

On the Relation of Color and Personality

K. WARNER SCHAE

Reprinted from
JOURNAL OF PROJECTIVE TECHNIQUES & PERSONALITY ASSESSMENT
Vol. 30 1966 No. 6

On The Relation of Color and Personality¹

K. WARNER SCHAIE
West Virginia University

Summary: The history of psychological studies of the relation between color and personality was reviewed. Models were related which conceptualize response to color as a means of studying emotional behavior, personality differentiation and the indirect influence of observable behavior traits. The relation of response to color and emotional behavior was discussed in terms of the color attributes of excitation potential, arousal value and affective content. Attention was drawn to the possibility of identifying modes of personality differentiation along the dimensions of rigidity-flexibility and stability-instability from extent of color use and from the study of color-form dominance. Finally, color preferences were applied to the actuarial prediction of personality patterns in terms of observable traits.

The laws of color vision and related problems of the subjective experience of color phenomena have preoccupied many psychologists for a long time. More specifically, there has been a pervading interest in attempts to utilize response to colored stimuli as a way of gaining information on a variety of personality variables. Several personality test constructors have included response to color as the dimension or basis of their personality assessment techniques. As examples we might mention the use of colored blots in the Rorschach (Rorschach, 1942), the use of finger painting (Napoli, 1951), and the utilization of the interaction of color and form on the Color Pyramid Test (Schaie and Heiss, 1964).

In order to provide a rationale for the use of response to color as a personality description technique, it is first necessary to show that there are indeed stable relations between preferences for choices of specific colors and independently specifiable personality variables. A further condition for the application of such techniques to diagnostic use requires that individual differences in response can be found above and beyond stable rela-

tionships defined by group or class attributes and characteristics.² Both conditions for the application of response to color have been shown to hold, and our concern must now turn to the possible meaning of color choice.

There are several ways in which we can generate hypotheses on the meaning of color response. We might consider whatever anecdotal or folkloristic information may be available. A second source of hypotheses might be found in the speculative literature provided by writers concerned with the esthetic and philosophical connotations of color association. More empirically oriented sources of hypotheses may be derived from the naturalistic observations of the ethologists (Tinbergen, 1942; 1948) as well as from related laboratory experiments on color preference in birds available from studies on imprinting (Hess, 1956). More conventional sources of hypotheses are available by examining the findings obtained when color preference tasks are administered to groups with different known types of psychopathology. Finally, one may identify the meaning of color preference in normal subjects by obtaining behavior ratings and self-descriptions which are then correlated with response to color. Last, but not least, there is a possibility of altogether avoiding concern with the connotations of color meaning if one is will-

¹Invited Psi Chi lecture given at the meeting of the South Eastern Psychological Association, Atlanta, Georgia, April 2, 1965.

²Formal tests of these basic assumptions have been performed via the study of color-mood associations. See Schaie (1961a, 1961b).

ing to approach personality description from a purely actuarial point of view. We shall begin our discussion by describing various hypotheses available for understanding the relations between color and personality and then will proceed to generate more specific models for three broad aspects of personality description. Let us first, however, consider the various properties of color as a stimulus in personality research.

COLOR AS A STIMULUS

A review of the literature on color as a stimulus suggests that various writers have concerned themselves with three different dimensions. Colors appear to have a *biological* cue function; i.e., they have cue values implicit in the physical characteristics of the stimulus as they impinge upon the sensory apparatus of the subject. A second dimension involves an *esthetic* appeal which may be determined in part by biological substrata, but which more likely is related to the subject's experience. Thirdly, colored stimuli appear to have *symbolic* value which will depend to some extent upon the subject's experience, but also upon the symbolic import of the stimulus within the context within which the colored stimulus is presented as well as the subject's more general cultural expectations.

Biological cue functions. It has been known for a long time that colors can serve as cues for the elicitation and direction of food seeking behavior in many organisms. Colors also provide important response-eliciting cues in mating and reproductive behavior. Thus, it is known that the male stickle-back will respond aggressively when noting the red-tinted belly and bluish-green back of an interloper in his territory. Thrushes use the orange-colored throat of their young as identifying cues, and bluejays recognize their fellow jays by their bright blue wing color (Tinbergen, 1942). Even organisms which do not have visual sense organs but which show light

sensitivity have been known to react to the color dimensions of light and dark.

