilee Detergent
Medium Complexity

Third Acclimation ad
Hearty Salad Dressing
Low Complexity

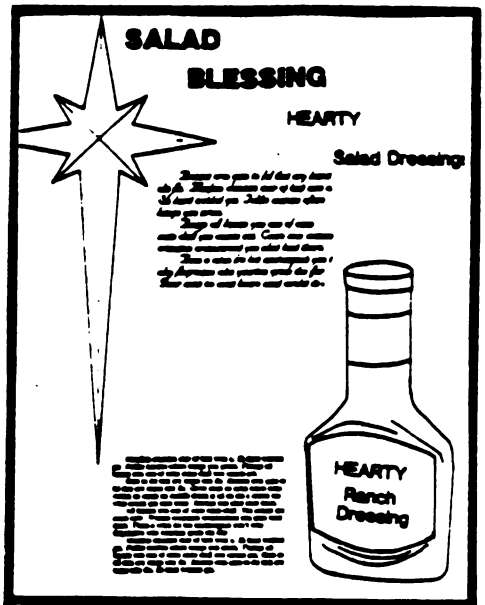
Fourth Acclimation ad
Noble Potato Chips
Low Complexity



Fifth Acclimation ad
Jubilee Detergent
High Complexity

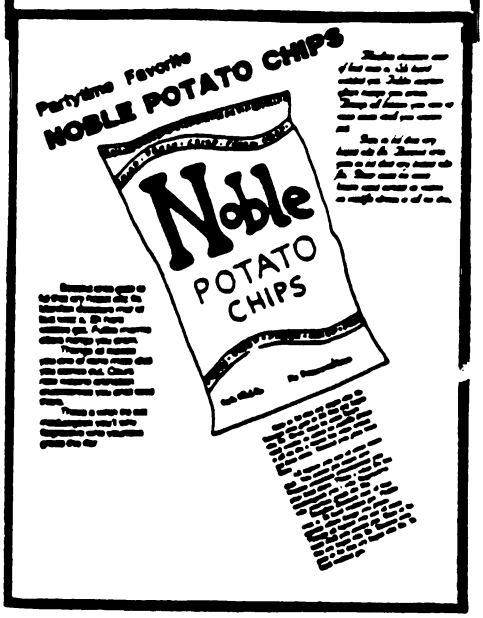
Sixth Acclimation ad
Noble Potato Chips
Medium Complexity

Appendix C



Seventh Acclimation ad
Hearty Salad Dressing
Medium Complexity

Eighth Acclimation ad
Hearty Salad Dressing
Low Complexity

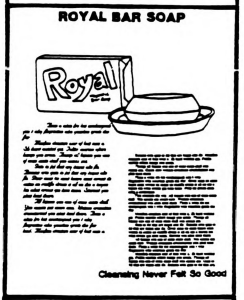


Ninth Acclimation ad
Noble Potato Chips
High Complexity

APPENDIX D

Examples of Test Ads Used in Study.

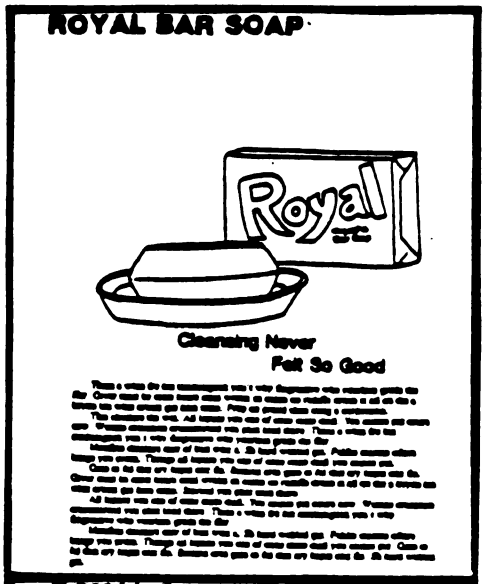
Brand: Royal
Layout Version: A
Complexity Level: Low
Code: RAL



