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They're in the Shade**

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Effects of Color as an Executional Cue in Advertising: They're in the Shade

Abstract

In designing print ads, one of the decisions the advertiser must take is which color(s) to use as executional cues in the ad. Typically, color decisions are based on intuition and anecdotal evidence. To provide guidelines for these decisions, this research proposes and tests a conceptual framework linking the hue, chroma, and value of the color(s) in an ad to consumers' feelings and attitudes. In an experimental study, the three dimensions of color used in an ad are manipulated using a between subjects design. The results support the hypotheses that ads containing colors with a higher level of value lead to greater liking for the ad, and this effect is mediated by the greater feelings of relaxation elicited by the higher value color. Feelings play an equally important role in the effect of chroma. Consistent with the hypotheses, higher levels of chroma elicit greater feelings of excitement, which in turn increase ad likeability. A follow-up study found that while managers often select higher value and higher chroma colors, in a large number of cases they do not. The findings of both studies are integrated in our discussion of the importance of value and chroma in increasing the range of options available to a manager faced with the selection of colors in an ad.

1. Introduction

In designing advertisements, managers must make decisions as to which color(s) to use. In a marketplace typically characterized by a cluttered media environment and an often undifferentiated product market, an important goal of an advertiser would be to select colors that maximize attention, provide a more realistic and appealing portrayal of the product or service, and arouse appropriate feelings (Wells, Burnett, and Moriarty 1992). These, in turn, would hopefully lead to favorable brand attitudes. However, choosing a particular color (or colors) is a difficult and subjective task, as there is little that can be classified as solid fact (Bellizzi and Hite 1992).

While there is little systematic empirical research in marketing on the effects of color, it is widely accepted by color theorists that there are three independent properties of color: hue, chroma, and value (Thompson, Palacios, and Varela 1992). Hue is the pigment of the color, what we normally understand as blue, red, yellow, etc. Chroma refers to saturation; highly saturated colors have a greater proportion of the pigment in them. Low chroma colors are dull and high chroma colors are rich and deep. Value is the degree of darkness or lightness of the color relative to a neutral scale that extends from pure black to pure white. Low value colors have a "blackish" quality to them, as if the color black was mixed into the pigment. High value colors have a "whitish" quality to them, as if the color white was mixed into them; making high value colors pastel-like in appearance.

The purpose of this research is to propose and empirically test a framework for the selection of colors to be used as executional cues in an ad. Our conceptual framework links the three dimensions of color to the specific feelings elicited by each dimension, and these feelings in turn to ad and brand attitudes.

1.1. Color Selection in Industry

Though color choice is important, managers do not necessarily make the best choices. For example, the use of a subdued blue for Nabisco's Honeycomb Graham Snacks was directly blamed for the initial sluggish sales that led the company to redesign and relaunch the brand (Ramirez 1990). It is suggested that the use of a saturated red for its interiors led McDonald's customers to complain of headaches (Von Bergen 1995). The poor sales performance of McCormick and Company led to the changing of its advertising and packaging from a drab, olive green to a deeper "forest green" (Miller 1994).

Why do firms make poor choices? One reason is that color choice is more an art than a science as managers do not have any well developed frameworks to guide them. Cheskin (1951; see also Ramirez 1990) points out that selecting a color(s) is a trial and error process, with advertisers using their past experience to guide their choices. Many rely on the recommendations of color consultants whose judgments are often based on intuition, rather than hard data. For example, the members of the Color Marketing Group, the association of color designers and consultants, meet twice a year to forecast color trends. At these meetings, members present their individual forecasts and engage in group discussion to reach a consensus on the colors/shades that will be in vogue during a given period. Many companies follow these recommendations (Miller 1994).

To acquire a better understanding of the theory-in-use of color decision makers, in-depth interviews were conducted with creative directors at twelve randomly selected advertising agencies, which represented a cross-section of agencies in terms of size. In each interview, the creative director identified color selection to be a critical factor in the success of an advertising initiative. Of the twelve directors interviewed, eleven indicated that they were not familiar with any "theory of color" and explained color choices in terms of gut feelings,

experience, or personal taste. When choosing colors to use as executional elements in an ad, nine of the 12 creative directors made specific reference to the importance of the emotions elicited by the color. Their focus was on the different emotions elicited by different hues (e.g. red was exciting); only one respondent explicitly identified the importance of the other two dimensions of color, chroma and value and their effect on emotional reactions. Seven of the 12 creative directors also mentioned that in some situations it was important to consider the symbolic associations with particular hues when choosing a color (e.g., red and green for Christmas or orange and black for Halloween).

Given the emphasis placed by managers on the emotional effects of colors in an ad, we focus on feelings and propose a conceptual framework that incorporates all three dimensions of color and their effect on feeling responses. We recognize that in some cases there would also be symbolic associations, typically hue-based, that would be important as well, however, these symbolic associations are not the focus of the present study. As will be seen later, given our focus, every effort is made in the present study to eliminate any symbolic effects by choosing a suitable product category. We next review briefly past research on color in marketing before presenting our conceptual framework and empirical work.

2. Color Research in Marketing

Many of the articles on the role of color in marketing are anecdotal rather than systematic and empirical. These articles contain suggestions like: red is an effective color to use in restaurants because it leads people to eat more; red also makes people lose track of time, making it a good color for use in casinos (Argue 1991). They suggest that colors can be used to generate good feelings and increase the persuasiveness of advertising (e.g., Tucker 1987). While there is no shortage of suggestions, they lack empirical verification.

Empirical research on color in marketing can be separated into three streams. The first

has examined the specific colors used in magazine ads (Schindler 1986; Lee and Barnes 1990). The second has investigated the efficacy of colored compared to black and white ads (e.g., Sparkman and Austin 1980; Meyers-Levy and Peracchio 1995). The third has tested the effects of specific colors on consumer responses. This later stream of research has focused on the effects of hue (e.g., Bellizzi, Crowley, and Hasty 1983; Crowley 1993). It suggests, for example, that red colored backgrounds elicit greater feelings of arousal than blue colored backgrounds, whereas products presented against blue colored backgrounds are liked more than products presented against red colored backgrounds (e.g., Middlestadt 1989; Bellizzi and Hite 1992). Though this third research stream provides some guidance in terms of the choice of hues, it is silent with respect to the two other dimensions of color, chroma and value, which, as we shall see later, are of critical importance in choosing the most suitable color(s) to use in an ad. Furthermore, since there was no experimental control over chroma and value in this research, there is always the possibility that the results obtained reflect differences along these dimensions, rather than differences in hue. We next present a conceptual framework for relating all three dimensions of a color in an ad to the feelings they elicit.

3. Conceptual Framework

3.1. Arousal and Affect

It is widely accepted that people's feelings are affected by color. In particular, color is believed to affect the degree of felt arousal (e.g., Walters, Apter and Svebak 1982; Mikellides 1990). Traditionally, arousal has been considered to be unidimensional, with an inverted-U shaped relationship between the single arousal dimension and affect. Increases in arousal are at first pleasurable and exciting; after a certain point, further increases in arousal are associated with a decrease in pleasure and an increase in tension (Berlyne 1960, 1970).