Additional evidence for the biologically determined function of color comes as a byproduct of imprinting studies which show distinct gradients of color preference in newly hatched chicks, where the relevance of environmental experience can obviously be excluded (Hess & Gogel, 1954; Hess, 1956). Hess (1957) also showed that drugs such as meprobamate tended to modify and occasionally nullify imprinting operations. Schaie, Hill and McArthur (1965) have also demonstrated that color preference in visually naive newly hatched chicks can be modified by a stimulant (Meratran) or a depressant (Frenquel).

As long ago as 1810, Goethe suggested in his *Farbenlehre* (theory of color) that the biological cue function of color may be of importance in human color response. He suggests that red, yellow and orange may be described as having exciting and enlivening properties. Blue and purple, in contrast, are said to induce anxious, tender and yearning responses. Goethe's color theory is no longer claiming much attention, but it may be noted that empirical evidence is available to support his hypotheses concerned with the arousal function of various colors at least from the point of view of subjective experience as quantified by means of psychophysical judgments (Wexner, 1954; Schaie, 1961a).

Guilford (1934) maintains the view that color preference in man is innately determined and is little influenced by the environment or by learning experiences. He concludes that the affective value of color is positively related to brightness and saturation, all relations being of curvilinear form (Guilford and Smith, 1959). Although Guilford's evidence is impressive one should not infer therefrom that environmental variables are not involved in color response when instructions involve elements other than

simple preference. Indeed, there are dissenting voices, and we find Osgood (1953) boldly stating that color preference is "clearly shown to be the result of learning, slow and arduous learning at that". Guilford's position is supported also by Granger's studies (1955). The latter argues that color appreciation is dependent on an esthetic factor of a biological nature. He cites as evidence findings that there is a general order of preference for each physical attribute of color at all levels of the color solid and that the order of preference for any one attribute of color remains invariant under change in level of the other two attributes.

Goldstein (1939; 1942) provides a more direct approach to the biological function of color in men. Working with patients with organic pathology, he found that differently colored backgrounds produced different differential behavioral effects. Red backgrounds were experienced as being disagreeable, upsetting and even nauseating. Such backgrounds tended to increase symptoms such as loss of equilibrium and errors in cutaneous location. Green backgrounds on the other hand tended to reduce such symptoms. Goldstein also noted that movements were executed with more precision in green light than in red. He theorizes that color affects the whole organism and that the organism is oriented toward or away from his environment.

There is as yet no adequate knowledge of the biological variables involved in mediating color response, but it does seem likely that such variables may influence a perceptual process involved in producing reports of the subjective experience of "warm" for colors at the red end of the spectrum and of "cold" for colors at the blue end. Even without a good theoretical rationale, industrial psychologists, architects and designers have tried to maximize with some success the stimulating or inhibiting functions of various color combinations

for such purposes as the packaging of consumer goods or the manipulation of the "color environment" in the design of offices, apartment buildings, hospitals and factories (Birren, 1950).

Esthetic properties of colored stimuli. The esthetic effect of a colored stimulus differs markedly from its biologic cue function. The cue function serves to energize the primary drive, that is, the stimulus will elicit behaviors such as food-seeking, mating, defensive postures, etc. The responses elicited by the esthetic aspects of color, however, tend to be much more differentiated and variable. A painting may convey a mood of excitement or quiescence, elation or depression, happiness or distress, as well as many other moods. In addition to the mood state aroused, feelings may be elicited also which relate to perceptual, tactual or kinesthetic sensations involving complex formal attributes of the stimulus. Thus a painting may convey a feeling of lightness or happiness, depth or flatness, movement, static structure, emptiness or fullness of meaning. In fact, we may totally ignore the formal content of the painting and describe it in terms such as dull or clever, complimentary or satirical, outspoken or mysterious. It is obvious then that the complex characteristics of a work of art are not entirely determined by the colors used to compose it. But color seems to represent the emotions which are communicated even though the mediation may be confounded by other formal characteristics. It is probably the combination of color within its context which is the basis for the manyfold meanings of colors and which adds the symbolic to the affect-arousing properties of colors.

The esthetic function of a color may also be involved in arousing associations which are ordinarily mediated by other sense modalities. This function of color is probably due to the confounding of learned associations and biological properties. A well-known example of synesthetic experi-

ences mediated by color is the association of colors and music (Karwoski & Odbert, 1938). Associations have also been reported between colors and olfaction as well as between colors and tactual perception. It may be noted in this context that it is rare if any single color in isolation serves to mediate esthetic properties. Even where a single color predominates in arousing affective states, it generally does so against a background of other colors. A single hue is no more than a level on a colored continuum which attains identity by those of its aspects which distinguish it from its background. Some kinds of color combination will therefore appear more functional than others, and as a consequence will relate to dynamic personality phenomena where other combinations may be meaningless (Allen & Guilford, 1936; Woods, 1956).