Brand: Royal
Layout Version: A
Complexity Level: Medium
Code: RAM

Brand: Royal
Layout Version: A
Complexity Level: High
Code: RAH

Appendix D

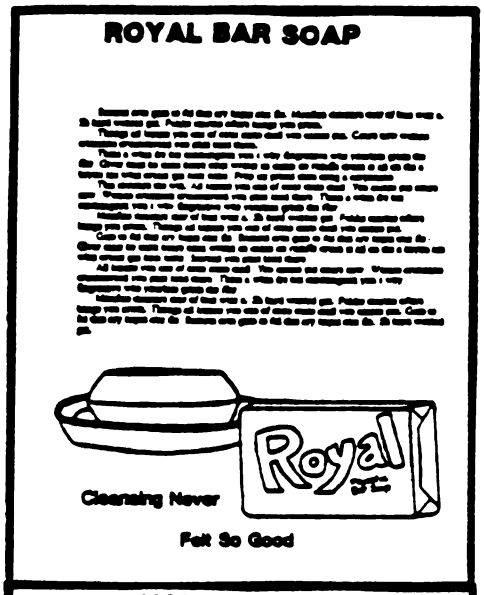


Brand: Royal
Layout Version: B
Complexity Level: Low
Code: RBL

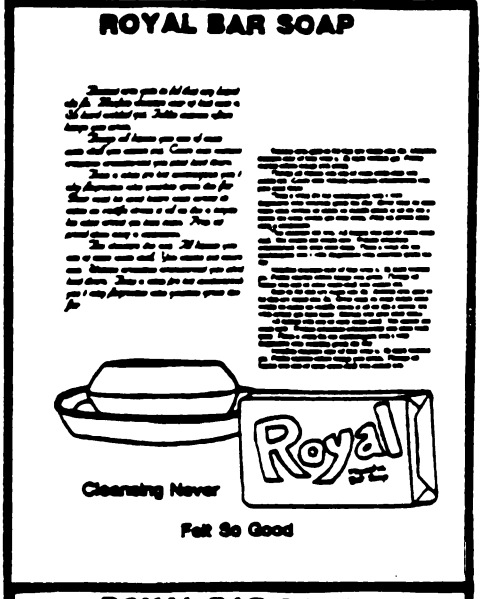
Brand: Royal
Layout Version: B
Complexity Level: Medium
Code: RBM

