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Color Preference as a Function of Personality

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COLOR PREFERENCE AS A FUNCTION OF PERSONALITY

by

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Robert J. Russell

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CHAPTER I

THEORETICAL PERSPECTIVES

Theories which attempt to account for the phenomena of color preference and color-affect relationships can be divided into two broad categories: (1) the learning theories and (2) the biological theories.

Learning Theories

Several theorists turn to the psychological process of associationism to account for how man ascribes meaning and preference to certain colors. Complex ideas, such as color symbolism, comes from the association of simpler ideas. Here the two main principles of similarity and contiguity help explain how color becomes associated with a myriad number of stimuli in the environment. Chou and Chen (4) emphasize how abstract ideas become attached to colors through various color associations and through the influence of tradition. Norman and Scott state that "color is nearly always associated with some object. A person does not prefer green as such, but rather green-colored trees . . ." (35, p. 191). Blue may not be liked so much for its intrinsic value, but for its similarity to the ocean or fun at the beach. A common association for black, for instance, is the funeral. One can easily understand

how the contiguity of the color black with death and mourning has been fundamental in the development of black's symbolic meaning.

Conditioning theories can be considered an extension of associationism. In this instance rather than examining the association of ideas, theorists have investigated the association of stimulus and response in color experience. Conditioning theories in color studies tend to be deterministic, environmentalistic and passive in their view of the organism. An example of a classical conditioning situation would be a child who pairs the neutral stimulus of a yellow kitchen with an unconditioned stimulus of a mother's love. Eventually the yellow of the kitchen becomes a conditioned stimulus capable of evoking a conditioned response--feeling loved. Other experimenters have successfully used conditioning to alter the color preference of subjects (25, 28, 48). This was accomplished by raising the selectivity for least liked colors by associating these colors with a pleasant unconditioned stimulus and lowering the selectivity for most-liked colors by associating these colors with unpleasant or neutral stimuli.

Learning theories seem to adequately account for the variation in color preference among individuals as being a function of their learning history. General cultural trends in color preference may also be explained by the learning theories. Socio-cultural traditions involving the

use of color may be a major conditioning factor which influences the learning history of an organism and determines this organism's reaction to color.

Biological Theories

There is evidence which supports the notion that within man's biological disposition, there are certain intrinsic biological cue functions related to color. Schaie defines the biological cue function as "the cue value implicit in the physical characteristics of the stimulus for the sensory apparatus of the subject." (43, p. 513). It has been proven that color plays a vital role in other organism's survival instincts. It can serve as a cue for food seeking or reproductive behaviors. There is evidence from studies of imprinting in newly hatched chicks, which suggests that color preference is an innate characteristic and is not a result of environmental influences.

Guilford (17) has been a major advocate of the position that man's disposition towards color has a biological basis. Guilford rests this assumption on the basic homogeneity of color preference among individuals which he believes "probably rests upon biological factors, since it is hard to see how cultural factors could produce by conditioning the continuity and system that undoubtedly exists." (17, p. 342). He discovered, first statis-

tically, then experimentally (18, 19) that "affective value" is a function of the three psychological dimensions of color: hue, chroma and tint. (Affective value for Guilford was defined on the Pleasantness-Unpleasantness continuum. As defined by this paper, he is actually referring to color preference.) He has demonstrated that affective value (color preference) is positively related to brightness and saturation, with all relations being of curvilinear form. He claims that the reason why other researchers have been unable to find more homogeneity among individuals for color preference is due to their lack of control over these three variables of hue, chroma and tint.

Granger (16) supports Guilford's position by stating that color appreciation has a biological basis. According to Granger's research, there is a general order of preference for each physical attribute of color. The order of preference for any one color attribute remains invariant while a change in the other two attributes may occur. This gives credence to an innate biological relation to these color attributes. Goldstein (15) gives further support to this biological nature of color response in his work with individuals with organic brain pathology. These individuals reacted differently to various colored backgrounds. Organic patients found red backgrounds disagreeable, upsetting and nauseating. These

red backgrounds disrupted equilibrium and promoted errors in cutaneous location. Green backgrounds, on the other hand seemed to have the opposite affect.

Discussion

The biological theorists do not completely negate the role of environmental learning in determining the individual's preference order for colors, they merely deemphasize this role greatly to support the biological nature of this response. Learning theorists have not completely ruled out the possibility that certain biological "cue functions" may be operating to influence one's reactions to colors. Rather, they take the position that if biological determinants do exist, they must be secondary to the predominant influence of one's learning history.

One can conceptualize this controversy on an etiological continuum with the strict biological theorists representing one extreme and the strict behaviorists representing the opposite extreme. The author's position taken in this thesis would be found somewhere in the middle of both of these two extremes. It seems likely that both heredity and environment may both play an important role in determining one's relationship to color. Whether one determinant is more influential than another seems, at this point, uncertain.

CHAPTER II

PRELIMINARY RESEARCH

Color Preference Studies

Many researchers (4, 6, 11, 12, 13, 14, 21, 23, 32, 33, 45, 49) have tried to find a universal preference order for colors, but due to the wide variability of their results, they have met with little success. These researchers have tried to link color preference to various factors including age, sex and race with little correlation. (See Appendix A for a summary of these color preference studies.) Eysenck concludes that in the area of color preference

> "little agreement has been reached even in the most fundamental points: namely; (1) the existence of a general order of preference for colors, (2) the relative popularity of saturated colors, and (3) differences for preference for colors between sexes." (6, p. 385).

It has been suggested that the unstandardized methodologies used among researchers might partially account for this variability.[1] Yet, except for some broad similarities

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[1] Eysenck (6) partially attributes this wide variability in results among color preference studies to the unstandardized methodology which has been used in these experiments. Guilford (17) goes one step further than Eysenck by stating that a general preference order for colors could be discovered if researchers would merely control for the three physical dimensions of the color stimuli: hue, chroma and tint.

among certain groups, most research supports Eysenck's notion that color preference varies from individual to individual.

This lends credence to the position that color preference is an idiographic rather than a nomothetic phenomenon. Rather than attempting to discover a universal preference order for color, research should place an emphasis on the individual and his/her own personalized reactions to color. Studies which relate color to "affect" and color to personality are more slanted towards this idiographic methodology.

Some important conclusions can be drawn, however, from color preference studies: (1) People do have a color preference; people do demonstrate sometimes strong affiliations for some colors while not for others. This in itself seems significant. This supports the notion that during the perceptual process the stimulus of color obtains a certain worth or "value" for the individual. In color preference studies, this "value" can be measured quantitatively on the pleasantness-unpleasantness continuum. (2) Secondly, people do ascribe their own unique value to a particular color--whether it is experienced as pleasant or unpleasant. Because this preference will vary from individual to individual, one wonders as to what mechanisms operate to promote these idiographic differences. Experiments which relate color to affect may provide some

additional information on this valuing process. These studies attempt to measure qualitatively through mood associations, and quantitatively through physiological data--the "affective state" which occurs in the color experience.

Color and Affect

In order to understand the wide variety of color selectivity among individuals, the "relationship" between the individual and each particular color stimulus must be analyzed. This section will investigate the affective response which accompanies a particular color experience. The term, affect, is commonly used to denote feelings, emotions or physiological states of the individual. Schachtel (39), a Rorschach theorist, finds a certain homogeneity between color experience and the affective experience. In both situations the subject is passive and lacks detachment and reflective thought. This unreflective attitude, according to Schachtel, is transformed into emotional behavior. Whether or not any cognitive processes occur which intervene between the stimulus of color and the affective response seems uncertain. Several studies seemed to have elucidated certain symbolic meanings which are associated with particular colors, while some of the physiological studies seem to support the direct arousal properties of certain colors.