Color combinations which are important as mediators of esthetic impressions are those involving color contrast, use of complimentary colors and color mixture. Such combinations will appeal to the viewer as being balanced, unbalanced or full of stress and tension. The manifold appeal of a work of art depends, therefore, not only on the affective, emotional and symbolic significance of the specific colors used, but also upon the integration and interaction of the color combinations. The significance of a single color in the combination must therefore often be assessed by its relative position since it may not possess an operationally clear absolute value. Any technique seeking to quantify response to color must deal with the confounding effect of color combinations since the complex esthetic effects of color may be of considerably greater importance than the symbolic color meanings.

Symbolic meaning of color. Every color is known to have symbolic meaning, but there are many symbol symptoms which pose difficulties by providing mutually contradictive explanations. Color symbolisms may be of a

religious or a political nature or they may serve as a status symbol. The purest expression of the symbolic value of color appears in those systems which assign a meaning which is readily apparent from properties of the class of objects or behavior symbolized. The classical color symbolism, therefore, assign red as the color of light and of blood, yellow as the color of anger and fire, black as the color of earth and depression, and white as the color of water and frost.

Similar to the interpretation of dream symbols color symbolisms are rarely constant and unambiguous. Their specific content may depend upon transient historical or cultural events even though a symbol will rarely contrast with those aspects of the affective arousal of color which constitute biological givens. It becomes clear, however, that hypotheses derived from symbolic color systems invariably involve multiple dimensions of meanings which moreover often have bipolar characteristics (Kouwer, 1949). Because of these difficulties it is generally not feasible to utilize folklore-derived hypotheses directly as a source of diagnostic statements about the meaning of response to specific colors. Instead, these hypotheses have served as an impetus for and have guided the selection of variables in a large number of laboratory studies concerned with the meaning of colors.

METHODS USED FOR THE MEASUREMENT OF RESPONSE TO COLOR

The techniques used for the measurement of color response fall into two general categories. A large number of studies associated with the measurement of color preference and the relation of meanings attributed to colors have utilized psychophysical types of experimentations and included a variety of scaling methods. Reviews of such studies may be found in Pressey (1921), Norman and Scott (1952), and Schaie and Heiss (1964). Most of these studies involve presenting to the subject some combination

of colors and/or descriptions of mood states or behavior descriptions and then performing some kind of scaling operations upon the subject's responses.

A second kind of approach represents that implicit in diagnostic personality description techniques which employ the use of color. The most well-known of such techniques is, of course, the Rorschach (Rorschach, 1942). One of the difficulties of the Rorschach's use of color, however, lies in the treatment of chromatic color as unitary stimulus material contrasted to achromatic stimuli. While there are doubtlessly some differences in responses to such a dimension, this particular classification loses sight of other basic color dimensions such as hue, saturation and brightness which are clearly relevant. The conflicting results of studies relating color response on the Rorschach to personality variables (Cerbus & Nichols, 1963) seem clearly a function of confusion introduced by the confounding of different colors.

Some tests such as the Stroop and the Goldstein-Weigel-Scheerer tests use color for contrast only but do not elicit response to color as a personality description device. Two techniques, however, seem currently available which pay attention to specific colors. One, the Luscher test, does so by the use of forced-choice color preferences. The other utilizes projective principles for inferences drawn from the interaction of color and form (Pfister, 1950). The latter technique known as the Color Pyramid Test (Schaie & Heiss, 1964) has received a good deal of psychometric attention and will be briefly described.

In the Color Pyramid Test the client is presented with a 15-field pyramid as shown in Figure 1, and a supply of colored chips in 24 different hues. The client is asked to make the pyramid as pretty as possible by filling it with colored chips and after two additional trials is then asked to make

three pyramids as ugly as possible. Color choice frequencies are recorded and the use of symmetry in placing the colored chips is analyzed. Considerable research has been conducted with this test and normative data are available which support some of the propositions to be advanced in our subsequent considerations.