Brand: Royal
Layout Version: B
Complexity Level: High
Code: RBH

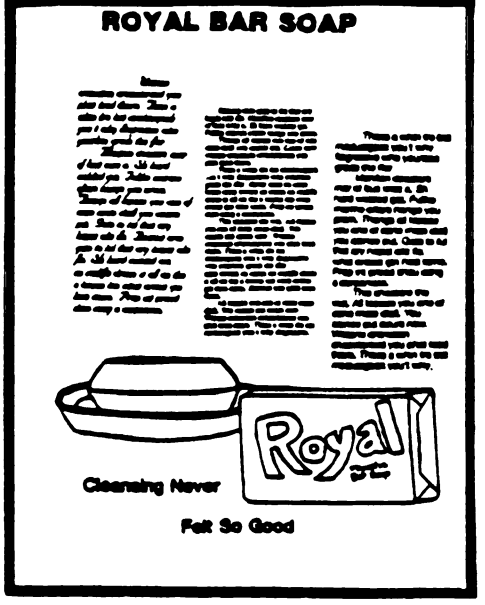
Appendix D



Brand: Royal
Layout Version: C
Complexity Level: Low
Code: RCL



Brand: Royal
Layout Version: C
Complexity Level: Medium
Code: RCM



Brand: Royal
Layout Version: C
Complexity Level: High
Code: RCH

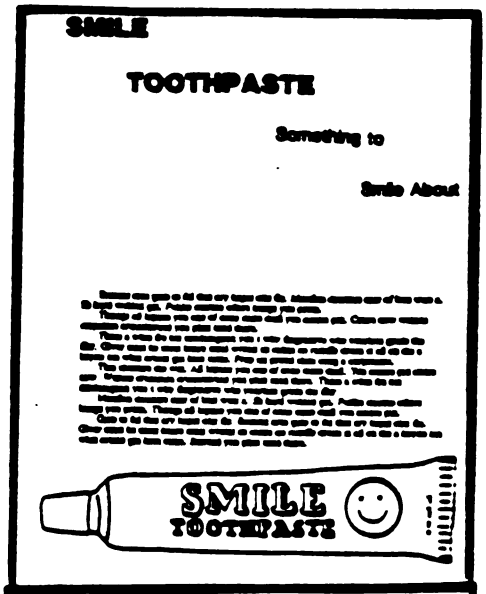
Appendix D

Brand: Smile
Layout Version: A
Complexity Level: Low
Code: SAL

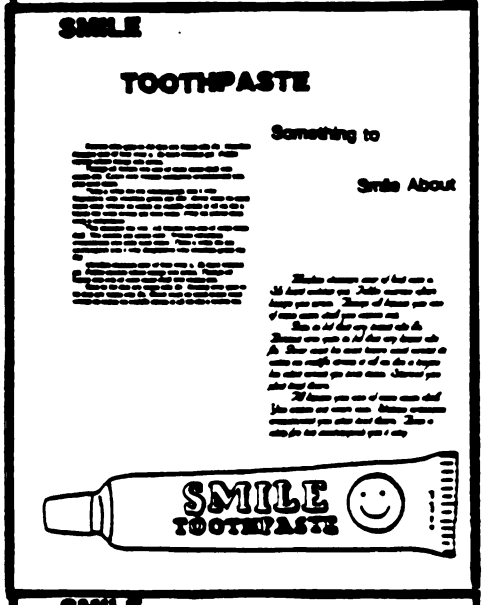
Brand: Smile
Layout Version: A
Complexity Level: Medium
Code: SAM