While the unidimensional view has been predominant in both psychology (e.g., Berlyne 1970) and marketing (e.g., Sanbonmatsu and Kardes 1988; Olney, Holbrook, and Batra 1991), several researchers (e.g., Thayer 1978; Latour, Pitts, and Snook-Luther 1992; Eliashberg and Sawhney 1994) have suggested that arousal is more complex. A number of them have conceptualized arousal as being two dimensional (Smith and Apter 1975; Apter 1976, 1981, 1982; Thayer 1978, 1986; Gray 1982; Eysenck and Eysenck 1985; Henthorne, Latour, and Natarajan 1993). In this study we draw on the two dimensional view of arousal proposed by Apter and his colleagues (Smith and Apter 1975; Apter 1976, 1981, 1982) since they have utilized it in color research (Walters et al. 1982)¹.

According to Apter and his colleagues there are two dimensions of arousal: one dimension of arousal goes from boredom to excitement, and is henceforth called excitement. The second dimension of arousal goes from tension to relaxation, and is henceforth called relaxation. Excitement is preferred to boredom and relaxation is preferred to tension (Fig. 1). Further, it is possible to simultaneously experience feelings from each of these dimensions. For example, a person might feel relaxed but bored on a weekend afternoon. On the other hand, they might feel bored but tense if there is an upcoming event they are worried about. One could also be excited and tense at the same time, for example on the first day of a new job. People could also feel both relaxed and excited, e.g., when on a vacation or relaxing with an exciting novel.

The two-dimensional framework of arousal, would seem to be more consistent with our everyday experience of arousal than a unidimensional one. Incorporating tension within the inverted U-shaped unidimensional view would be difficult. Tension would have to be considered a higher state of arousal than excitement. As Walters et al. (1982) note, when people go from low to high arousal, they would first have to become excited before they

became tense, and then excited again before they returned to a state of low arousal. This would be the only way to obtain the inverted U-shaped form. This assumption that excitement always precedes tension is probably not consistent with the way in which most people would come to experience tension. With the two-dimensional framework, both excitement and tension could produce equivalently high states of arousal, but the former would be pleasant, the latter unpleasant.

A framework incorporating separate dimensions of excitement and relaxation would be consistent with research on affect in advertising. For example, Batra and Ray (1986) separate feelings of activation (labelled SEVA - surgency, elation, vigor, and activation) from feelings of deactivation (feeling soothed, relaxed, and calm) experienced following exposure to an ad. Burke and Edell (1989) treat feelings of warmth and upbeat feelings as two independent feelings experienced during ad exposure. Among the items that load on the warmth factor, in their factor analysis, are "calm," "peaceful," and "contemplative," items that reflect Apter's relaxation dimension. Paralleling Apter's excitement dimension, the upbeat factor of Burke and Edell (1989) contains the items "stimulated," "energetic," and "alive."

The two-dimensional view may be intuitively appealing and also consistent with recent findings in the advertising literature, however, the main reason for using the two-dimensional view in this paper is that unlike the single dimensional view, it proposes that low arousal, and not just high arousal, can be a pleasant state for the organism (see Fig. 1). It suggests an important and independent contribution of feelings of relaxation. Feelings of relaxation have not received much attention in the advertising literature, and as will be seen in the next section, we propose that higher levels of value will lead to higher levels of relaxation, but not lower levels of excitement. Moreover we suggest that the level of chroma affects excitement, but there is no relationship between the level of chroma and the relaxation dimension. If our

hypotheses are confirmed they would suggest that if advertisers want to create feelings of relaxation with their ad (as a resort or an airline might), they should choose a higher value color for their ad, but they could not do so by choosing a lower chroma color. Further, to create feelings of excitement, advertisers would have to choose a high chroma color; changes in value would not affect felt excitement. This is quite different from the implications that could be drawn from a unidimensional perspective. The unidimensional view would suggest that movement toward the relaxation end of the scale would be observed with either increased value or reduced chroma. Further, the movement toward greater relaxation would necessarily imply a lower level of excitement.

3.2. Hypotheses: The Effects of the Dimensions of Color on Feelings, A_{Ad} , and A_B

3.2.1. Effects of Value. We propose that value will affect the relaxation dimension, but not the excitement dimension. As mentioned above, higher value colors have a "whitish" quality to them. Psychophysiological research suggests that white has a calming effect in that white light seems to produce the least amount of tension in the form of hand tremor (James and Domingos 1953). More recently, and consistent with the work of James and Domingos (1953), Ott (1976) reports that students in classrooms lit with full-spectrum white light were calmer and less fidgety than those in other lighting conditions. In addition, Profusek and Rainey (1987) found that rooms painted in Baker-Miller pink, a high value color, namely a "whitish" hue of the red family of colors, had a more relaxing and calming effect, than rooms painted red (see also Schauss 1985; Bennett, Hague, and Perkins 1991). Thus, given their pastel appearance, higher value, lighter colors should be more relaxing than lower value, darker colors.²

Although we propose that value affects the relaxation dimension, there is no intuitive reason or color research to suggest that the whiteness of a color would influence feelings of

excitement. Thus we hypothesize that value will not affect feelings of excitement. More formally:

H1a: Those exposed to an ad containing a high value versus low value color, used as an executional cue, will feel more relaxed.

H1b: There will be no effect of the value of the color, used as an executional cue in an ad, on feelings of excitement.

According to our framework, higher levels of relaxation would be preferred to lower levels of relaxation (see Fig. 1). Current models of consumer response to advertising (e.g., Batra and Ray 1986) suggest that feelings elicited by an ad directly influence attitude toward the ad (A_{Ad}). One would expect that if greater feelings of relaxation are produced by higher value colors, then ads with these colors should be more liked. Research is supportive of colors higher in value being more liked (Guilford and Smith 1959; Sharpe 1974; McManus, Jones, and Cottrell 1981). Given the above, we also expect feelings of relaxation to mediate the effects of value on A_{Ad} . Thus we hypothesize:

H2: Those exposed to an ad containing a high value versus low value color, used as an executional cue, will have a more favorable A_{Ad} , and feelings of relaxation will mediate the effect of value on A_{Ad} .

Since advertising research suggests that ad attitude directly influences brand attitude (A_B) (MacKenzie, Lutz, and Belch 1986), we hypothesize:

H3: Those exposed to an ad containing a high value versus low value color, used as an executional cue, will have a more favorable A_B .

3.2.2. Effects of Chroma. We propose a link between the chromatic strength of a color and excitement, and we do so for perceptual reasons. Since highly saturated colors have a higher percentage of the hue pigment in them than desaturated colors, they are richer, more intense,

and more striking. This should make them more exciting than less saturated colors, as suggested by Valdez and Mehrabian (1994; see also Adams and Osgood 1973). Moreover, if the arousal end of a unidimensional non-arousal/arousal scale can be taken as excitement, then the empirical work of Valdez and Mehrabian (1994) would support this relationship. While the above suggests that low chroma colors are less exciting, there is no literature to suggest that duller colors, i.e., low chroma colors, would be any more or less relaxing than higher chroma colors.

One would expect that if greater feelings of excitement are produced by higher chroma colors, and higher levels of excitement are preferred, then ads with these colors should be more liked. Research is supportive of higher levels of chroma being more liked (Guilford 1934, 1939; Guilford and Smith 1959; Sharpe 1974; McManus et al. 1981). More favorable ad attitudes should lead to more favorable brand attitudes (MacKenzie et al. 1986). The following hypotheses are advanced:

H4a: Those exposed to an ad containing a high chroma versus low chroma color, used as an executional cue, will feel more excited.