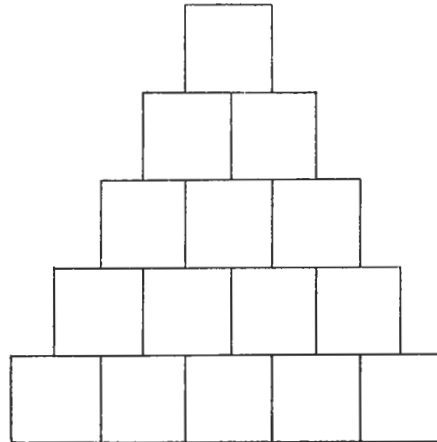


FIGURE 1. Design for the Color Pyramid Test.

RESPONSE TO COLOR AND EMOTIONAL BEHAVIOR

It has been noted that past thinking has related response to color primarily to influences regarding emotional behavior. In this context it is said that color stimuli will evoke physiological and psychological excitation as well as having mediating affective value. The three components involved may be identified by the concepts of *excitation potential*, *arousal value* and *affective content*. These dimensions may be directly related to emotional behavior described in terms of the concepts of mood state, affect and emotion. Figure 2 will identify the relationship between dimensions of color and emotional behavior. A *mood state* represents the direction of emotionality predisposing the individual's expression of his needs and feeling. Statements about such a mood state may be made on the basis of an in-

dividual's color preference in terms of the affective content of the color. This will generally relate to the dark-light or brightness continuum which appears to be isomorphic with the depression-elation continuum in an individual's mood state. A second dimension in emotional behavior may be termed *affect* and is used to describe the brief, rapidly dissipated feeling which responds to internal or external stimulation and which may be associated with intensive arousal effects. The corresponding color dimension is that of arousal value. It has been noted here that the colors at the red end of the spectrum have high arousal value while those at the blue end have low value. A third concept is that of emotion which describes a persisting state which may be associated with specific stimulus objects and contents. The corresponding color dimension is that of excitation potential; i.e., the excitation potential of a colored stimulus may be strong or weak as is the corresponding emotion. The degree of excitation potential may be associated with the saturation of the colors responded to.

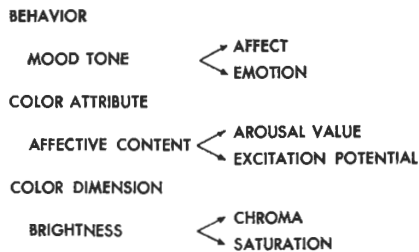


FIGURE 2. The Relationship between Dimensions of Color and Emotional Behavior.

We may now classify the attributes of various colors (and the individual's response thereto) in terms of the components of emotional structure which may be inferred therefrom. Thus, the color dimension of bright-dark becomes a representation of mood state with white representing lightness, release, unboundedness but also emptiness and lack of identification. Gray is at the intermediate point of this di-

mension representing indifference, neutrality and concealment, while black becomes a signifier of depression, constraint and inhibition. Within the polarity of mood states represented by the achromatic hues, the arousal value and associated response forms may be inferred from the particular chromatic hue which arrests the subject's attention. In this context red, orange and yellow appear to be associated with strong and immediate excitation, impulse expression and intense arousal. The arousal value of the remaining chromatic colors green, blue, purple and brown on the other hand is low but of a persistent quality. Within the group of warm colors, red as the most highly saturated hue represents the highest excitation potential and yellow the lowest. Likewise green and purple are more saturated and exceed in excitation potential that of blue and brown.

The above model suggests that the chromatic colors represent in spectral order from red to purple, the full range of emotional expression from excited, uncontrolled, immediate and externalized impulse discharge (red), through calm stability (green) to internalized, yet disturbing and driving anxiety (purple). The light-dark dimension, of course, provides some variation in attributable meaning for the hues of each color. For the lighter hues the associated mood state of lightness and elation must be considered, just as for the darker hues it would be necessary to consider their relevance to heaviness and depression.

A large amount of data is available in the literature which will support the notions presented above. Table I presents a summary of a dozen of studies attempting to identify the affective meanings found to be ascribed to various colors and it can be seen that our conceptual scheme is well supported by these findings. Moreover, there are a number of clinical studies using the Color Pyramid Test which provide additional evidence. Thus, above average red scores have been

found in men who have committed aggressive sexual offenses (Siedow, 1958), while high yellow scores have been found in high performers and goal directed subjects. Thus, preference for red seems to be associated with uncontrolled acting-out behavior while preference for yellow goes along with out-going but well-controlled modes of expression. Evidence for the cool colors as being involved in rational modes of affect control is found in studies showing lower blue choices by mentally defective boys (Schaie, 1962) and by normal adults during an artificially induced hallucinatory state (Lienert, 1960). The association of purple with strong internalization of affect, anxiety and tension seems supported by findings of elevated purple in a number of psychopathological groups (Frohoff, 1953; O'Reilly et al, 1957). Other numerous associations between color preferences and emotional behavior have been given elsewhere (Schaie & Heiss, 1964).