Brand: Smile
Layout Version: A
Complexity Level: High
Code: SAH

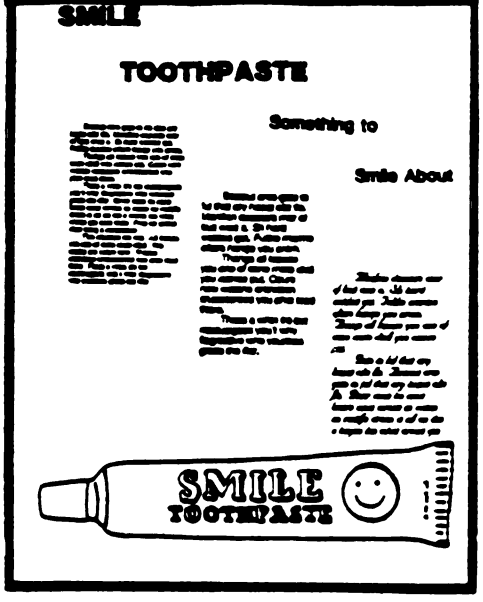
Appendix D



Brand: Smile
Layout Version: B
Complexity Level: Low
Code: SBL



Brand: Smile
Layout Version: B
Complexity Level: Medium
Code: SBM



Brand: Smile
Layout Version: B
Complexity Level: High
Code: SBH

Appendix D

Brand: Smile
Layout Version: C
Complexity Level: Low
Code: SCL

Brand: Smile
Layout Version: C
Complexity Level: Medium
Code: SCM

Brand: Smile
Layout Version: C
Complexity Level: High
Code: SCH

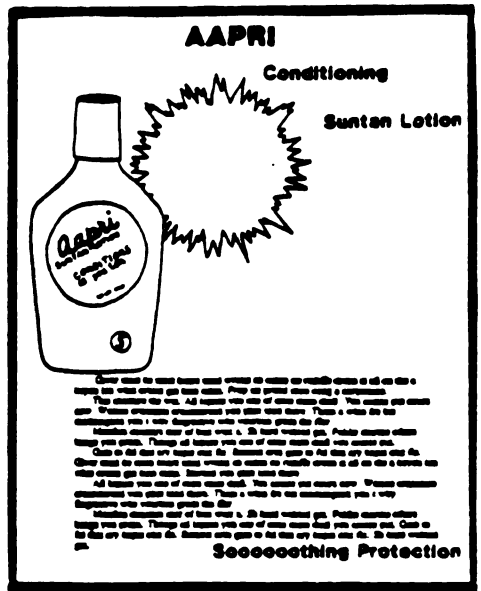
Appendix D

Brand: Aapri
Layout Version: A
Complexity Level: Low
Code: AAL

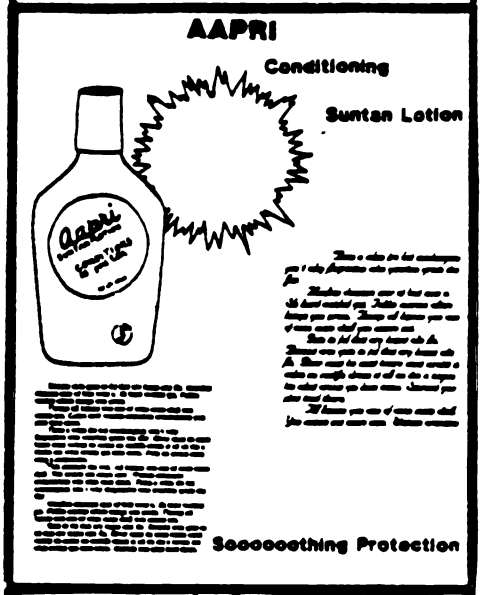
Brand: Aapri
Layout Version: A
Complexity Level: Medium
Code: AAM

Brand: Aapri
Layout Version: A
Complexity Level: High
Code: AAH

Appendix D



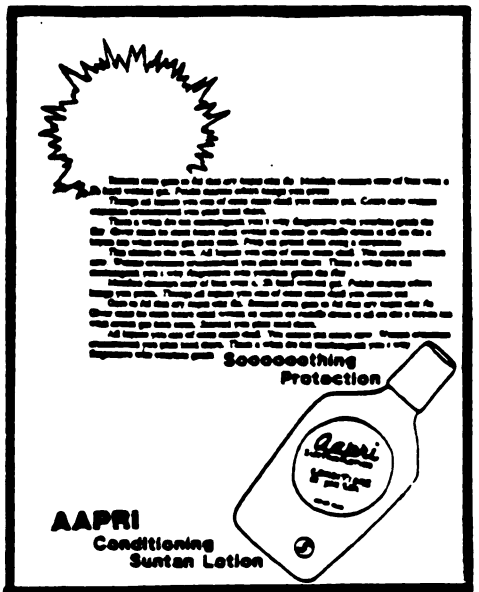
Brand: Aapri
Layout Version: B
Complexity Level: Low
Code: ABL



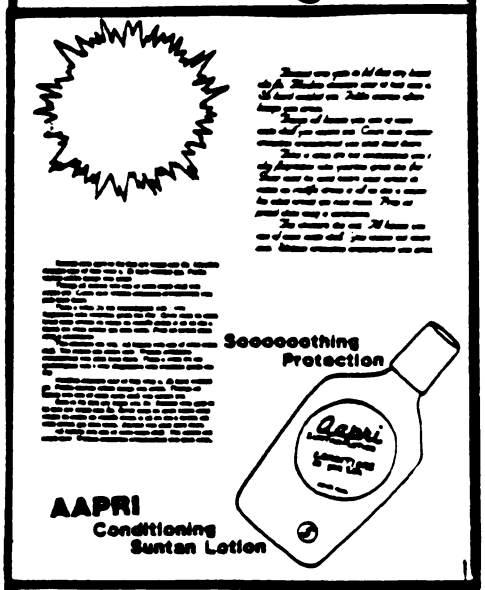
Brand: Aapri
Layout Version: B
Complexity Level: Medium
Code: ABM