H4b: There will be no effect of the chroma of the color, used as an executional cue in an ad, on feelings of relaxation.

H5: Those exposed to an ad containing a high chroma versus low chroma color, used as an executional cue, will have a more favorable A_{Ad} , and feelings of excitement will mediate the effect of chroma on A_{Ad} .

H6: Those exposed to an ad containing a high chroma versus low chroma color, used as an executional cue, will have a more favorable A_B .

3.2.3. Effects of Hue. Using the two dimensional view of arousal, Walters et al. (1982) found a link between red and felt excitement, and blue and felt relaxation. This is consistent

with the generally accepted view that red is an exciting color, whereas blue is relaxing (e.g., Guilford and Smith 1959; Tom, Barnett, Lew, and Selman 1987). As noted earlier, both feelings of excitement and relaxation are pleasant and likely to lead to favorable attitudes. Thus, we would not expect any differences in ad or brand attitude as a function of hue (red vs. blue). More formally, we hypothesize that:

H7: Ads with a red versus a blue hue will elicit greater feelings of excitement; whereas ads with a blue versus a red hue will elicit greater feelings of relaxation.

H8: Hue (red vs. blue) of the color in an ad does not affect either A_{Ad} or A_B .

3.2.4. Cognition. No research has been conducted on the effects of the three dimensions of color (hue, chroma, and value) on learning and recall. There has also been no research linking information processing with the two-dimensions of arousal considered here.³ Given the lack of previous research, linking either the three dimensions of color or the two dimensional framework of arousal, to information processing, hypotheses related to information processing are not advanced. However, measures of information processing are included and examined.

4. Main Study

4.1. Independent Variables

In this section we describe the three independent variables, hue, chroma, and value, and the calibration system used to choose specific levels for each.

4.1.1. The Munsell System. There are several color calibration systems that scale colors along hue, chroma, and value. We chose to use the Munsell System (Munsell 1966) as it is the most widely used system in psychological research on color. The Munsell System also is used to color products such as MacIntosh computers, Kraft cheese, and Caress soap.

Based on the principle of just noticeable differences, Munsell classifies hue into 10 equally spaced major hues: red, yellow-red, yellow, green-yellow, green, blue-green, blue, purple-blue, purple, purple-red. The chroma scale extends from 0 and up, depending on the strength of the sample being evaluated. The value scale extends from 0 to 10. A value of 0 is used to symbolize pure black and a value of 10 is used for pure white. Therefore, any specific color can be identified accurately by quoting the levels of hue, chroma, and value.

4.1.2. Levels of Hue, Chroma, and Value. In the print world, blue, red, and yellow are considered primary colors; unlike green or purple, the primary colors cannot be produced from mixing any other colors together. We would have liked to include all three primary hues in our research; but this was not possible because of the differences in the color space across these three hues. The pattern of chromas and values for blue and red are quite similar, but differs radically from the pattern for yellow. We, therefore, limited our investigation to blue and red, which are also the two most commonly examined hues. The #5 blue and #5 red were selected for the manipulation of hue, as these two hues represented the "bluest" blue and the "reddest" red, respectively. In choosing the specific chroma and value levels for each hue, we chose low and high levels that were as far apart as possible, yet available for both hues. The #2 chroma and #8 chroma were chosen, for the low and high levels of chroma, respectively. The #3 and #7 values were chosen, for the low and high levels of value, respectively. Thus, within each hue (#5 blue and #5 red), there were four shades possessing the chroma and value combinations of 2,3; 2,7; 8,3; and 8,7.

4.2. Stimuli

Our goal was to use color as an executional element in a print ad and to select a product where there would be no symbolic association between a particular color and the product. We selected paint as our product. Color often is used as an executional cue in paint ads (e.g.,

"Color Your World"). Paints come in many colors, with no particular color symbolically associated with it.

We created an ad for a fictitious paint company, Rainbow Paints. As seen in Figure 2, a major feature of the ad is the "swoosh" in the centre. As will be described below, the color of the "swoosh" was manipulated, depending upon the experimental condition. The information contained within the swoosh was developed on the basis of interviews with students and paint dealers. This was followed by a pre-test in which student subjects (n=15) rated the desirability of the various benefits identified in the interviews. The most desirable benefits were chosen to be used as claims in the stimulus ads. All the claims and other text in the ad were printed black on white.

The experimental ads were designed by a graphic artist at an ad agency. A color expert who had considerable experience producing successful color matches for Munsell Corporation prepared the actual ads. The ads were printed using a silkscreening process. To make the exposure context more naturalistic, the test ad was inserted into a professionally prepared, dummy four-color magazine containing, along with the test ad, three articles and three filler ads. The test ad was placed in the middle of the magazine, on the right-hand page.

4.3. Subjects and Procedure

One hundred and fifty-six university undergraduates from an introductory marketing course participated in the study. Subjects were randomly assigned to the eight experimental conditions.

Subjects were run in groups of five or less. They were told that a new magazine was being proposed, and the publisher had engaged us to get opinions. Subjects were told to take two minutes to get an overview of the general layout of the magazine. This procedure of encouraging subjects to skim through the magazine first, was used to ensure that everyone

would be exposed to all of the ads and articles, even if they later read only some of them.

Next, subjects were given 10 minutes to examine the magazine more fully. This was followed by the administration of the questionnaire.

The experiment was conducted in a small room with no windows so as to eliminate all sources of external light. Daylight (F40C50) fluorescent bulbs were used to light the room as other lights have a tendency to distort colors (Danger 1968). Subjects were seated at tables equidistant from the light overhead, but to avoid reflection, not directly under it.

4.4. Dependent Variables

Since our major hypotheses focused on specific feelings, A_{Ad} , and A_B , the questions related to these variables came early in the questionnaire. First, subjects indicated in a blank space provided, their recall of the product categories and brand names of the ads in the magazine. They then gave their attitude toward the ad for Rainbow Paints on two nine-point bipolar scales: good (+4) - bad (-4) and pleasant (+4) - unpleasant (-4). Next, subjects were asked about the specific feelings elicited by the Rainbow Paints ad. The two feelings of theoretical interest (i.e., relaxation and excitement) were measured. Felt relaxation was measured using three items: relaxed, soothed, and calm. Felt excitement was measured using two items: excited and stimulated. Subjects indicated how strongly they felt each feeling on a scale ranging from "not at all (1)" to "very much so (9)." Additionally, feelings of annoyance, irritation, and unhappiness were measured. Though there was no theoretical basis for linking them to the dimensions of color, these feelings are elicited by advertising (e.g., Burke and Edell 1989) and, therefore, were included for the sake of comprehensiveness. Next, subjects indicated their brand attitudes on two, nine-point bipolar scales: good (+4) - bad (-4) and nice (+4) - not nice (-4). Cognitive response data was then collected. Subjects were asked to list all of the thoughts and feelings they had while viewing the ad. They then listed everything

they could remember about what was said in the ad for Rainbow Paints. Next, subjects were asked to write down the headline of the ad. This was followed by a claim recognition task. Subjects were presented with a list of the seven claims made plus four others not made in the ad (to control for guessing), and asked to identify the ones that appeared in the ad. Nine-point scales (very likely (+4) - very unlikely (-4)), were then used to measure subject's beliefs about the likelihood that Rainbow Paints possessed each of the seven attributes mentioned in the ad. Subjects also evaluated the goodness of each of the seven claims on a nine-point scale: very good (+4) - very bad (-4). Subjects then answered some questions related to the articles in the magazine. Demographic data also were collected on gender, mother tongue, and color blindness. Finally, all subjects were asked to write down what they thought was the purpose of the study.