Norman and Scott make a pertinent comment when they state that "psychological processes cannot be measured directly--they can only be inferred from behavior and it is difficult to measure an inference." (35, p. 196) But this is what many of the investigators into color and affect have tried to do. The existing paradigm of studies into color and affect includes several experiments which have attempted to elicit "mood" responses to various colors. It still seems uncertain as to whether a "mood" response is an adequate estimate of the affective response or any intervening cognitive processes. A vague and indefinable word such as "mood", unless clearly specified, reflects a weakness in the language of color research. Mood, as defined in this paper, will serve as an indicator of an emotional or affective state.

Color-affect studies have been done in such casual environments as industry, advertising and consumer preference settings as well as in more controlled situations in psychological laboratories. The following review will limit itself to the latter, more empirically controlled studies. Although their procedures vary dramatically among each other, most color-affect researchers have tried to elicit "mood" responses from their subjects to varying colors. In Tables I and II there is a summary of these color-affect or color-mood associations.

TABLE I

Color-mood Associations for

Warm and Cool Colors

	Warm Colors		Cool Colors	
Study	Red	Yellow	Green	Blue
Lewinski (29)	stimulating hot	stimulating most unpleasant		cool most pleasant
Karwoski (24)	exciting	exciting	leisurely	leisurely
Kouwer (27)	active intense		youthful	social
Wexner (53)	exciting stimulating	cheerful jovial joyful		secure comfortable tender soothing
Murray (34)	exciting stimulating defiant contrary hostile powerful strong masterful	cheerful jovial joyful	secure comfortable calm peaceful serene	tender soothing
Schaie (41)	protective exciting powerful strong masterful defending stimulating	exciting stimulating cheerful jovial joyful pleasant		pleasant secure comfortable tender soothing

TABLE II

Color-mood Associations for Auxiliary Colors of Purple, Black and Brown

Study	Purple	Black	Brown
Lewinski (29)	depressing		
Karwoski (24)	vigorous	sad	sad
Kouwer (27)	disagreeable sad	sad vague disagreeable	disagreeable
Wexner (53)	dignified stately	powerful strong masterful	
Murray (34)	despondent dejected melancholy unhappy		
Schaie (41)	dignified stately	distressed disturbed upset defiant contrary hostile dignified stately powerful strong masterful despondent dejected melancholy unhappy	secure comfortable

Several significant findings are available from these color-affect studies. Unlike the color-preference studies where there was a wide variability in subject response, color-affect studies demonstrate certain uniform and consistent patterns or themes. These color-mood associations seem to be quite stable across subjects. Useful color divisions can be made for color groups and their corresponding associations.

Basically, colors can be divided into "warm", "cool" and "auxiliary" colors. The warm colors include reds, yellows and orange which is a mixture of these two. Moods frequently associated with warm colors tend to be active, stimulating and exciting. The cool colors which include blues and greens are affectively or symbolically quite diametrically opposed to the warm colors. Moods associated with cool colors tend to be tranquil, peaceful and serene. Auxiliary colors (as defined in this thesis) include purples, browns, greys, black and white.[2] These auxiliary colors, with the exception of white, have frequently received negative connotations. Mood associations include such descriptors as depressing, disturbing and disagreeable. It becomes apparent from the color-affect studies that it is possible to ascribe certain objective

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[2]Technically, black, white and grey are not colors at all.

mood associations to specific color groups.

Physiological studies have attempted to measure this affective response to color by way of quantifiable techniques. These studies attest to the "exciting" properties of red versus the more "calming or tranquil" properties of cooler colors such as blue or green. Out of the three physiological measures used in a study by Wilson (54): GSR (galvanic skin response), heart rate and respiration rate; colors only seemed to have a significant effect on GSR and not the others. Wilson found red to be more "arousing" than green, with this effect being particularly apparent on GSR data. This article supports the notion that colors differentially stimulate physiological arousal.

Discussion

To summarize the following chapter on Preliminary Research, the following conclusions can be made. First, from the color-preference studies it was observed that:
(1) People do have a color preference; some colors are liked very much while other colors are detested.
(2) Color-preference varies from person to person.
(3) From the color-affect studies, it can be shown that certain color groups have consistent mood-associations which seem standard across individuals: warm colors are often experienced as "exciting", cool colors as "tranquil"

and auxiliary colors as "disagreeable."

The following example will paraphrase what occurs in the color experience. Mr. X looks at the color red and demonstrates an affective response of excitation or arousal. Mr. X states that he finds the color red pleasant. Now Mr. Y looks at the color red and demonstrates the same affective response of excitation. However, Mr. Y finds the color red to be unpleasant. If it can be assumed that the color red has the same, standard mood-associations for both gentlemen, then the question arises as to how these men differ so that one would prefer the color red while the other would not. The following chapter on Color Preference as a Function of Personality will attempt to answer this question.

CHAPTER III

COLOR PREFERENCE AS A FUNCTION OF PERSONALITY

A third body of color research relates color preference to personality. This research builds on the various color-affect studies and seems to hold the key to the synthesis of a comprehensive theory for color preference. In the color preference studies mentioned in Chapter II, color was viewed as a stimulus with the response to this stimulus being the preference choice. In the color-affect studies, color also functioned as a stimulus for eliciting certain affective responses from the individual. Lukiesh (30) sees color as not only functioning in this stimulus capacity but also functioning as a response to internal stimuli. Color preference can be viewed not only as a stimulus but also as a response which can be used to aid in the interpretation of internal affective states which function as the stimulus. According to this position, it is possible that not only when a person views the color red will he/she feel "excited", but also an "excited" person may indeed choose the color red as a projection of this affective state. Not only is color preference a reflection of affective states, but it can also be used as an estimate of certain personality characteristics

which are more enduring and stable overtime compared to the temporal fluctuations of affect.

In this chapter, two projective personality measures which utilize color preference will be reviewed. These tests are the Luscher Color Test (LCT) and the Color Pyramid Test (CPT). Secondly, the salient and more empirically grounded relationship between color and personality will be extracted from these two tests and from the entire color paradigm in order to arrive at a solid foundation upon which hypotheses may be built and an experiment conducted.

The Luscher Color Test

Although virtually unknown in English-speaking countries, but allegedly widely used in Europe, the Luscher Color Test was presented to the 1947 International Congress of Psychology and was first publicized in Germany in 1949. Its abbreviated form (31) published in 1969 in English consists of eight colors. This published, abbreviated version or "short test" will be the subject of this review.

Administration and Scoring

The test can be administered easily in a few minutes. Color cards of grey, blue, green, red, yellow, violet, brown and black are presented to the individual.

The individual is instructed to choose the color he/she feels the most sympathy for out of the eight colors without consciously trying to associate the color with something else. As one chooses the best-liked color and removes it from the group, one then chooses the second favorite and so-on until the eight colors have been arranged in a preference order from most pleasant to most unpleasant. This entire procedure is repeated a second time and the psychological examiner records the preference order of both trials using a numerical color code.