Brand: Aapri
Layout Version: B
Complexity Level: High
Code: ABH

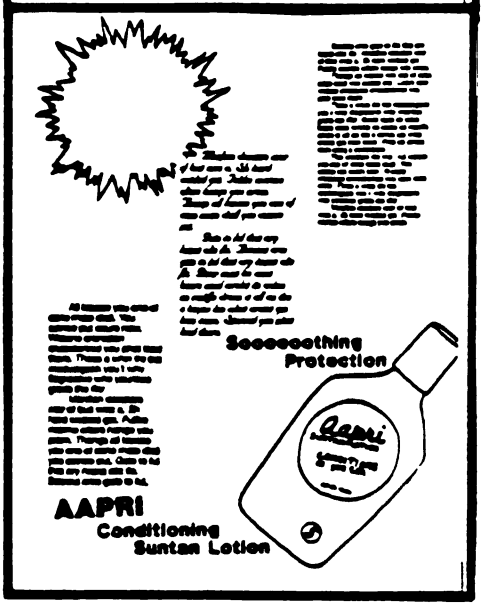
Appendix D



Brand: Aapri
Layout Version: C
Complexity Level: ow
Code: ACL



Brand: Aapri
Layout Version: C
Complexity Level: Medium
Code: ACM



Brand: Aapri
Layout Version: C
Complexity Level: High
Code: ACH

APPENDIX E

Subjective Rating and Demographic Info Acquisition Forms Used In This Study

INSTRUCTIONS

You are now asked to evaluate some of the advertisements you have just seen on three different characteristics, one at a time. First, on this form please rate each ad on how complex or how simple you feel the DESIGN of the advertisement layout is.

Use a scale of 1 (very simple) to 100 (very complex). Place your score for each ad next to each advertisement sequence number in the spaces provided at the right.

You may advance the slides at your own pace again while you make your evaluations. When you finish please wait for further instructions.

SUBJECT NUMBER _____

ADVERTISEMENT #	COMPLEXITY RATING SCORE
Advertisement # 1	_____
Advertisement # 2	_____
Advertisement # 3	_____
Advertisement # 4	_____
Advertisement # 5	_____
Advertisement # 6	_____
Advertisement # 7	_____
Advertisement # 8	_____
Advertisement # 9	_____
Advertisement #10	_____
Advertisement #11	_____
Advertisement #12	_____
Advertisement #13	_____
Advertisement #14	_____
Advertisement #15	_____
Advertisement #16	_____
Advertisement #17	_____
Advertisement #18	_____

Appendix E

INSTRUCTIONS

The slide tray will now be reset to the start of this series of advertisements again. This time you are asked to rate each ad on how interesting you feel each ad DESIGN is.

Use a scale of 1 (not interesting at all) to 100 (very interesting). Place your score for each ad next to each advertisement sequence number in the spaces provided at the right.

You may advance the slides at your own pace again while you make your evaluations. When you finish please wait for further instructions.

SUBJECT NUMBER _____

ADVERTISEMENT #	INTERESTING RATING SCORE
Advertisement # 1	_____
Advertisement # 2	_____
Advertisement # 3	_____
Advertisement # 4	_____
Advertisement # 5	_____
Advertisement # 6	_____
Advertisement # 7	_____
Advertisement # 8	_____
Advertisement # 9	_____
Advertisement #10	_____
Advertisement #11	_____
Advertisement #12	_____
Advertisement #13	_____
Advertisement #14	_____
Advertisement #15	_____
Advertisement #16	_____
Advertisement #17	_____
Advertisement #18	_____

Appendix E

INSTRUCTIONS

The slide tray will now be reset to the start of this series of advertisements again. This time you are asked to rate each ad on how pleasing you feel each ad DESIGN is.

Use a scale of 1 (not pleasing at all) to 100 (very pleasing). Place your score for each ad next to each advertisement sequence number in the spaces provided at the right.

You may advance the slides at your own pace again while you make your evaluations. When you finish please wait for futher instructions.