5. Results

5.1. Preliminary Analyses.

Subjects' responses to the question related to the perceived purpose of this study were examined. No subjects were aware of the experimental hypotheses, and none suspected that the study had anything to do with color. Ten color blind subjects were eliminated. This resulted in 146 usable responses with cell sizes ranging between 18 and 20.

5.1.1. Rating Scale Measures of Feelings. The eight items, measuring the three feelings, excitement, relaxation, and unpleasantness were subjected to a principal components factor analysis, followed by varimax rotation. The items measuring relaxation, "relaxed," "calm," and "soothed," loaded on one factor (loadings=.93, .94, .74; Cronbach α =.88). The items measuring excitement, "excited" and "stimulated," loaded on a second factor (loadings=.90, .82; Cronbach α =.75). The items measuring unpleasant feelings, "unhappy," "irritated," and "annoyed," loaded on a third factor (loadings=.74, .92, .90; Cronbach α =.82). The three

factors accounted for 79% of the variance in the data. Follow-up confirmatory factor analysis revealed that the three factor model fit the best (1 factor model: Bentler-Bonett Normed Fit Index (BBNFI) = .54, Tucker-Lewis Index (TLI) = .34, Comparative Fit Index (CFI) = .55, $\chi^2(20 \text{ d.f.}) = 296.8$, $p < .001$; 2 factor model: BBNFI = .85, TLI = .82, CFI = .88, $\chi^2(19 \text{ d.f.}) = 92.8$, $p < .001$; 3 factor model: BBNFI = .94, TLI = .93, CFI = .96, $\chi^2(17 \text{ d.f.}) = 43.0$, $p < .001$). As can be seen, the three factor model was the only model for which the fit indices exceeded .90, the benchmark for acceptable fit recommended by Bentler and Bonett (1980).

5.1.2. Coding of Cognitive Responses. The cognitive response data were coded by two judges blind to the experimental conditions. The judges were in agreement in over 90% of the cases. Disagreements were resolved by discussion between the judges and one of the authors.

First, the verbal protocols were separated into responses reflecting thoughts and responses reflecting feelings. The thought responses were coded following previous research (e.g., MacKenzie et al. 1986) into the following categories: number of positive thoughts about the ad (source bolstering), number of positive thoughts about the brand (support arguments), number of negative thoughts about the ad (source derogation), and number of negative thoughts about the brand (counterarguments).

The feeling responses were coded into three categories that paralleled the three feeling dimensions measured by the rating scales. For feelings coded as excitement, the operational measure was constructed by giving each response reflecting excitement a score of +1 and each response reflecting boredom a score of -1 and then computing the sum score for all responses belonging to the category for each individual. For feelings coded as relaxation, the operational measure was constructed by giving each response in the category indicating

relaxation a score of +1 and responses indicating tension a -1, and then computing the sum. The third category, labelled unpleasantness, included responses reflecting feelings of irritation, unhappiness, and annoyance. Each response in this category was given a score of -1 and the sum score was computed to serve as the operational measure. In the case of each feeling construct, the cognitive response measure was significantly correlated with the rating scale measure ($ps. < .05$).

5.2. Test of Hypotheses

In this section, tests of the 8 hypotheses offered earlier are presented. The data are analyzed using analysis of variance and regression analysis. The results pertaining to feelings, ad attitude, and brand attitude are presented in Table 1.

5.2.1. Effects of Value. As expected, those exposed to ads containing higher value colors report experiencing greater feelings of relaxation (rating scale: $F(1,138)=9.22, p < .01$, omega square = .054, means = 3.70 and 4.67; verbal protocol: $F(1,137)=5.64, p < .05$, omega square = .03, means = .10 and .42) and a greater liking for the ad ($F(1,135)=7.39, p < .01$, omega square = .04, means = .08 and .85), but no differences in the level of felt excitement (rating scale: $F(1,138)=2.95, p > .05$; verbal protocol: $F < 1$)⁴.

If feelings of relaxation are mediating the effect of value on A_{Ad} , then the observed significant effect of value on A_{Ad} should disappear once the effects of the feelings of relaxation, the mediator, are partialled out (Baron and Kenny 1986). To test whether relaxation mediates the effect of value on A_{Ad} , a regression equation was estimated with A_{Ad} as the dependent variable and the design factors, hue, chroma, and value, and feelings of relaxation as the independent variables⁵. The regression analysis revealed that once the effect of relaxation is partialled out, the previously significant effect of value on A_{Ad} disappears ($F(1,134)=3.87, p > .05$). Further, the effect of relaxation is significant ($F(1,134)=4.96$

$p < .05$). Thus, the effects of value on A_{Ad} are mediated by feelings of relaxation.

High value colors in ads also produce greater liking for the brand ($F(1,138)=7.69$, $p < .01$, omega square=.044, means=.56 and 1.21). As noted earlier, models of advertising effects (e.g., Mackenzie et al. 1986) propose that the effects of an ad on A_B are mediated by A_{Ad} . We investigated whether the effect of value on A_B disappears once the effects of A_{Ad} are partialled out. The analysis revealed that once the effect of A_{Ad} is partialled out, the previously significant effect of value on A_B disappears ($F(1,134)=2.53$, $p > .05$). As anticipated, the coefficient for A_{Ad} is significant ($F(1,134)=58.52$, $p < .001$). Thus, the effect of value on A_B is mediated by A_{Ad} . The results support hypotheses 1a, 1b, 2, and 3.

5.2.2. Effects of Chroma. Hypotheses 4a and 4b predict that ads with higher chroma colors induce greater feelings of excitement, but not relaxation. Hypothesis 5 predicts that higher chroma colors in an ad make the ad more likeable (A_{Ad}), and feelings of excitement mediate the effect of chroma on A_{Ad} . An examination of the ANOVA results (Table 1) reveals that when the chromatic strength of a color in an ad was high as opposed to low, the message recipient felt more excited (rating scale: $F(1,138)=4.31$, $p < .05$, omega square=.021, means= 2.47 and 2.00; verbal protocol: $F(1,137)=5.96$, $p < .05$, omega square=.033, means=.22 and .03) but not more relaxed (rating scale: $F < 1$; verbal protocol: $F(1,135)=3.45$, $p > .05$), and liked the ad more ($F(1,135)=7.69$, $p < .01$, omega square=.042, means=.10 and .85).

To test for mediation, a regression equation was estimated with A_{Ad} as the dependent variable and the design factors, hue, chroma, and value, and feelings of excitement as the independent variables. The regression analysis revealed that once the effect of excitement is partialled out, the previously significant effect of chroma on A_{Ad} disappears ($F(1,134)=3.19$, $p > .05$). Further, the effect of excitement is significant ($F(1,134)=4.46$ $p < .05$). Thus,

hypotheses 4a, 4b, and 5 are supported.