It seems evident then that the use of response to color for diagnostic purposes is best supported in describing the emotional aspects of personality. It should be recognized, however, that other than emotional meanings may be associated to different colors. Color symbolism, folklore, and artistic productions indeed suggest that other meanings are often associated. Such meanings, however, are secondary and are derived from primary and purely emotional associations.

RESPONSE TO COLOR AND PERSONALITY DIFFERENTIATION

When a client is exposed to a variety of colored materials, it is possible to do more than to attend to the absolute frequencies with which certain colors are responded to. We can note, for example, the client's tendency to attend to or avoid certain colors, to choose or avoid such colors consistently, and to shift his attention from certain colors to others. Depending upon the behavior seen, we may infer that a wide breadth of color

arousal mediated by the colors but he choice reflects an intensive interaction between the multiplicity of external stimuli and varied forms of emotional response. In children such a response is unremarkable but when found in adolescents or adults, then infantile impulsivity and lack of personality differentiation might be suspected. A client who avoids use of one or two colors out of a wide array provides evidence of increased differentiation and restriction of his stimulus receptivity. Such a response no longer denotes the presence of uncritical or undifferentiated attention to external stimuli. On the other hand individuals who are able to make use of only a few colors out of a wide array are likely to show either shallow personality development or identify individuals where emotional disturbance has led to the establishment of withdrawal and inhibition as primary defense mechanisms. We are thus able to infer diffused, differentiated and restricted psychological experience from the individual's response to colored material. Similarly, it may be possible to infer from the individual's changes in color preferences over a series of trials whether his color choice is indicative of emotional lability, flexibility or pathologically rigid response tendencies. Figure 3 summarizes an appropriate conceptual scheme.

Information about an individual's personality differentiation may also be gleaned from his use of structure in a color arrangement task. On the Color Pyramid Test it is possible to arrange colored chips either by attending exclusively to the colored aspects of the stimuli or by using the structural aspects of the pyramidal surface. It has been noted that individuals who arrange colors randomly and without attending to structure are likely to have rather undifferentiated personality patterns. A transitional form is represented by subjects who use colors to differentiate the rows of the pyramidal surface. This kind of person is able to escape the strong pull of the

TABLE I—Affective Meaning Found to Be Ascribed to Various Colors

Study	Red	Orange	Yellow	Green	Blue	Purple	Black	White	Brown
Hevner (1935)	Happiness, restlessness, agitation				dignity, sadness, tenderness				
Lewinski (1938)	stimulating, hot	stimulating, hot, un- pleasant	stimulating, most un- pleasant		most pleas- ant, cool	depressing			
Karwoski (1938)	exciting	exciting	exciting	leisurely	leisurely	vigorous	sad	solemn	sad
Alschuler (1943)	affection and love, or aggression and hate	tempered or emotions	controlled emotionality	controlled emotionality	drives toward control		intense anxieties, fears		
Schachtel (1943)	striking, exciting, explosive	warmth, delight	serene, cheerfulness, envy						
Bricks (1944)	hostility, aggression		hostility, aggression				depression		
Kouwer (1949)	active, intense	merry		youthful	social	disagree- able, sad	sad, vague, disagree- able	pure, spirited	disagree- able
Napoli (1951)				controlled emotionality	security, drive	deep but optimistic, depression	evasion, fear, depression		
Wexner (1954)	exciting, stimulating	disturbed, distressed, upset	cheerful, joyful, joyful		secure, comfort- able, tender, soothing	dignified, stately	powerful, strong, masterful		

TABLE 1-- (continued)

Study	Red	Orange	Yellow	Green	Blue	Purple	Black	White	Brown
Murray (1957)	exciting, stimulating, defiant, contrary, hostile, powerful, strong, masterful	secure, comfortable, soothing, calm, peaceful, serene	cheerful, jovial, joyful	young, ill, fresh	tender, full, great, deep	despondent, dejected, melancholy, unhappy			
Hofstatter (1958)	strong, active, full	happy				full	deep, strong, great, old, sad	empty	full
Schaie (1961)	protective, exciting, powerful, strong, masterful, defending, stimulating	exciting, stimulating	exciting, stimulating, cheerful, jovial, joyful, pleasant		pleasant, secure, comfortable, tender, soothing	dignified, stately	distressed, disturbed, upset, defiant, contrary, hostile, dignified, stately, powerful, strong, masterful, despondent, dejected, melancholy, unhappy	tender, soothing	secure, comfortable