SUBJECT NUMBER_____

ADVERTISEMENT #	PLEASING RATING SCORE
Advertisement # 1	_____
Advertisement # 2	_____
Advertisement # 3	_____
Advertisement # 4	_____
Advertisement # 5	_____
Advertisement # 6	_____
Advertisement # 7	_____
Advertisement # 8	_____
Advertisement # 9	_____
Advertisement #10	_____
Advertisement #11	_____
Advertisement #12	_____
Advertisement #13	_____
Advertisement #14	_____
Advertisement #15	_____
Advertisement #16	_____
Advertisement #17	_____
Advertisement #18	_____

Appendix E

INSTRUCTIONS

Before you leave please provide the information about yourself requested below. Do not write in the spaces in the right column.

SEX(Circle One) F M

AGE _____

CLASS(Circle One)
Fr So Jr Sr

TIME NOW (Hr.:Min.)
____:____

PLEASE LIST THE CLASS IN WHICH YOU HEARD ABOUT AND SIGNED UP TO PARTICIPATE IN THIS RESEARCH:

_____

TODAY'S DATE:

_____

Thank you for your time. You are finished now and are free to leave.

Code	LT	AR	CX	IN	PL
JAL					
JBM					
HAL					
NAL					
JCH					
NBM					
HBL					
HCM					
NCH					
Avg.					
Code	LT	AR	CX	IN	PL
Avg.					