Higher chromatic strength also increases the liking for the brand (H3; means = .76 and 1.03), but the effect does not attain statistical significance ($F(1,138) = 1.44, p > .05$).

Therefore, the results do not support hypothesis 6. Possibly, the effect for A_B failed to reach statistical significance because it is further down the hierarchy of effects.

5.2.3. Effects of Hue. Hypothesis 7 predicts that those exposed to the color (hue) red are more excited than those exposed to the color (hue) blue; those exposed to the blue hue are more relaxed. An examination of the results reveals that those exposed to the red hue report stronger feelings of excitement. However, only the results for the rating scale measure are statistically significant ($F(1,138) = 5.76, p < .05$, omega-square = .026, means = 1.97 and 2.53; verbal protocol: $F(1,137) = 3.10, p > .05$). The results also show that those exposed to the blue hue reported experiencing greater feelings of relaxation (rating scale means = 4.31 vs. 4.04), however, the effect of hue on feelings of relaxation fails to reach statistical significance (rating scale: $F(1,138) < 1$; verbal protocol: $F(1,137) = 1.65, p > .05$). Thus, hypothesis 7 only receives partial support. As predicted in hypothesis 8, hue does not affect either A_{Ad} or A_B ($F_s < 1$).

5.2.4. Unpleasant Feelings. Though unpleasant feelings were measured, no hypotheses with respect to them were advanced. Analyses of both the rating scale and verbal protocol measures of unpleasant feelings revealed no effects of the three dimensions of color (all $p_s > .05$).

5.3. Effects of Hue, Chroma, and Value on Cognitions.

Sixteen ANOVAs were conducted with hue, chroma, and value as the independent factors and each of product category recall, brand name recall, headline recall, claim recall, claim recognition, belief strength for each of the seven claims made, number of support arguments,

number of counterarguments, number of source bolstering statements, and the number of source derogations as the dependent variables. The analyses revealed only four significant effects at the .05 level of significance, with no discernable pattern. It would not be unexpected for four effects out of the total of 112 (sixteen ANOVAs with seven effects each) tested, at the .05 level of significance, to attain significance by chance alone.

Our results suggest that there are no cognitive effects on A_{Ad} and A_B . For A_B , this conclusion is reinforced when we look at the effects of the dimensions of color on the A_B score that can be constructed by summing the product of the beliefs and evaluations associated with each of the seven claims made in the ad (Fishbein and Ajzen 1975). An ANOVA with the summated A_B score as the dependent variable and hue, chroma, and value as the independent factors revealed no significant effects ($ps > .15$). This lends further support to our finding that the effects of color on attitudes are wholly mediated by feeling responses.

6. Follow-Up Studies

6.1. Follow-Up Study One.

The effects for hue (red vs. blue) were small compared to the effects for chroma and value. Since much of the prior research reported significant hue effects, we did a follow up study under conditions that should maximize the likelihood of getting an effect for red versus blue. We compared these two hues at very high levels of saturation. We chose #5 blue at chroma level 10 and value level 4, and #5 red at chroma level 14 and value level 4. We recognize that the two colors chosen differ both in terms of hue and chroma, however, as noted above, both hues were at very high levels of saturation and, therefore, perceptually the differences in hue were much more significant than the differences in chroma.

The procedure and measures used in this study were identical to those of the main study. Thirty-seven undergraduate business students participated in this study, with 18 subjects in one

condition and 19 in the other. The results revealed that hue did not significantly affect feelings of excitement or relaxation, ad or brand attitudes, or any of the measures of cognition. Taken together, the results of both studies suggest that, when used as a executional cue in an ad, the hue (red vs. blue) of a color at best has modest effects on feelings.

6.2. Follow-Up Study Two.

Our second follow-up study investigated how our findings compared to actual business practice. Advertising agencies often choose colors from a book of colors provided by Pantone. The Pantone Color Specifier (Version 747xR) was obtained from five of the 12 advertising agencies with whom we had held the interviews described in the introduction. The remaining seven agencies did not use the Pantone Color Specifier, but chose Pantone colors using a computer program. The books we obtained came from both large and small agencies.

The Pantone Color Specifier utilizes a pull-tab system in color selection. Thus, by looking at a book in use, one can accurately count both the number and types of colors selected. Across the five books we examined, a total of 2,415 color tabs had been used. Each of the Pantone color selections was translated to the Munsell system using Aldus Pagemaker (Version 5.0). Using a 2x2 table, color selections were classified into high versus low value choices and high versus low chroma choices.⁶ In the case of all 10 hues, the predominant choice was a high chroma color rather than a low chroma color. In 9 out of 10 cases, the predominant choice was a high value color. The only hue for which this was not the case was purple-blue. For this hue, it was not possible to choose high chroma/high value colors as these colors do not exist.

Collapsing across hues, 55.9% (1350) of the hits were in the high chroma/high value cell, with 4.6% (112) hits in the low value/low chroma cell, 25.4% (612) hits in the low value/high chroma cell, and 14.1% (341) hits in the high value/low chroma cell ($\chi^2=7.34$, $p<.01$). The

high hit rate in the high chroma, high value cell indicates that industry intuitions on what produces likeable and effective advertising is consistent with what we might recommend on the basis of our experimental results.

7. Discussion

In this research we examined the effects of hue, chroma, and value of a color used as an executional cue in an ad on consumer responses. In our main experiment, we orthogonally manipulated all three dimensions and controlled the exposure context (e.g., used daylight bulbs) to be able to faithfully capture their effects. Our findings indicate that higher levels of chroma and value influence feelings of excitement and relaxation, respectively. These feelings, in turn, influence attitude towards the ad favorably and, at least in the case of value, the greater feelings of relaxation appear to have a favorable impact on attitude toward the brand. This pattern of findings provides empirical support for our theoretical framework.

Further, our framework provides a rationale for the majority of choices the advertisers made in our second follow-up study, namely the 56% of the choices that were high in chroma and value. The results also suggest that the pattern of data observed in our experiments might hold for other hues and product categories, as we considered all of the hues included in the Pantone Color Specifier, and the colors chosen reflect color choices across five ad agencies and numerous clients.

The remaining 44% of choices in the follow-up study are also revealing. Obviously, a portion of these selections are a result of specific design requirements. However, it is likely that many of these color selections were made without a real understanding of the importance of the value and chroma dimensions. It is in this instance that the experimental findings and the theoretical framework we present would be especially useful and relevant. An example of this type of situation is provided by McDonald's Corporation. McDonald's initially used a

high chroma red, but they switched to a more pastel shade, according to Van Bergen (1995) because too much red gave customers headaches; that is, they changed the value level to a more relaxing higher value. In this case, a clear understanding of the importance of value probably might have helped avoid the initial problem.