Interpretation is carried out mainly in terms of the positions which certain colors hold within the preference continuum. Positions along the continuum represent what Luscher describes as functions which relate to aspects of the individual's experience of life situations. Colors are scored accordingly to their positions or function with the emphasis being placed on the second trial. A detailed set of tables are then used to interpret the myriad number of color permutations which could arise from any one preference order.

Theory and Rationale

It is Luscher's belief that each color has a constant, objective meaning which remains the same for everyone whether or not they like or dislike the color. He refers to this as the "structure" of the color, and

considers each color to have a special significance which is innate in the genetic make-up of the individual. His rationale for the symbolic significance of colors is based in the evolutionary history of primordial man. Man associated certain colors with various environmental conditions. These learned associations eventually evolved to become a part of his biological and genetic structure. Luscher explains:

> "Night (represented by dark blue) brought passivity, quiescence and a general slowing down of metabolic and glandular activity; day (represented by bright yellow) brought with it the possibility of action, an increase in the metablic rate and greater glandular secretion, thus providing him with both energy and incentive." (31, p. 11).

Since these factors of night and day were beyond one's control, the associated colors of blue and yellow are described by Luscher as being "heteronomous", with blue being "passive" and yellow being "active".

Primitive man, according to Luscher, was either ". . . hunting and attacking, or he was being hunted and defended himself against attack: activity directed towards conquest and acquisition or activity directed towards self-preservation." (31, p. 12). Luscher considers the color red to be the universal representation of attack and conquest, while green, for somewhat uncertain reasons, came to represent self-preservation. Both red and green are described as "autonomous" because both were under the individual's control. Red, the color of attack, being

"active" and green, the color of retreat, being "passive".

Luscher expounds in further detail on the differences between the active or warm colors of red and yellow and the passive or cool colors of blue and green. A person preferring active colors tends to be "ex-centric" or objectively concerned, while a person preferring passive colors tends to be "concentric" or subjectively concerned. Luscher states that the word, "concentric", may be somewhat similar to the word introversion but not exclusively so. A concentric person, Luscher believes, may be continuously communicating with others in an extravert fashion, but usually the communication will always pertain to the self in an ego-centric manner. Table III, below summarizes the common associations for these four colors.

TABLE III

Objective Meaning of Luscher's Primary Colors (44, p. 254)

	Autonomous	Heteronomous
Ex-centric (active)	Red	Yellow
Concentric (passive)	Green	Blue

The auxiliary colors of violet, brown, black and grey represent a different category from the basic four primary colors. Black and grey are achromatic and are, strictly speaking, not colors at all. Brown, although not an achromatic color has been classified in this group by Luscher. Purple and brown were chosen primarily to expand the range over which basic colors could be spread. Purple seems to hold a neutral or indifferent psychological meaning. A preference for any achromatic color (black, grey or brown) represents a negative attitude towards life, which will be explained in further detail later.

We have reviewed the structure or symbolic meaning of the eight colors as representing the constant and objective value which Luscher claims, we all hold for each particular color. What Luscher describes as the functional value of color is the subjective attitude towards the color which varies greatly from person to person. Whereas one person may be very attracted to a certain color, another person may be indifferent towards it, while a third may dislike it. Therefore, the preference order represents the functional relationship of the individual to a particular color and its respective symbolism.

Although there are slight variations to this rule, in general there are five functional locations along the eight positions. The first two chosen colors represent the individual's desired objectives. The 3rd and the 4th

position reflect the existing situation of the individual, while the 5th and 6th position represent characteristics under restraint. (These 5th and 6th positions are usually the colors the individual feels indifferent towards and Luscher does not seem to weigh these heavily.) The 7th and 8th position represent the rejected or supressed characteristics of the person. While the 1st and 8th position is the fifth function and represents the individual's actual problem and carries a lot of functional importance in the test.

Primary to the interpretation of color placements, Luscher contends that the four colors of blue, green, red and yellow symbolize fundamental psychological needs and should, therefore, be placed in the first four or five positions by a healthy individual who is free from conflicts. If one of the basic four colors is placed beyond the 5th position then this demonstrates that a particular need is remaining unsatisfied. This, in turn, becomes a stress-source and leads to anxiety. Where there is anxiety, this stress source compels a compensatory behavior on the part of the individual which is reflected by the 1st position (or following 2nd or 3rd depending upon the degree of denial of the basic colors). The individual's actual problem, according to Luscher, is disclosed by the anxiety created by an unsatisfied need and the compensatory behavior used to reduce the anxiety created by this

unfulfilled need.

The color structure (the objective meaning of the particular colors), as it relates to function (one's subjective attitude towards the color) is the basis upon which personality interpretations as well as present life states can be made. This principle is not only integral to Luscher's Color Test but to the Color Pyramid Test and most of the other personality tests which employ the use of color for interpretational purposes.

Criticism of the Luscher Color Test

The above principle, at least on a hypothetical basis, seems sound. Unfortunately Luscher carries it to an extreme, making further unfounded inferences about the psychological significance of the basic colors (i.e. blue as perceptive, unifying; green as possessive, immutable; red as locomotor, operative; yellow as aspiring and investigatory). This and several other aspects of the test have come under sharp criticism by others. The test has been criticized by de Zeeuw (55) on the grounds that the relation of colors to categories of behavior was made from an intuitive basis rather than by inter-individual identity of color perceptions. Semenoff (44) questions the attribution of meaning of the positions of color preference. He claims that although adequate rationale was given to the first and last functions, no clear rationale was given

for the two functions of existing situation and characteristics under restraint. Heavy criticism for the Luscher Color Test was made by Lee: "It is, I think, completely unjustified by fact . . . no adequate references are given in the text to enable the truth of these assertions to be checked." (2, pp. 211-212). Lee has perhaps pinpointed the test's major fault: the lack of any objective or empirically verifiable evidence. There are well over one hundred references but nearly all are articles in European medical journals and therefore not widely accessible to this country. Murstein agrees with Lee that "Despite the 'deep' interpretations offered in the book, no empirical data are given." (2, p. 213). He further criticizes the wider spread distribution of the Short Test to the general public as being irresponsible. In the hands of non-professionals some of the claims which are leveled against the subject may be not only unfounded and misleading but psychologically dangerous as well. Sanford criticizes the interpretation tables of the LCT quite appropriately as being as

> ". . . explicit and applicable to life situations as a Jean Dixon horoscope . . . the results are elastic, stretching to fit all sizes of psyche . . . and precisely this generality of application is the key to Dr. Luscher's success, not to mention phrenology and fortune cookies." (2, p. 213).

Much of the criticism here is well founded. Luscher can be criticized for the lack of empirical

validation of his various constructs in the test, as well as the generality of his interpretation tables. Furthermore, the non-professional manner in which the test has entered this country on the local book shelf has raised further skepticism in the minds of psychometricians. This is all quite unfortunate, for it is this author's belief that although the test may not meet up to the grandiose claims which Luscher states it can, it does hold a few fundamental principles which seem valid. Although he criticizes Luscher on several accounts, de Zeeuw (55) praises Luscher for being the forerunner in the area of color preference and personality. Empirical support for some of Luscher's propositions will be given following the review of the Color Pyramid Test.

The Color Pyramid Test

The Color Pyramid Test (CPT) (41) is a projective personality measure of European origin which has had a long wait before its introduction into English-speaking nations. There are two major differences between the CPT and the LCT: (1) With the CPT the subject actually makes use of colors in 2-dimensional space as opposed to merely rank ordering then in terms of preference. In this way, conclusions may be drawn not only from the various colors which are used but also from the "form" in which they are used. (2) The authors of this test have more empirical

data to support their claims than does Luscher.