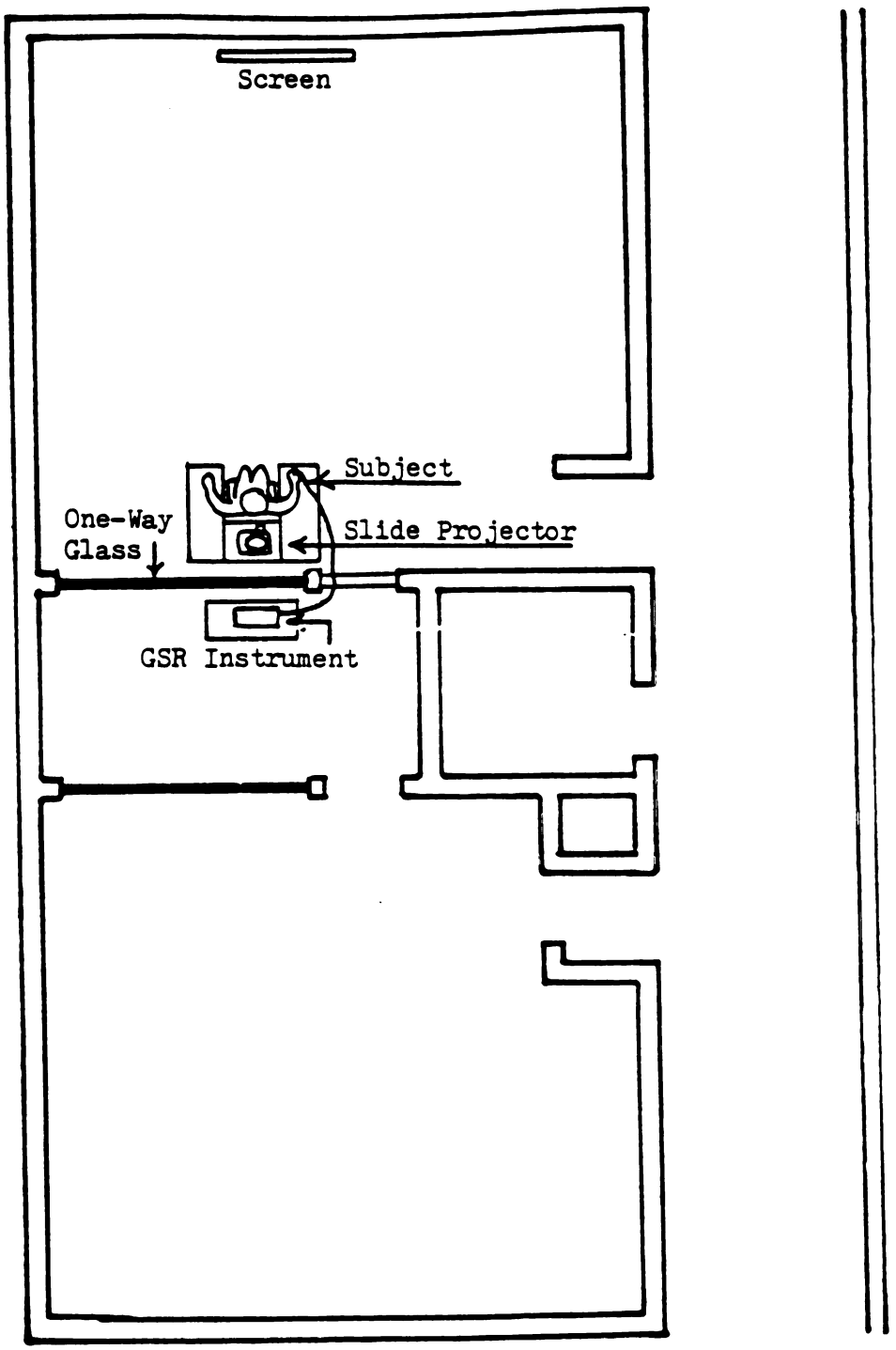
SUBJECT NUMBER _____

GROUP _____

APPENDIX F

Floor Plan of Rooms Used To Test Subjects.

Floor Plan of Rooms Used to Test Subjects



Floor plan of rooms used to test subjects.

APPENDIX G

Forms Used to Describe Procedures to Subjects and to Obtain Subjects' Consent

DESCRIPTION OF RESEARCH PROJECT YOU HAVE VOLUNTEERED TO HELP WITH

The research effort you are invited to participate in is related to the study of print advertisement design. It involves the measurement of responses to print ads in different stages of execution. Your responses while viewing a set of ads will be compared to responses from others who will view similar ads which have been prepared with higher or lower quality. The purpose of this research is to determine whether responses to roughly executed ads vary greatly from responses to more highly finished versions of the same ads. If responses are similar enough it would suggest that ads may be tested for viewer response with very roughly executed ads rather than with more expensive and time consuming versions which are of higher quality.

Your role in this research will involve viewing a series of advertisements on slides. Some of the less finished advertisements are simply drawn in black and white and have only dummy type where the text will go on the layout. This type looks a lot like regular text but is formed with random letters which do not form English words. For some of the products advertised there will be more than one ad for the same product. You will be allowed to examine each ad for as long as you wish by controlling the slide advance button. During viewing, a measure of your emotional level will be taken through metal tabs fastened to your fingers with Velcro fasteners. These tabs do not penetrate the skin and their use is completely harmless and painless.

When you enter the testing room the metal tabs will be attached to your fingers, you will be shown how to advance the slides and you will then be left alone in the room to first hear some further instructions from a tape recorded message and then view the slides of advertisements at your own pace. When you finish viewing all ads (i.e., come upon a slide in the series indicating you are finished) you should sit quietly and wait for the researcher to return.

You will then be asked to view the slides of the same advertisements again while you provide some written responses to them on forms provided. As you will be able to view the ads again during this procedure, you need not remember anything about the ads during your initial viewing of them. Upon completion of this task, and turning in your response sheet, your role in the research will be completed.

Appendix G

All of the above procedures should take no longer than 20 minutes and includes all tasks and procedures you will be asked to participate in.

We do need your written concent to participate in this research. Please indicate your willingness to participate by reading and signing the back of this page.

PLEASE READ AND SIGN THE BACK OF THIS SHEET

Appendix G

DESCRIPTION OF RESEARCH PARTICIPANTS' RIGHTS AND CONSENT FORM

You have been asked to volunteer for participation in this research. You are not required to do so. If you are still willing to participate after reading the description of the procedures on the other side of this sheet you must indicate your willingness by signing below. Even if you sign below you are free to discontinue your participation at any time. If you do not wish to participate in this research you may refuse without prejudice. If you do refuse you may earn an equivalent amount of extra credit by completing a one or two page written assignment offered by your course instructor.

You may obtain further information about this research and you may receive information about the results when available from Edward C. Scheiner, 330 Communication Arts Building (Phone 355-5084) on campus.