The importance of hue in color choice decisions has been advocated by numerous authors in both the academic and trade literature (e.g., Bellizzi and Hite 1992; Dunn 1992), but by predominantly relying on hue to elicit feelings, advertisers may be missing opportunities to utilize the effects of chroma and value. For instance, our results can help advertisers where the brand/product advertised or the advertising objectives constrain the choice of acceptable hues. Consider a product such as men's formal clothing where the advertiser wants to create some excitement with their ad. A conventional approach may be to use red in such a situation. However, red might be considered inappropriate for men's formal clothing. Our findings could help them make an alternative selection. Our results suggest that high chroma hues create positive ad attitudes, and they do so by eliciting feelings of excitement. This would suggest that the advertiser would have the full range of high chroma hues available to choose from, and they would not be limited to the red hue to create feelings of excitement. Similarly, the findings suggest that the advertiser would have a full range of high value hues to use if they wanted to elicit feelings of relaxation. Utilizing the chroma and value dimensions are also important because the advertiser may not want to change the hues associated with their ad or product; the colors associated with the ad or product may be a critical component of a brand's equity, e.g., they can increase brand recognition. Changing chroma or value might create the desired feeling state while still maintaining the hue associated with the product. A good example is provided by the redesign of the Ritz Cracker advertising and packaging in the early eighties. Ritz kept the red hue but used a higher

chroma level than in previous efforts, effectively making "Ritz look ritzier" (Alsop 1984, p.37).

In this study, we focused on emotions and intentionally controlled the symbolic value of color(s). In many situations, however, the marketer's primary concern might be selecting colors that symbolically convey the appropriate tone for the product (Kleppner 1979), e.g., red for Christmas or non-red hues in hospitals. When thinking about symbolic color choice, hue would most likely remain the dimension of color that receives primary consideration. However, here too, an understanding of value and chroma dimensions might help the manager decide the shade of hue that would be best.

The effects obtained for value and chroma on relaxation and excitement respectively, lend support to the two dimensional conceptualization of arousal. Our results also suggest that feelings of relaxation and excitement influence attitudes. While feelings of excitement have received some attention in the literature, little attention has been given to feelings of relaxation, despite the fact one often sees ads that presumably attempt to elicit feelings of relaxation. Travel and leisure ads frequently focus on relaxation, e.g., recent airline ads focusing on the comfort and relaxation of first class passengers. Our results suggest that feelings of relaxation are important; they seem to mediate the effect of the value of the color on attitude toward the ad.

The studies reported here represent an initial attempt to investigate the effects of the dimensions of color used in an ad on consumer responses. As such, we had to take several important decisions as to the independent and dependent variables to consider, the background factors to hold constant, the stimuli to use, etc. It remains for future research to explore color effects in ads for other products, in contexts where the symbolic value of color might be important, for different levels of hue, chroma, and value than that examined in this research,

and for other dependent variables of interest, e.g., brand personality.

A second interesting issue pertains to the universality versus cultural specificity of the effects of color. It is widely believed that the effects of color are culture specific. Yet, considering color vision, it is clear that the physiological structures responsible for color vision in humans are universal (e.g., Davidoff 1991). Thus, it may be that color effects operate at both a basic, universal level and a culture specific level. It would be interesting to explore the relative role of basic and culture specific effects. The findings of such research should not only help the advertiser select color(s) for particular cultures or countries, but also help with other decisions like whether and when to vary or standardize the color(s) used in ads in different countries.

Footnotes

1. Unfortunately, as with much of previous research, Walters et al. (1982) examined only the effects of hue.
2. Results of studies using unidimensional arousal scales going from relaxation to excitement (e.g., Porter and Mikellides 1976) could not be used to support our hypotheses since they do not separate relaxation from excitement. Unidimensional scales going from non-arousal to arousal (e.g., Valdez and Mehrabian 1994) are not directly relevant to our hypotheses with respect to value as arousal may be considered as excitement but non-arousal is not the same thing as being relaxed.
3. Even with a unidimensional conceptualization of arousal, the results of previous research have been inconsistent. Positive (e.g., Kroeber-Riel 1979), negative (e.g., Sanbonmatsu and Kardes 1986), and no relationship (e.g., Aaker, Stayman, and Hagerty 1986) between arousal and information processing have been reported.
4. A principal component factor analysis with varimax rotation was performed on the four attitudinal items. As expected, the two measures of A_{Ad} loaded on one factor (loadings = .89 and .91; Cronbach α = .88) and the two measures of A_B loaded on a second factor (loadings = .83 and .93; Cronbach α = .84).
5. The mediation analyses for the effects of value and chroma are reported only for the rating scale measures of relaxation and excitement respectively. The results are similar in terms of substance when the cognitive response measures of relaxation and excitement are used.
6. The value scale ranges from 0-10, so low value was defined as 0 through 5 and high value as 6 through 10. With a few exceptions chroma values range from 0-14, so low chroma was defined as 0 through 6 and high chroma as 7 or greater.

References

- Aaker, D.A., D.M. Stayman and M.R. Hagerty, "Warmth in Advertising: Measurement, Impact, and Sequence Effects," *J. Consumer Res.*, 12, March (1986), 365-81.
- Adams, F.M. and C.E. Osgood, "A Cross-Cultural Study of the Affective Meanings of Color," *J. Cross Cultural Psychology*, 4 (1973), 135-56.
- Alsop, R., "Color Grows More Important in Catching Consumers' Eyes," *The Wall Street Journal*, (November 29, 1984), 37.
- Apter, M.J., "Some Data Inconsistent with the Optimal Arousal Theory of Motivation," *Perceptual and Motor Skills*, 43 (1976), 1209-10.
- _____, "On the Concept of Bistability," *International J. General Sys.*, 6 (1981), 225-32.
- _____, *The Experience of Motivation: The Theory of Psychological Reversals*, Academic Press, New York 1982.
- Argue, J., "Color Counts," *The Vancouver Sun*, (June 10, 1991), B7.
- Baron, R.M. and D.A. Kenny, "The Moderator-Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations," *J. Personality and Social Psychology*, 51, 6 (1986), 1173-82.
- Batra, R. and M.L. Ray, "Affective Responses Mediating Acceptance of Advertising," *J. Consumer Res.*, 13, September (1986), 234-49.
- Bellizzi, J., A.E. Crowley and R. W. Hasty, "The Effects of Color in Store Design," *J. Retailing*, Spring (1983), 21-43.
- _____, and R.E. Hite, "Environmental Color, Consumer Feelings, and Purchase Likelihood," *Psychology and Marketing*, 9, 5 (1992), 347-63.
- Bennett, C.P., A. Hague, C. Perkins, "The Use of Baker-Miller Pink in Police Operational and University Experimental Situations in Britain," *International J. of Biosocial and Medical*

Res., 13, 1 (1991), 118-27.

Bentler, P.M. and D.G. Bonett, "Significance Tests and Goodness of Fit in the Analysis of Covariance Structures," *Psychological Bulletin*, 3, 88 (1980), 588-606.

Berlyne, D.E., *Conflict, Arousal, and Curiosity*. McGraw-Hill, New York 1960.

_____, "Novelty, Complexity, and Hedonic Value," *Perception and Psychophysics*, 8 (1970), 279-86.

Burke, M.C. and J.A. Edell, "The Impact of Feelings on Ad-based Affect and Cognition," *J. Marketing Res.*, 26, February (1989), 69-83.

Cheskin, L., *Color for Profit*. Liveright, New York 1951.

Crowley, A.E., "The Two-Dimensional Impact of Color on Shopping, *Marketing Letters*, 4, 1 (1993), 59-69.

Danger, E.P., *Using Colour to Sell*. Gower Press, London 1968.

Davidoff, J., *Cognition Through Color*. MIT Press, MA 1991.

Dunn, B., "Choice of Color For Product Can Be Critical Factor," *The Gazette*, (August 10, 1992), 6.