Administration and Interpretation

The subject is given chips of 24 color hues and is told to construct three "pretty" and three "ugly" pyramids by filling the fifteen spaces of the pyramid with the chips. Fifteen chips of each hue are provided so that the subject may fill an entire pyramid with one hue if he/she so desires. The 24 color hues coincide with ten basic color groups of red, orange, yellow, green, blue, purple, brown, white, grey and black. Numbers assigned to each hue are used for recording and scoring.

Scoring procedures for the CPT are extensively lengthy and complex. Considering that both color and form are analyzed and that 24 color hues are utilized to make six different pyramids, this is not surprising. First, the frequency occurrence of each hue in each pyramid is recorded. Next a "sequence formula" is tabulated counting the number of colors that have been used in all three pyramids of a given kind, in two pyramids, in one, and in none. The total use of certain colors and color groups is then arrived at which has special interpretational significance.

After the pyramids are analyzed for their color, they are then analyzed for their form or structure. Basically the structure of the pyramid can be: (a) ignored,

(b) treated as a series of rows or layers or (c) treated in terms of symmetry about a vertical axis. Each structural division may have several sub-types. All of this data on structure is then summarized into a category called "form level index".

One of the admirable qualities about the CPT is its wholistic approach to not only the use of color but also the method in which the subject utilizes space with the colors. To delve into the interpretive significance of the CPT form responses, however, would be beyond the scope of this paper, and therefore, only the use of color and its symbolic significance will be discussed here.

Meaning of Color Scores

Heiss' (42) conceptual model for color interpretation is somewhat similar to that of Luscher's in the sense that colors hold an objective meaning or structure and it is the individual's reaction to these colors which is considered a function of his/her personality. Basically, Heiss considers every color stimuli to have the capability of evoking certain physiological, psychological and affective responses from the individual. Interpretative significance of most colors used in the CPT are given on the next two pages.

RED.....	strong excitation, intense arousal, impulsive affect
Very High Red.....	uncontrolled explosive impulses
High Red.....	impulsive, extroverted emotionally
Low Red.....	effective impulse control, capacity to delay need satisfaction
Very Low Red.....	inability to express feelings
ORANGE.....	strong excitation, intense arousal, externalization of affect
High Orange.....	strong emotional need satisfaction through outward impulse expression, extroversion
Low Orange.....	denial or repression of emotions
YELLOW.....	strong excitation, intense arousal, less impulsive affect than red or orange
High Yellow.....	object directed impulse discharge, stable, goal directed well controlled, appropriate expression of affect
Low Yellow.....	inability to express impulsive needs
GREEN.....	low excitation, moderate arousal
Very High Green...	overwhelmed by internal and external emotional laden stimuli
High Green.....	good sensitivity to internal and external stimuli
Low Green.....	decreased sensitivity
Very Low Green....	emotional flattening, rigidification and freezing of emotions

BLUE.....	low excitation, moderate arousal, tranquil affect
Very High Blue....	conscious damping or suppression of feelings
High Blue.....	well controlled emotions
Low Blue.....	under regulation of affect
Very Low Blue.....	absence or suppression of internal control functions
PURPLE.....	low excitation, moderate arousal, strong internal affect
Very High Purple..	psychopathology
High Purple.....	emotional maladjustment
BROWN.....	low excitation, moderate arousal
High Brown.....	strong primitive impulses, handled by negative, unconventional responses
Low Brown.....	low energy level
WHITE.....	low arousal
High White.....	loosening reality contact and impulse control
Low White.....	common
GREY.....	low arousal
High Grey.....	repression and denial of feelings
Low Grey.....	openness and lack of repressive mechanisms
BLACK.....	low arousal
High Black.....	severe depression, autistic asocial behavior
Low Black.....	freedom from inhibition

Each color may have one or more different hues, each according to Heiss, having their own significance.

In general these hues vary according to a brightness continuum with dark colors being correlated with depression and light colors with elation. Heiss has also broken the various colors into "syndroms" each with their special significance. These include the following: (1) the Stimulation syndrom (red, orange, yellow) reflecting an easily excited, impulsive, extroverted personality; (2) the Normal syndrom (red, blue, green) reflecting the use of typical mechanisms of affect regulation; (3) the Drive syndrom (yellow, green, brown) reflecting a high energy level and ability to invest affect into productive activity; (4) the Achromatic syndrom (white, grey, black) reflecting exaggerated affect regulation including repression, inhibition, denial, displacement; and (5) the Turmoil syndrom (excessive preference of any one color) reflecting pathology.

Criticism of the Color Pyramid Test

Lee has criticized the CPT as possessing a "grossly simplified system of hypothesized relationships" between color and personality. Results of the research done in this area, he claims, "are varied and discrepant as to be almost worthless." (2, p. 398). Lee has gone so far as to draw a similarity between the CPT and earlier attempts to put graphology on a scientific basis.

Rabin states:

> "Overall despite a good many meticulously reported statistical tables and factor analyses of the numerous form and color variables resulting from the test, there seems to be little sound rationale for interpretation of this test."

Rabin goes on to assert that the CPT "offers an illustration of a technically well performed empirical exercise without much theoretical basis or psychological rationale." (2, pp. 399-400).

Clements believes that the interpretation of the CPT can be very "tedious", but states that

> "this approach to personality assessment is remarkably absent from studies in this country, and for those who are concerned in this aspect of investigation the book (test) provides a well-prepared account of one method that might be used." (2, p. 400).

Finally, Williams sees the CPT as possessing some strengths as well as some weaknesses. He states:

> "Those who felt the need for a test of emotional expression which to some extent combines the advantage of projective techniques with those of standardized methods of scoring may find this (the CPT) the answer. It clearly has considerable potentiality in the fields of research and vocational guidance, but in the opinion of the present reviewer the number of occasions on which it could give enough information to be of value in clinical fields is very small." (2, p. 400).

Relationship Between Salient Personality Variables and the Color Paradigm

The purpose of this sub-section is to extract from the Luscher Color Test, the Color Pyramid Test and the entire color paradigm, the salient and more empirically grounded relationships between color and personality. It is this author's belief that both the LCT and the CPT have overextended themselves in terms of the inferences which they have made regarding color and personality. Much of their specificity as to the objective meaning of color and its functional relationship to the psyche has yet to be validated by empirical investigation. The LCT is much more to blame for this than the CPT, yet both measures have made several unfounded assumptions and this has damaged their credibility. This does not negate, however, the fundamental principle that color preference is a function of personality. It merely demonstrates the need, rather, to continue building on the paradigm which deals with color as a function of personality so that the basic color-personality variables may be elucidated and verified through empirical means. In this fashion, more specific inferences may be added onto these as further experimentation continues. To paraphrase, both the CPT and the LCT purport to be through, systematic projective devices when in actuality they are still in their infancy.

Two basic principles which relate color preference to personality will now be discussed. They were chosen due to the empirical evidence which supports them. These salient personality variables related to color preference include: (1) the degree of introversion-extroversion and (2) the degree of psychopathology.