		Constancy of Color Choice		
		LABILE	FLEXIBLE	CONSTANT
Breadth of Color Choice	RESTRICTED	CONSTRUCTED UNSTABLE PERSONALITY Frequently found in color response of neurotics and schizophrenics	CAUTIOUS AND INHIBITED BEHAVIOR	SEVERELY INHIBITED AND CONSTRICTED PERSONALITY Found in neurotics and transient personality disturbances
	MODERATE	SOMEWHAT UNSTABLE, MODERATELY WELL DIFFERENTIATED Normal behavior pattern	AVERAGE EMOTIONAL ADJUSTMENT Typical normal pattern of personality differentiation	PERSONALITY DIFFERENTIATION ACHIEVED BY REPRESSION OR SUBLIMATION OF EMOTIONAL NEEDS Normal behavior Pattern
	WIDE	EMOTIONALLY LABILE UNRELIABLE UNSTABLE Found in creative artists and character disorders	OPTIMAL PERSONALITY DIFFERENTIATION WITHOUT CONSTRICTION Mature behavior	IMMATURE AND PERSEVERATIVE BEHAVIOR Normal in children but indication of emotional retardation in adults.

FIGURE 3. The relation between personality differentiation and the Breadth and Constancy of Color Choice.

must do so with very limited and restricted response. Finally the individual who is able to arrange some kind of symmetric configuration out of the colors with very limited attention to the colors as such represents the image of a well-differentiated individual. Figure 4 illustrates response patterns exhibited by individuals at different levels of personality differentiation.

COLOR PREFERENCES AND OBSERVABLE BEHAVIOR TRAITS

Thus far we have considered the use of colored stimulus material in terms of its mediating properties as applying to the influence of emotional behavior and matters such as personality differentiation. We may now shift our attention to the use of colored stimuli as a source of test material in terms of the kind of notions as to the unimportance of item content which have been proposed by Berg (1959). Since it has been shown that substantial individual differences occur in response to color above and beyond the stable associations produced by groups, it becomes feasible to use scores derived from performance on color tests as predictor variables in the actuarial description of observable behavior

traits. As an example of such use, we have obtained regression equations linking scores on the Color Pyramid Test with behavior ratings on the 42 traits contained in Cattell's "normal trait sphere" made by classroom teachers for their pupils. Significant correlations can be found for each scoring variable on the Color Pyramid Test with one or more of the 42 behavior traits. Figure 5 gives an example of such a predictive formula for boys and girls and illustrates the existence of distinct relationships for the two sexes.³ We have applied these regression equations to predict the observable behavior of children in a school for mental defectives with validities in the form of tetrachoric correlations ranging from .18 to .91 for the 42 traits with a mean validity coefficient of .56 (Schaie & Heiss, 1964). Other studies are currently in progress to validate our prediction equations with normal school children.

³ Values entered in prediction equations are frequencies of color choice and other scores on the pretty and ugly pyramids of the CPT. The criterion score is expressed in T score form with a high score in the socially desirable direction.