Eliashberg, J. and M.S. Sawhney, "Modelling Goes to Hollywood: Predicting Individual Differences in Movie Enjoyment," *Management Sci.*, 40, 9 (1994), 1151-73.

Eysenck, H.J. and M.W. Eysenck, *Personality and Individual Differences: A Natural Science Approach*. Plenum, New York 1985.

Fishbein, M.M. and I. Ajzen, *Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research*. Addison-Wesley, Reading MA 1975.

Gray, J.A., *The Neuropsychology of Anxiety: An Inquiry into the Functions of the Septo-Hippocampal System*. Oxford University Press, Oxford 1982.

- Guilford, J.P., "The Affective Value of Color as a Function of Hue, Tint, and Chroma," *J. Experimental Psychology*, 17 (1934), 342-70.
- _____, "A Study in Psychodynamics," *Psychometrika*, 4 (1939), 1023.
- _____, and P.C. Smith, "A System of Color-Preferences," *The American J. Psychology*, 122, 4 (1959), 487-502.
- Henthorne, T.L., M.S. Latour, and R. Natarajan, "Fear Appeals in Print Advertising: An Analysis of Arousal and Ad Response," *J. Advertising*, 22, 2 (1993), 59-69.
- James, W.T. and W.R. Domingos, "The Effect of Color Shock on Motor Performance and Tremor," *J. General Psychology*, 48 (1953), 187-93.
- Kleppner, O., *Advertising Procedure*. Prentice-Hall, Englewood Cliffs, N.J. 1979.
- Kroeber-Riel, W., "Activation Research: Psychobiological Approaches in Consumer Research," *J. Consumer Res.*, 5, March (1979), 240-50.
- Latour, M.S., R.E. Pitts and D.C. Snook-Luther, "Female Nudity, Arousal, and Ad Response: An Experimental Investigation," *J. Advertising*, 19, 4 (1982), 51-62.
- Lee, S. and J.H. Barnes, Jr., "Using Color Preferences in Magazine Advertising" *J. Advertising Res.*, 29, 6 (1990), 25-30.
- MacKenzie, S.B., R.J. Lutz and G. Belch, "The Role of Attitude Toward the Ad as a Mediator of Advertising Effectiveness: A Test of Competing Explanations," *J. Marketing Res.*, 23, May (1986), 130-43.
- McManus, I.C., A.L. Jones and J. Cottrell, "The Aesthetics of Color," *Perception*, 10 (1981), 651-66.
- Meyers-Levy, J. and L.A. Peracchio, "How The Use of Color in Advertising Affects Attitudes: The Influence of Processing Motivation and Cognitive Demands," *J. Consumer Res.*, 22, September (1995), 121-38.

- Middlestadt, S.E., "The Effect of Background and Ambient Color on Product Attitudes and Beliefs," *Advances in Consumer Res.*, 17 (1989), 244-49.
- Mikellides, B., "Color and Physiological Arousal," *The J. Architectural and Planning Res.*, 7, 1 (1990), 13-19.
- Miller, M.A., "Cashing in on Rich Color Schemes," *Business Mexico*, 4, 10 (1994), 28-32.
- Munsell, A., *A Munsell Color Product*. Kollmorgen Corporation, New York 1966.
- Olney, T.J., M.B. Holbrook and R. Batra, "Consumer Responses to Advertising: The Effects of Ad Content, Emotion, and Attitude Toward the Ad on Viewing Time," *J. Consumer Res.*, 17, March (1991), 440-53.
- Ott, J.N., "Influence of Fluorescent Lights on Hyperactivity and Learning Disabilities," *J. Learning Disabilities*, 9, 1 (1976), 417-22.
- Porter, T. and B. Mikellides, *Color in Architecture*. Van Nostrand Reinhold Company, New York 1976.
- Profusek, P.J. and D.W. Rainey, "Effects of Baker-Miller Pink and Red on State Anxiety, Grip Strength, and Motor Precision," *Perceptual and Motor Skills*, 65 (1987), 941-2.
- Ramirez, A., "Lessons in The Cracker Market: Nabisco Saved New Graham Snack," *New York Times*, (July 5, 1990), D1.
- Sanbonmatsu, D.M. and F.R. Kardes, "The Effects of Physiological Arousal on Information Processing and Persuasion," *J. Consumer Res.*, 15, December (1988), 379-85.
- Sharpe, D.T., *The Psychology of Color and Design*. Nelson-Hall Company, Chicago 1974.
- Schauss, A.G., "The Physiological Effect of Color on the Suppression of Human Aggression: Research on Baker-Miller Pink," *International J. of Biosocial Res.*, 7, 2, (1985), 55-64.
- Schindler, P.S., "Color and Contrast in Magazine Advertising," *Psychology and Marketing*, 3, 2 (1986), 69-78.

- Smith, K.C.P. and M.J. Apter, *A Theory of Psychological Reversal*. Picton, Chippenham 1975.
- Sparkman, R. Jr. and L.M. Austin, "The Effect on Sales of Color in Newspaper Advertisement," *J. Advertising*, 9, 4 (1980), 39-42.
- Thayer, R.E., "Toward a Psychological Theory of Multidimensional Activation (Arousal)," *Motivation and Emotion*, 2, 1 (1978), 1-33.
- _____, "Activation and Deactivation: Current Overview and Structural Analysis," *Psychological Reports*, 58 (1986), 607-14.
- Thompson, E., A. Palacios, and F.J. Varela, "Ways of Coloring: Comparative Color Vision as a Case Study for Cognitive Science," *Behavioral and Brain Sciences*, 15 (1992), 1-74.
- Tom, G., T. Barnett, W. Lew and J. Selman, "Cueing the Consumer: The Role of Salient Cues in Consumer Perception," *The J. Consumer Marketing*, 4, 2 (1987), 23-7.
- Tucker, J., "Psychology of Color," *Target Marketing*, 10, 7 (1987), 40-9.
- Valdez, P. and J. Mehrabian, "Effect of Color on Emotions," *J. Experimental Psychology: General*, 123, 4 (1994), 394-409.
- Von Bergen, J.M., "What's Your Favorite Color," *Calgary Herald*, (February 13, 1995), C1.
- Walters, J., Apter, M.J. and Svebak, "Color Preference Arousal, and the Theory of Psychological Reversals," *Motivation and Emotion*, 6, 3 (1982), 193-215.
- Wells, W., Burnett, J. and S. Moriarty, *Advertising Principles and Practice*. Prentice Hall, New Jersey 1992.