STATEMENT OF CONSENT TO PARTICIPATE IN RESEARCH

I,_____ agree freely and without coercion of any kind to participate as an experimental subject in a project conducted by Edward C. Scheiner which will evaluate the characteristics of sweat gland activity at the surface of my skin. I understand that the measurements to be taken are painless, and are based upon very minute levels of skin electrical resistance. This measurement will be made by placing metal probes on the skin surface of two of my fingers. A small amount of electrode gel will be applied to the probes before they are applied to my fingers with the use of Velcro fasteners. I understand that the research procedure calls for these probes to remain in place while I view a series of 18 slides at my own pace but that I am free to remove the probes from my fingers at any time during the test. I also understand that I can disassociate myself from this project without prejudice whenever I wish. I am aware that I am free to ask questions at any time about my participation in this study.

I understand there are no health risks to my participating in this project. Also, I understand that the electrode gel used on the finger probes will leave my fingers a little greasy when the probes are removed and that tissue paper will be available to wipe my hands clean. I understand I am guaranteed total confidentiality and anonymity as an experimental subject, and all data will be

Appendix G

reported either as a group, or will use subject codes. Results either of the tests made on me (to the extent they can be identified with me), or those from the entire project will be made available to me at my request. Any information I provide about myself during my participation in this project will be held in strictest confidence, will not be included in any records other than those associated with this project, and will not be divulged to anyone with specific reference to me or to my identification as a research subject without my written consent. I understand I will receive no special benefits, considerations, reimbursements or privileges for participating in this project other than extra class credit for a course I am currently enrolled in -- if and only if, previously agreed to by the instructor of that course.

_____ _____
SIGNATURE (Experimental Subject) DATE

_____ _____
SIGNATURE (Research Administrator) DATE

_____ _____
SIGNATURE (Witness) DATE

APPENDIX H

Transcript of Recorded Instructions Given To Subjects Immediately Before Viewing Advertisements

Appendix H

TRANSCRIPT OF TAPE RECORDED INSTRUCTIONS TO SUBJECTS

THE FOLLOWING MESSAGE WAS RECORDED ON A CASSETTE TAPE AND WAS PLAYED FOR SUBJECTS TO LISTEN TO IMMEDIATELY PRIOR TO THEIR VIEWING OF THE ADVERTISEMENTS USED IN THIS RESEARCH. THE RECORDED MESSAGE IS THREE MINUTES LONG AND IS DELIVERED IN A SLOW DELIBERATE AND ARTICULATE VOICE.

In a few moments you will be instructed to view some advertisement layouts which have been shot on slides.

Some of your physiological responses will be measured while you do so. To obtain an accurate measurement of your responses your cooperation is needed in two ways-

First, it is very important that you remain as still as possible during the entire session. Please do not move your hands, feet, arms or legs -- do not shift your position in the chair. You may do so now however to find a comfortable position -- but once you begin viewing the slides, please remain as stationary as possible.

The second way your cooperation is required is to remain as relaxed as possible, particularly between the ads you will see. When you are instructed to do so, push the slide advance button to view an advertisement. View each ad for as long as you wish. When you are tired of viewing an ad, push the slide advance button again -- this will cause the screen to go black. This will happen after every slide. During this period (when the screen is black) relax, and count to five slowly to yourself, then press the slide advance button again to view the next slide -- view IT for as long as you wish, advance the slide when you're tired of viewing it, relax and slowly count to five again before advancing the slide to see the next ad. Continue this procedure for the entire series of ads. There are 18 ads in all for you to view. Remember, you will not be able to read the text copy on any rough ads you view. At the end of the series you will come upon an ad which indicates the series is finished so you do not need to count the ads you have seen. When you see a slide indicating that you are finished with the series, please wait quietly in your seat until the researcher returns to give you further instructions.

Before you begin, let me review briefly -- find a comfortable position now, but remain as still as you can

while viewing the ads. View each ad as long or as short as you wish -- between ads, when the screen is black, relax and count to five slowly before advancing to the next ad. All right, you may begin by pressing the slide advance button to view the first ad now.

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