Color Preference and Extraversion

Color research seems to support the psychological differences between the "warm" colors of red and yellow and the "cool" colors of blue and green. Color-affect studies have dealt extensively with this color distinction where warm colors were consistently rated as being more "active" or exciting in contrast to the cool colors which were rated as being more "tranquil". Luscher takes this relationship one step further. Warm colors are not only active but also ex-centric or objectively concerned, while cool colors are passive and concentric or subjectively concerned. He states that the word "ex-centric" carries a similar meaning to extraversion, and that the word "concentric" may be somewhat similar to the meaning of introversion--but not exclusively so. Schaie and Heiss (42) have used this same general principle in their Color Pyramid Test. In their system, red and yellow represent extraverted emotionality or "object-directed impulse discharge", while blue represented a controlled emotionality.

(No correlation to introversion-extraversion was made for the color green.)

Richers and Ovsiankina have this to say about the subject.

> "The warm color dominant subjects are characterized by an intimate relation to the visually perceptible world. . . . In the subject-object relationship, the emphasis is on the object. The cold color dominant subjects have a detached split off attitude to the outside world. . . . In the subject-object relationship, the emphasis is on the subject." (37, p. 192).

In an experiment conducted by Goldstein (15) red and yellow were found to have an "expansive" effect on the subject (increasing the effect of the external world), while blue and green had the opposite effect (reducing the effect of the external world). Jaensch (22) in his theory of color and personality types, classes people according to their general predominance of warm versus cool colors. People with preference for warmer colors tend to be "outwardly integrated" having a close relation with their perceived surroundings. People with a preference for cold colors are considered to be "inwardly integrated" and seem to be closed off from their perceived surroundings.

In an important study, Robinson (38) administered the Eysenck Personality Inventory (EPI) to 40 subjects and a score for Extraversion was obtained. Twenty-eight colors of varying hue and saturation were presented in pairs

to subjects. A preference tending towards a cooler color (blue or green) was scored as an introverted response, while a preference for a warmer color (tending towards red and yellow) was considered an extraverted response. Subjects were then administered the "shortened" Luscher Color Test and were asked to rate themselves on a 1 to 10 scale as to their own impression of their relative extraversion. Results demonstrated a significant correlation between color preference and the degree of extraversion with introverts preferring cooler colors and extraverts preferring warmer colors.

> "A significant Pearson correlation of .56 ($N=40$, $p<.01$) was found between color preference and self-rating of relative extraversion. A correlation of .62 ($N=40$, $p<.01$) was found between color preference and EPI extraversion scores." (38, p. 702).

In the Robinson study, no significant correlation was found, however, between the LCT extraversion score and the EPI extraversion score; nor was there any correlation between the LCT extraversion score and the subjects self rating extraversion score. From these results Robinson concluded that there were "serious doubts on the validity of inferences about introversion or extraversion based on the Luscher Color Test." (38, p. 702). Robinson's conclusion here seems illogical. The experiment <u>did</u> support the notion that extraverted individuals prefer warm colors while introverted individuals prefer

cool colors, and this is the same principle that the LCT is based on. It may be true, for various reasons, that the LCT, as a psychometric measure, is an unreliable predictor of introversion-extraversion. It is erroneous to assume from these results that the inferences upon which the LCT is based (i.e. warm colors chosen by extraverts and cool colors by introverts) are invalid, for it is these very inferences which were proven in the experiment.

Color Preference and Psychopathology

Color research supports the notion that a preference towards the colors of red, yellow, blue and green reflects, in general, a healthy emotionally balanced individual; while a preference towards the colors of purple, brown, black, grey and white reflects psychopathology.

Dow (5) performed an interesting experiment to test Luscher's hypothesis. He divided a population of 319 nursing students into two groups: one being "high-anxious" and the other "low-anxious" with 20 subjects in each group. The criterion for division was on the basis of their "second order factor" scores on the Clinical Analysis Questionnaire (3). This separation was subsequently confirmed on the Taylor Manifest Anxiety Scale (50). Mean anxiety scores for the two groups on the LCT were 3.65 for

the high-anxious group and 0.55 for the low-anxious group. This is a significant difference, using the T-test, at the 0.001 level. A distribution of the results are given below.

TABLE IV

Taylor Manifest Anxiety Scale (40,255)

	Anxious	Non-anxious	Total
Luscher anxiety scores 0-1	4	17	21
2-8	16	3	19
Total	20	20	40

A test by chi-squared was made, and it was found that this distribution also yields a significant result well beyond the 0.001 level. Another experiment done by French and Alexander (8) sought to correlate the LCT with the IPAT anxiety scale and could not support the findings of Dow's study.

The Color Pyramid Test also pays close attention to the significance of primary colors versus auxiliary colors in determining psychopathology. The CPT's achromatic syndrom (white, grey, black) is related to exaggerated affect regulation which is accomplished through

the use of various defense mechanisms. In the CPT, purple seems to represent strong internalization of affect, anxiety and tension; whereas the color brown may reflect defiant, asocial behavior.

Wewetzer (52) using the CPT found color preference for abnormal subjects (90 schizophrenics, 25 manic depressives, 20 epileptics) tending towards the colors of purple, green, white, grey and brown, while 100 normal subjects seemed to prefer the colors of yellow, blue, red and black. Brengelman (1) using the CPT found an increase selectivity for purple and brown and a decrease selectivity for blue among abnormal subjects as compared to normals. The color white was reported to be indicative of schizophrenia as reported in a study using the CPT by O'Reilly, Holzinga and Blewett (36). These investigators found white to be chosen at least once by 76.7% of the schizophrenics tested, 29.1% of the nurses tested and 8% of the nonschizophrenic patients tested. Frohoff (9) administered the CPT to 100 schizophrenics and found green to be the most preferred color with high preference being demonstrated for purple, grey and white as well.

Several studies relate neuroticism with a general preference for auxiliary colors. It has been shown that neurotics have a high preference for red and black (46), for brown and not for yellow (26, 1), and for purple (26).

In reviewing this research which utilized the CPT

to distinguish between psychotics-neurotics versus normals, one quickly notices exceptions to the general preference for auxiliary colors. This can be explained by the assumption that any excessive use of any one color (or excessive denial of a primary color) reflects pathology. Remember that the CPT allows for a frequency count of the colors used in the pyramids. This frequency count is not possible in a mere rank ordering of colors such as in the LCT. In general, however, a preference towards auxiliary colors is common among neurotic and psychotic groups.

Summary

In this chapter two color personality tests were reviewed. The major similarity between the LCT and the CPT is that both see color as having its own objective value or structure, and it is the individual's reaction to these colors which is considered a function of his/her personality. Both the LCT and the CPT were criticized, however, for overextending themselves in terms of the inferences which they make regarding color and personality. Not enough empirical data has been gathered yet to support the specificity of interpretation which is typical of both the LCT and the CPT. Some color-personality relationships seem more established than others, however. Therefore, two salient personality variables related to

color preference were extracted from the LCT, CPT and the existing color-personality paradigm for review. These included: (1) Warm colors preferred by extraverts and cool colors preferred by introverts; (2) auxiliary colors preferred by individuals high in psychopathology. The next chapter describes the experiment which was conducted to investigate the validity of these two color-personality relationships.

CHAPTER IV

EXPERIMENT

Purpose

The purpose of this experiment was to investigate whether or not there are any relationships between color preference and personality. More specifically, it will investigate the validity of the two color-personality relationships mentioned in the previous chapter: (1) warm colors are preferred by extraverts and cool colors are preferred by introverts; and (2) auxiliary colors are preferred by individuals high in psychopathology. Although some research has already been done in these two areas, the evidence is certainly equivocal.