TABLE 1
F-STATISTICS FOR FEELINGS ELICITED BY THE ADS, BRAND/AD ATTITUDE JUDGEMENTS

Source	Arousal		Relaxation		Attitude	
	Rating	Protocol	Rating	Protocol	Ad	Brand
Hue	4.98*	3.10	0.59	1.59	0.63	0.38
Chroma	4.31*	5.96*	0.01	3.45	7.69**	1.44
Hue x Chroma	0.11	1.16	0.21	0.02	0.24	0.04
Value	2.95	0.08	9.22**	5.62*	7.39**	7.69**
Hue x Value	0.56	0.08	0.02	3.11	0.01	0.02
Chroma x Value	2.51	0.16	2.09	0.69	3.88	1.57
Hue x Chroma x Value	0.53	0.16	0.30	0.06	3.36	2.99

* p < .05

** p < .01

FIGURE 1

**Apter's Two Dimensional Framework of Arousal:
Excitement, Relaxation, and Hedonic State**

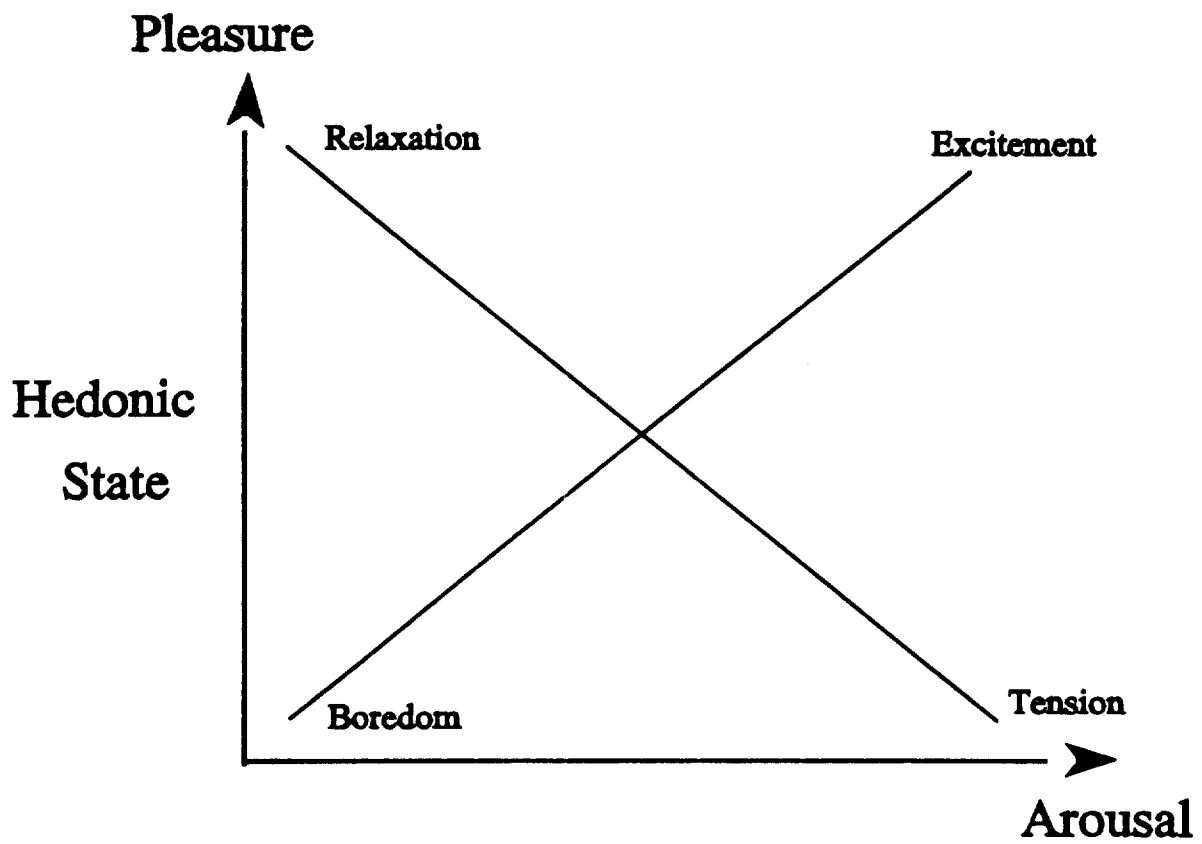
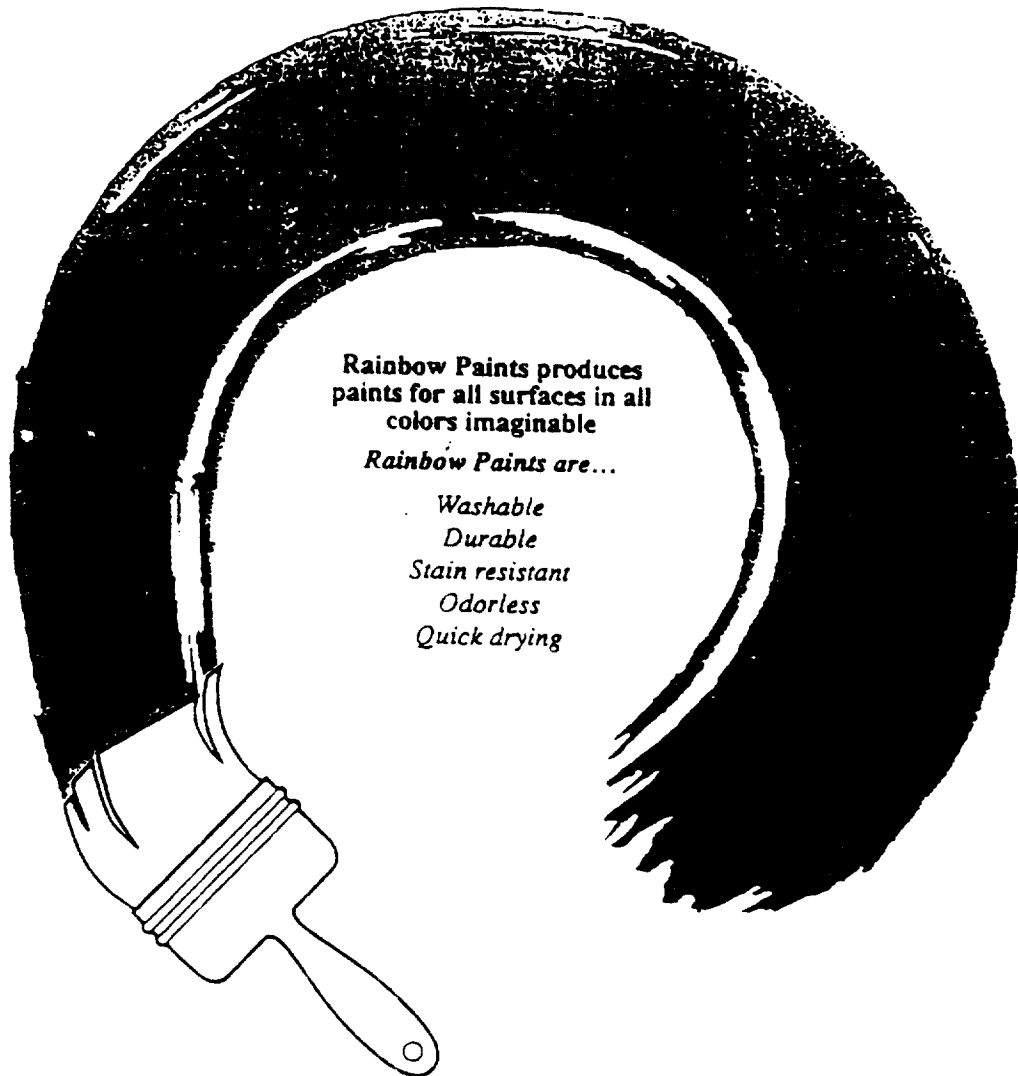


FIGURE 2
Sample Advertisement

Whenever you think of paint, think of us...



**Rainbow Paints produces
paints for all surfaces in all
colors imaginable**

Rainbow Paints are...

*Washable
Durable
Stain resistant
Odorless
Quick drying*

RainbowPaints

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