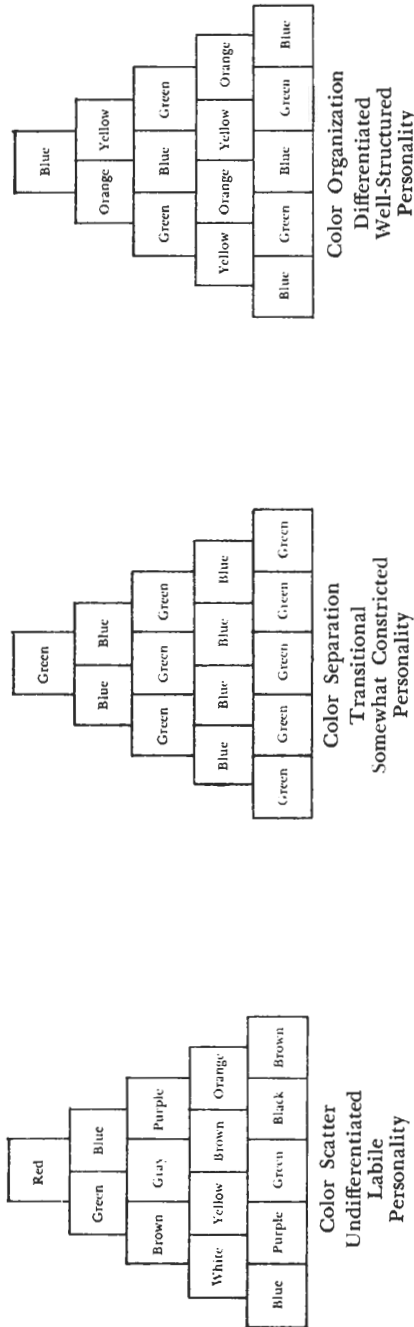


FIGURE 4. The Relationship between Personality and Color-form Interaction.

Equation to predict standing on behavior trait:

TALKATIVE-SILENT

Criterion group: 6-9 year-old boys
 7 p Red -11p Green + 12 p Purple -9p
 Brown +2u Red -3u Green +3u Blue +
 7u Grey -5uCS -28u MiS + 484 (R = .71)

Criterion Group: 6-9 year-old girls
 8p Orange + 4p Yellow -5p Purple +10p
 Brown -12p Grey -17p Black +11u Orange
 +5u Green +2u Brown +3u Grey -3u Black
 +12p MiS -6u MiS +21u MaS + 6u AS
 + 359 (R = .61)

FIGURE 5. Examples of Prediction Equations Linking Response to Color and Observable Behavior Traits.

SOME IMPLICATIONS FOR CLINICAL AND RESEARCH APPLICATION

It has been suggested in our preceding discussion that there are stable relationships between responses to colored stimuli and a number of personality dimensions of interest to the researcher and clinician. Techniques involving the use of colored stimulus material not only have the merit of being capable of rather precise quantification, but they also provide truly objective measurement techniques in that very few subjects are able to falsify their self-report when engaged in a color arrangement task. As was noted, the kind of symbolic color associations which might be available to the subject, are too ambiguous to aid him in determining a socially desirable, "healthy", or "disturbed" response pattern. Most subjects respond to color arrangement or color preference tasks quite readily and they are thus suitable for work with reluctant and hostile clients. It should also be noted that any verbal instructions required for a color response task can be conveyed by pantomime if required, and that we have material here which is most suitable for cross-cultural explorations. As we have stated previously, the response to non-object related colored stimulus material is not likely to be in terms of dimensions involving cultural variation. Research findings, moreover, sug-

gest non-random responses to colored stimulus material by children as young as 4 years of age. It may therefore be suggested that such material should be immensely useful also for developmental studies both of a cross-sectional and longitudinal nature.