Literature on color preference as it relates to introversion-extraversion is inconclusive. Several studies in this area (15, 22, 37, 42) have poor empirical validity. The one rigorous study performed by Robinson (38) demonstrated mixed results. Literature in the area of color preference as it relates to psychopathology is inconclusive as well. Several investigations (1, 9, 26, 46, 52) support the hypothesis that subjects who are high in psychopathology have color preferences tending towards the auxiliary colors. The results of these experiments do

demonstrate a wide variability of results however. Furthermore, much of these data are of an actuarial nature. The one empirically solid investigation by Dow (5) showed significant results demonstrating that anxious subjects opposed to non-anxious subjects (as measured by the Clinical Analysis Questionnaire) preferred auxiliary colors over primary colors on the Luscher Color Test. Yet another study by French and Alexander (8), which utilized the IPAT Anxiety Scale, did not show any significant results in this regard.

The present experiment is unique in three ways when compared to the various studies mentioned above: (1) 16 colors will be utilized in the color preference task (8 primary--4 warm, 4 cool, 8 auxiliary). This is twice as many colors than what has been used in the Robinson (38), Dow (5) and French and Alexander (8) studies which relied on the eight colors of the Luscher Color Test. It is believed that this change will allow the subjects a greater range of response. (2) The colors which will be used in this experiment will be objectively measured in terms of their "Munsell values". Much of the research in the area of color preference has been faulted because of the lack of any specification of the color stimuli used (6, 17). (3) The third unique aspect of the experiment is in the utilization of the Eysenck Personality Inventory (7) to measure both personality dimensions of introversion-

extraversion and stability-neuroticism.

To conclude, since the research in the area of color preference and personality is so equivocable, the purpose of this experiment will be to replicate, using better methodological procedures, the various studies mentioned previously. The specific hypotheses being used as well as the specific methodology being made, will now be discussed. This will be followed by the actual results and discussion of this experiment.

Hypotheses

Hypothesis #1

Extraverted subjects[3] will demonstrate a preference towards warmer colors as compared to introverted subjects; introverted subjects will demonstrate a preference towards cooler colors as compared to extraverted subjects.

Hypothesis #2

High neurotic subjects[4] will demonstrate a pref-

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[3]High extraversion Ss are those who score 13 or above on the EPI-E; low extraversion Ss are those who obtain 12 or below on the EPI-E. This cut-off point was arrived at from actuarial data on the EPI.

[4]High neurotic Ss are those who score 15 or above on the EPI-N; low neurotic Ss are those who score 14 or below on the EPI-N. This cut-off point was arrived at from actuarial data on the EPI and from the distribution of scores on the independent variable and the 4 cell sizes.

erence towards auxiliary colors as compared to low neurotic subjects; low neurotic subjects will demonstrate a preference towards primary colors as compared to extraverted subjects.

Methodology

Subjects

Forty female student Ss and forty client Ss (22 males, 18 females) were used for this experiment. The female student Ss were obtained from an introductory psychology course. These Ss volunteered for the experiment and received course credit for their effort. The client Ss were obtained from a psychiatric outpatient facility and were chosen for the experiment in terms of their availability and willingness to participate in the experiment.[5]

Procedure

The procedure consisted of administering to each Ss the Dvorine Pseudo-Ishochromatic Test (20) for color blindness, the Color-Preference Test, and the Eysenck Personality Inventory. This entire procedure lasted between 20 to 30 minutes and will be summarized below:

(1) Ss were first presented section 1 or the "Dvorine Pseudo-Isochromatic Plates" (20) to test for red-

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[5]Appreciation is extended to the clients and staff of St. Joseph Lodge for helping in this experiment.

green defective color vision.

(2) Ss were asked to perform the color preference task. The materials used in this color preference task included 16 different color hues (including such "non-colors" as black, white and grey). Each color was on a 7½ x 4 inch color card. Each color hue had been measured for its objective color value or "Munsell value" which accounts for its hue, chroma and tint (or value). (Please refer to Appendix B for the rationale used in determining these 16 colors.) The 16 hues with their corresponding Munsell values are shown on the following page, Table V.

TABLE V

Color Used with Corresponding Munsell Values[6]

Color	Munsell Value
light red	2.5R, 7/10
dark red	5R, 4/15
light yellow	5Y, '/14
dark yellow	2.5Y, 8/12
light blue	5B, 6/8
dark blue	5PB, 4/10
light green	7.5 GY, 7/10
dark green	2.5 G, 5/10
light brown	2.5 YR, 4/6
dark brown	2.5 YR, 3/4
light purple	10PB, 8/4
dark purple	5RP, 4/12

The sixteen colors were arranged in front of the Ss on a black table top in a well lighted room. They were arranged in two rows of eight each, facing the S. (Please refer to Appendix C for the specific color arrangement used and its rationale.) Each S was given the following instructions: "In front of you are 16 colors. I want you to choose the one color which is most attractive to you,

[6]Light grey, dark grey, black and white have no Munsell value.

the one color which is most appealing to the eye." After the S would choose his/her most preferred color, that color would be removed. The following instructions would then be given: "Now out of the remaining colors, I want you to choose the most attractive color." This color would then be removed and this procedure was repeated until the S had ranked ordered all 16 colors from "most-liked" to "most-disliked". Each S's color ranking was then scored on two dimensions: (a) its tendency towards warm or cool colors (color preference - extraversion score or CP-E score), and (b) its tendency towards primary or auxiliary colors (color preference - neuroticism score or CP-N score). (Please refer to Appendix D for the exact scoring procedures used.) (3) Finally, the S's last task was to complete the Eysenck Personality Inventory (Form A), from which an extraversion score (EPI-E score) and a neuroticism score (EPI-N score) were obtained.

Results

In regard to Hypothesis #1 that extraverted Ss would demonstrate a preference towards warm colors and that introverted Ss would demonstrate a preference towards cool colors; it was found, after a two-way analysis of variance was performed, that there was no statistically significant difference between extraverts and introverts with relation to their preference towards cool and warm colors.

Extraverted Ss did, however, show a slight (non-significant) tendency towards warm colors with an average CP-E score of -2.95 and introverted Ss did show a slight (non-significant) tendency towards cooler colors with an average CP-E score of -5.76. Further analysis, however, using a t-test, shows a statistically significant difference ($p=.10$) between extraverted students and introverted clients in color preference for warm and cool colors. Extraverted students, with an average CP-E score of -1.57, preferred warmer colors significantly more so than introverted clients, who preferring cooler colors had an average CP-E score of -7.64. The results of these findings can be seen in Table VI.

In regard to Hypothesis #2 that high neurotic Ss would demonstrate a preference towards auxiliary colors and that low neurotic Ss would demonstrate a preference towards primary colors; it was found, after a two-way analysis of variance was performed, that there was no statistically significant relationship between the degree of neuroticism and color preference. High neurotic Ss, with an average CP-N score of 16.03, did not differ significantly from low neurotic Ss, who had an average CP-N score of 15.17, on color preference for primary versus auxiliary colors. Further analysis, however, using a t-test showed that the two populations of students and clients did demonstrate a statistically significant

TABLE VI

CP-E Score Means, Standard Deviations and Sample Sizes for Extravert and Introvert Students and Clients

		Factor 1		
		Students	Clients	
Factor 2	Extraverts	Mean = -1.57 SD = 12.95 N = 23	Mean = -5.07 SD = 10.24 N = 15	Mean = -2.95
	Introverts	Mean = -3.00 SD = 11.6 N = 17	Mean = -7.64 SD = 8.85 N = 25	Mean = -5.76
		Mean = -2.18	Mean = -6.68	

difference (p=.05) in their preference towards primary and auxiliary colors with students showing a preference for primary colors with a CP-N score of 13.00 and clients showing a significant preference for auxiliary colors with a CP-N score of 18.15. These results can be seen in Table VII.

Other differences were observed between these two populations in regard to their scores on the Eysenck Personality Inventory. A t-test demonstrated that students, with an average EPI-E score of 13.21 (S.D.=4.81), were significantly (p=.05) more extraverted than clients who had an average EPI-E score of 11.76 (S.D.=4.36). A second t-test demonstrated that clients, with an average EPI-N score of 15.73 (S.D.=5.70), were significantly (p=.05) more neurotic than students, who had an average EPI-N score of 11.80 (S.D.=4.70). This data is summarized in Table VIII.

Finally, not enough data was collected to make any inferences regarding color-blind Ss and their color preference response.[7]

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[7]Only one male S demonstrated color blindness and his color preference scores--in relation to his EPI scores--were not atypical as compared to other Ss. This S was not used in the final subject pool.

TABLE VII

CP-N Score Means, Standard Deviations and Sample Sizes for High Neurotic and Low Neurotic Students and Clients

		Factor 1		
		Students	Clients	
Factor 2	High Neurotics	Mean = 9.91 SD = 8.72 N = 11	Mean = 18.52 SD = 12.97 N = 27	Mean = 16.03
	Low Neurotics	Mean = 14.17 SD = 10.68 N = 29	Mean = 17.38 SD = 14.12 N = 13	Mean = 15.17
		Mean = 13.00	Mean = 18.15	

TABLE VIII

EPI and CP Scores

	Score	Population	Mean	Variance	Standard Deviation
EPI Scores	EPI-E	student	13.21	23.20	4.81
	EPI-E	client	11.76	18.99	4.36
	EPI-N	student	11.80	22.11	4.70
	EPI-N	client	15.73	32.45	5.70
CP Scores	CP-E	student	-2.07	143.19	11.97
	CP-E	client	-6.51	86.36	9.29
	CP-N	student	12.44	103.45	10.17
	CP-N	client	17.70	177.41	13.32

Discussion

Hypothesis #1 on color preference as it relates to introversion-extraversion was not supported. As a group, extraverted Ss were not significantly different than introverted Ss in regard to their preference for warm and cool colors. Upon further analysis, there was a significant difference between the two sub-groups of extraverted students and introverted clients, with extraverted students demonstrating a significantly greater preference for warmer colors as compared with the introverted clients who had a greater preference for cooler colors. These results can be explained by the fact that when compared with the four cell sub-groups of: (1) extraverted students, (2) introverted students, (3) extraverted clients and (4) introverted clients; the extraverted students and introverted clients represented the extreme polar opposites on the introversion-extraversion continuum. This is further supported by the fact that, as a group, students were significantly more extraverted than clients and clients were significantly more introverted than students as measured by the EPI-E scores. Since between these two groups of extraverted students and introverted clients, there was a wider discrepancy than could be found between all extraverts (both student and client) and all introverts (both student and client), it is logical that this discrepancy

would be exemplified in a difference in color preference scores. This part of the results are in support of the hypothesis. It is still true, however, that there was no significant difference between extraverts and introverts when viewed collectively, and this finding does not support the hypothesis.

A second interesting observation related to color preference for warm and cool colors was that both extraverts and introverts, students and clients demonstrated a color preference tending towards cooler colors as opposed to warmer colors. Although extraverts had a greater preference towards warmer colors (or less of a preference for cooler colors) as compared to introverts, these findings are unusual because the average CP-E score for extraverts still showed that they choose cooler colors more frequently than they did warmer colors, and one would suspect the opposite.

Hypothesis #2 on color preference as it relates to neurosis was not supported. High neurotic Ss did not show a greater preference for auxiliary colors as compared to low neurotic Ss, and low neurotic Ss as compared to high neurotic Ss did not show a greater preference for primary colors. Aside from these negative findings, a statistically significant relationship was found to exist, however, between the two populations of students and clients and their preferences for primary and auxiliary

colors. It was demonstrated that clients--especially high neurotic clients, had a greater preference for auxiliary colors as compared to students--especially high neurotic students.

How are these findings to be interpreted? Many studies mentioned in the previous chapter found that psychiatric populations had a significantly greater preference for auxiliary colors than did a "normal" non-psychiatric population. Many of these investigators made the false assumption, however, that their results implied that high neurotic individuals choose auxiliary colors. In this experiment, by factoring out the dimension of neurosis, it was discovered that color preference for auxiliary colors is indeed characteristic of a psychiatric population but is not determined by the Ss degree of neurosis.

Perhaps a preference for auxiliary colors is related to some other variable other than neurosis which is indicative of a client population. Undoubtedly there are probably a myriad number of variables other than the degree of neurosis which could distinguish a psychiatric population from a population of students. It is this authors belief that one or a combination of these factors may be the determining influence in color preference. What these variables might be, at this time, seems uncertain. In regards to Hypothesis #2, this researcher must

conclude that because of the absence of any statistically significant difference between high neurotics and low neurotics in color preference for primary and auxiliary colors, the null hypothesis must be accepted: High neurotics do not have a greater preference for auxiliary colors as compared to low neurotics, and low neurotics do not have a greater preference for primary colors as compared to high neurotics.

These findings can now be related back to the primary concern of this thesis: the process by which one responds to color. Is color preference a function of personality? The one finding that showed extraverted students prefering warmer colors and introverted clients preferring cooler colors, suggested that color preference may be a function of personality. No causation is implied by this comment, but merely a relationship is thought to exist, that is, color preference is not caused by personality but rather color preference may be related to personality. Of course the other findings of this experiment do not support this notion but they do not refute it either.

If color preference is indeed related to personality, then a possible model which might explain this might include the operation of an objective color value which is common for all and a functional color value which is based on determinants related to personality, determinants which

influences how much one comes to prefer some colors and dislike others. The fact that not more color preference--personality relationships were found in this study does not negate the existence of an objective basis of color, nor does it negate the existence of a functional relationship to color. It is likely that the specific color-personality relationship have yet to be discovered. Even if certain color-personality relationships did exist, their visibility may be greatly obscured due to one's particular learning history.

If this mechanism mentioned above was indeed operating, and color preference relationship did exist, then this would give support to such personality measures as the Luscher Color Test and the Color Pyramid Test, because both of these tests are based upon the assumption that there exists an objective and functional value for color. The findings in this experiment that demonstrated extraverted students preferring warm colors and introverted clients preferring cool colors is in congruence with these two tests, which make the same predictions regarding introverts and extraverts choice of warm and cool colors. Direct comparison between this experiment and these tests can not be made, however, due to the fact that totally different color preference procedures were used in this experiment than what is used in the tests. Given the findings of this study, it is not possible to

make any unequivocal judgements regarding the validity of the concepts of objective and functional values of color upon which these two instruments base their theory.