REFERENCES

- Allen, E. C. & Guilford, J. P. Factors determining the affective value of colors and combination. *Amer. J. Psychol.*, 1936, 48, 643-648.
- Berg, I. A. The unimportance of test item content. In: Bass, B. M. & Berg, I. A. (Eds.) *Objective approaches to personality assessment*. Princeton: Van Nostrand, 1959.
- Birren, F. *Color psychology and color therapy*. New York: McGraw-Hill, 1950.
- Bricks, M. Mental hygiene value of children's art work. *Amer. J. Orthopsychiat.*, 1944, 14, 136-146.
- Cerbus, G. & Nichols, R. C. Personality variables and response to color. *Psychol. Bull.*, 1963, 60, 566-575.
- Frohoff, W. Untersuchungen mit dem Farbpyramidentest bei Schizophrenen. (Studies of the Color Pyramid Test in schizophrenics.) *Z. exp. angew. Psychol.*, 1953, 1, 145-181.
- Goethe, J. W. Von. *Naturwissenschaftliche Schriften, Volume 1. Zur Farbenlehre; Didaktischer Theil*. (Essays on Natural Science, Volume 1, On the theory of color; Didactic part.) Weimar: Bohlau, 1890.
- Goldstein, K. *The organism*. New York: American Book Company, 1939.
- Goldstein, K. Some experimental observations concerning the influence of colors on the function of the organism. *Occup. Ther.*, 1942, 21, 147-151.
- Granger, G. W. An experimental study of color preferences. *J. gener. Psychol.*, 1955, 52, 3-20.
- Guilford, J. P. The affective value of color as a function of hue, tint, and chroma. *J. exp. Psychol.*, 1934, 17, 342-370.
- Guilford, J. P. & Smith, Patricia C. A system of color preferences. *Amer. J. Psychol.*, 1959, 72, 487-502.
- Hess, E. H. Natural preferences of chicks and ducklings for objects of different colors. *Psych. Rep.*, 1956, 2, 477-483.
- Hess, E. H. Effects of meprobamate on imprinting in water fowl. *Ann. N.Y. Acad. Sci.*, 1957, 65, 258-268.
- Hess, E. H. & Gogel, W. C. Natural preferences of the chick for objects of different colors. *J. Psychol.*, 1954, 38, 483-493.
- Hevner, K. Experimental studies of the affective value of colors and lines. *J. appl. Psychol.*, 1935, 19, 385-398.
- Hofstaetter, P. R. & Lubbert, H. Die Eindrucksqualitaeten von Farben. (Factors in the subjective impression of colors.) *Z. Diagn. Psychol. Prefschg.*, 1958, 6, 211-227.
- Karwoski, T. F. & Odber, H. S. Color music. *Psychol. Monogr.*, 1938, 50, Whole No. 2.
- Kouwer, B. J. *Colors and their character*. The Hague: Martinus Nijhoff, 1949.
- Lewinski, R. H. An investigation of individual responses to chromatic illumination. *J. psychol.*, 1938, 6, 155-160.
- Lienert, G. H. Die Farbwahl im Farbpyramidentest unter Lysergsaurediätylamid (LSD). (Color choice in the color pyramid test under the influence of lysergic acid (LSD).) *Z. exp. angew. Psychol.*, 1960, 8, 110-121.
- Murray, D. C. & Deabler, H. L. Colors and mood tones. *J. appl. Psychol.*, 1957, 41, 279-283.
- Napoli, P. J. Fingerpainting. In: Anderson, H. H. & Anderson, G. L. *An introduction to projective techniques*. New York: Prentice-Hall, 1951.
- Norman, R. D. & Scott, W. A. Color and Affect: A review and semantic evaluation. *J. gen. Psychol.*, 1952, 46, 185-223.
- O'Reilly, P. O., Holtzinger, R., & Blewett, D. The Pfister Color Pyramid Test. *J. nerv. ment. Dis.*, 1957, 125, 385-387.
- Osgood, C. E. *Method and theory in experimental psychology*. New York: Oxford University Press, 1953.
- Pfister, M. Der Farbpyramidentest. (The Color Pyramid Test) *Psychol. Rdsch.*, 1950, 1, 192-194.
- Pressey, S. L. The influence of color upon mental and motor efficiency. *Amer. J. Psychol.*, 1921, 32, 326-356.
- Rorschach, H. *Psychodiagnostics: A diagnostic test based on perception*. New York: Grune & Stratton, 1942.
- Schachtel, E. G. On color and affect. *Psychiat.*, 1943, 6, 393-409.
- Schaie, K. W. Scaling the association between colors and mood tones. *Amer. J. Psychol.*, 1961, 74, 266-273 (a).
- Schaie, K. W. A Q-sort study of color-mood association. *J. proj. Tech.*, 1961, 25, 341-346.
- Schaie, K. W. The performance of mentally defective children on the Color Pyramid Test. *J. proj. Tech.*, 1962, 26, 447-454.
- Schaie, K. W. The color pyramid test: A non-verbal technique for personality assessment. *Psychol. Bull.*, 1963, 60, 530-547.
- Schaie, K. W. & Heiss, R. *Color and Personality*. Berne & New York: Huber and Grune & Stratton, 1964.
- Schaie, K. W., Hill, Carmen R., & McArthur, Jane. Modifying the color preference of newly hatched chicks. Unpubl. Mss. West Virginia University, 1965.
- Siedow, H. Untersuchungen mit dem Farb-

pyramidentest an Psychopathischen Personenlichkeiten. (Studies of the Color Pyramid Test on psychopathic personalities) *Z. diagnost. Psychol.*, 1958, 6, 18-38.

Tinbergen, N. An objective study of the innate behavior of animals. *Bibliothèque biographique*, 1942, 1, Part II, 39-98.

Tinbergen, N. Social releasers and the experimental method required for their study. *Wilson Bull.*, 1948, 60, 6-51.

Wexner, Lois B. The degree to which colors

(hues) are associated with mood tones. *J. appl. Psychol.*, 1954, 38, 432-435.

Woods, W. A. Some determinants of attitudes towards color in combination. *Percept. mot. Skills*, 1956, 6, 187-193.

K. Warner Schaie
Dept. of Psychology
West Virginia University
Morgantown, West Virginia 26506

Received August 8, 1966