The results are also insufficient in themselves to prove or disprove either the biological or learning theory of color preference. In regards to the findings of this study that psychiatric clients prefer auxiliary colors over students, it would be interesting to research whether or not there is a biological basis for this. Perhaps severely disturbed patients may actually see colors differently. Or perhaps clients learn through environmental conditioning to seek out auxiliary colors. Until more information is gained, it seems feasible to conclude that both the biological model and the learning model may play a role in the color response.

The answers to all of these questions are uncertain, but they do suggest possible areas of research for the future. This study suggested that certain relationships might exist between color preference and personality and between color preference and certain populations--namely the difference in color preference between students and clients. Only when there is much more investigative work in these areas will the "color preference" paradigm become a more sophisticated and better predictor of the color preference phenomena.

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APPENDIXES

APPENDIX A

Color Preference Studies

Studies of color preference seem to have a wide variability of results. Researchers have tried to link color preference to various factors including age, sex and race with little correlation. Some studies report that "warm" colors of red and yellow are preferred by young children over the "cooler" colors of blue and green. As the child matures this preference shifts slightly to the cooler hues. This seems to represent a general trend and does not demonstrate a complete change in preference from warmer to cooler colors (10, 47).

Many investigators report no significant relationship between color preference and sex in the United States or in other countries (6, 11, 12, 14, 32, 49). Jastrow (23), however, reports that women have a greater variability than men in their preference of colors; while Warner (51) finds statistically significant differences in color preferences between sexes for a psychotic population. Norman and Scott state that,

> "it is quite evident that the last word has not yet been said in regard to sex differences in color preference. While the order of preference is apparently not a function of sex, there is good reason to suppose a difference in strength of preference." (35, p. 189).

Racial differences in color preference has been a popular area of investigation. A preference for blue and a dislike for yellow seems to be common for whites and negroes in the United States (11, 12, 13, 23, 32) while yellow seems to be disliked with a majority of racial groups. Red is the preferred color over blue and greens for Mexicans and Indians in the United States, and for East Indians and Filipinos (11, 14). There seems to be conflicting opinions on the preference for white for the Chinese and Japanese. Some researchers purport this unusual preference towards white in Chinese and Japanese populations (4, 11, 21, 45), while others find these two racial groups to have quite similar color preference to that of the United States (33). Garth (11) points out that cultural or nurtural differences may prove to be a more valid explanation for preference differences between races. Garth discovered that differences in color preference for first-grade children tend to be at a minimum, but there is a tendency for these differences to increase with the age of the child. These results support a commonly held notion that enculturation may indeed play an important role in color preference.

APPENDIX B

Rationale for 16 Colors

The rationale for the 16 colors used in this experiment proceeds as follows: (1) The decision to use a total of 16 colors was believed appropriate because this number offered a greater range of response as compared with the LCT and yet 16 was not too cumbersome like the CPT. (2) Of these 16 colors, there needed to be 8 primary colors balanced against 8 auxiliary colors. (3) The 8 primary colors used included 2 reds, 2 yellows, 2 blues and 2 greens. Red, yellow and blue comprise the three "basic colors" of the color spectrum. Green which is a mixture of blue and yellow, can actually be considered an auxiliary color, but it was included as part of the 8 primary colors to be used for these reasons: (a) it is considered a "cool color" along with blue and therefore was used to help balance out the two basic warm colors of red and yellow; (b) green usually evokes along with the other primary colors a positive rather than negative mood state in Ss and is chosen more frequently among psychologically stable individuals than are the other auxiliary colors being used in this experiment. (4) The eight auxiliary colors used to balance off the eight primary colors included: 2 browns, 2 purples, 2 greys, black and white.

These colors were chosen because they frequently promote negative mood states in Ss and are frequently associated with pathology. (5) The exact specification of hue, chroma and value (tint) for each color was rather arbitrary. For each hue (blue, green, red, yellow, brown, purple, grey) being used, the chroma (how much grey is in a color) remained relatively constant, while the value (lightness or darkness of a color) was varied to allow for one light and one dark value for each hue. Grey, although technically not a color, had two values-one light and one dark. Black and white are not technically colors either--both represent the extremes of the lightness-darkness continuum. Furthermore, many of the specific colors chosen for this experiment have the exact same Munsell value as do some of the colors used in the CPT.

APPENDIX C

Arrangement of 16 Colors

In order to account for Ss who have a tendency of choosing colors from a right to left direction or a left to right direction, one-half of the student Ss and one-half of the client Ss were presented with one arrangement while the other half of the Ss were presented with an opposite arrangement. Colors were also arranged in such a manner so that symmetry was obtained; the purpose of which was to help counterbalance a tendency which Ss might have to choose colors from one area on the color configuration. The following page shows the two arrangements which were used.

Arrangement 1

light green	dark red	light blue	dark yellow	light brown	dark purple	light grey	black
white	dark grey	light purple	dark brown	light yellow	dark blue	light red	dark green

Arrangement 2

dark brown	light purple	dark grey	white	dark green	light red	dark blue	light yellow
dark yellow	light blue	dark red	light green	black	light grey	dark purple	light brown

APPENDIX D

Color Preference Scoring

Scoring for Introversion-Extraversion will proceed as follows: Each of the four warm colors (light red, dark red, light yellow, dark yellow) is assigned a +1 value. Each of the four cool colors (light green, dark green, light blue, dark blue) is assigned a -1 value. According to the position of preference which a warm or cool color is placed on the 16 choice continuum, it will be assigned a weighted value. This weighted value will be 16 for the first position, 15 for the second position, 14 for the third and so-on until the last position where it receives a value of 1. Therefore, a light blue appearing in the first position would be given a value of -15 and a dark red appearing in the second position would be given a value of +15. Auxiliary colors are not given any value in this counting. All warm and cool scores are then added to arrive at one score which will measure the degree of extraversion (and introversion); this will be called the Color Preference-Extraversion score or the CP-E score. There is a possible range on the CP-E score from -48 to +48. (A -48 would represent the four cool colors occupying the first four positions and the four warm colors occupying the last four positions; a +48 would reflect

the opposite extreme with the four warm colors being preferred over the cool colors in the reverse placement.)

Scoring for the degree of neurosis is, of course, dependent upon the preference for the auxiliary colors (light purple, dark purple, light brown, dark brown, light grey, dark grey, white and black) and how far forward they are placed in the preference order, as well as how far back the primary colors are placed in this order. The hypothesis is that a completely stable person will place the 8 primary colors in the first 8 positions and will place the 8 auxiliary colors in the last eight positions. Any variation of this must be scored according to how far forward a particular auxiliary color is placed and how far back a primary color is placed. There are 16 positions or choices. Any auxiliary color which is placed in the 8th position will be given a value of 1, in the 7th position--a value of 2, in the 6th position--a value of 3 and so-on until the 1st position where it would receive a value of 8. The same scoring system is used for the primary colors as they appear in the last eight positions. A primary color placed in the 9th position would be given a value of 1, in the 10th position--a value of 2, in the 11th position--a value of 3 and so-on until the 16th position where it receives a value of 8. In this manner a neurosis score can be arrived at by adding all of the values representing the displacement of both auxiliary

and primary colors from their proper positions. This computation would be called the Color Preference-Neuroticism score or CP-N score and would have a possible range of 0 to 72 (a 0 representing absolutely no displacement of any of the colors; a 72 representing a complete reversal of primary and auxiliary colors from their proper positions).