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ABSTRACT

The purpose of the study was to experimentally determine if the attribution of positive or negative social values is associated with particular colors. The subjects were 76 four-and five-year old females drawn from six privately owned kindergartens and nurseries. The children were randomly assigned to one of two groups. In the control group, color preference was established by presenting each child with circles of each of the five colors: red, blue, yellow, black, and white, and asking them to select the color of their choice. The children in the experimental group were individually presented with dog caricatures of each of the five colors. Each child was then told a story about either a good or a bad dog and then asked to select which of the dogs she thought was the good or bad dog. These stories were presented to each child in a counter-balanced order. A Bayesian statistical analysis revealed that attribution of good or bad is strongly dependent on color. Attribution of good is associated with the colors red and white; the attribution of bad is associated with black. However, comparison of attribution of good and bad with color preference revealed that attribution of good was highly dependent upon color preference whereas attribution of bad was not. (Author)

The Relationships of Color to the Attribution of Positive or Negative Affect

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Running Head: Color attribution

The Relationship of Color to the Attribution of Positive or Negative Affect

Young children have been an interesting source for study of color perception and preference. Studies in color preference have been popular because it has been demonstrated that they provide an indication of the child's level of maturity, personality organization, and intellectual functioning. Alschuler and Hattwick (1947) found that children who emphasize color instead of line and form have a predominantly emotional rather than rational orientation. During the preschool years, when the child grows from impulsiveness toward reasoning and emotional control, he becomes more attracted to colors on the blue end of the spectrum.

These findings parallel Birren's (1945) findings in which he stated that with maturity children prefer hues of shorter wavelength (blue,green) over hues of longer wavelength (red, orange). When measured by eye fixation, babies prefer red first, then yellow, green, and blue. As the child grows older, his preference seems to become red, blue, green, violet, orange, and yellow.

Color may also arouse strong feelings of synesthesia such as temperature (cold or warm), weight (heavy or light), and smell (fresh or musty). As most children grow older, they learn through common experiences to associate "red with fire, blood, and danger; blue with cool rivers and lakes; orange and yellow with sunlight and comfortable warmth" (Anastasi 1964, p. 292).

While children's affective responses to color have frequently been studied, few studies have been conducted attempting to investigate the relationship between color and the attribution of positive or negative responses. However, several studies have been conducted which attempted to investigate the relationship which may exist between color perception and the formation of racial

attitudes. Williams and McMurtry (1970) presented subjects with five race related colors (red, yellow, brown, black, and white), and they found a strong tendancy among 13 year olds as well as college students to associate positive adjectives with the color white and negative adjectives with the color black.

Williams' (1964) study also suggests that there is a relationship between color and the formation of racial prejudice. Using a semantic differential procedure, Williams asked both Caucasian and Negro subjects to evaluate the colors black and white. Both Caucasian and Negro subjects exhibited a significantly more positive evaluation of the color name white than of the color name black. He feels that the strong evaluative meanings associated with specific colors are closely tied to the formation of racial prejudice by children. However, it is difficult to determine whether the evaluative meaning associated with a particular color promotes the formation of racial attitudes or if racial attitude is a variable in the formation of evaluative meanings associated with color.

Aside from studies investigating the formation of racial attitudes, few studies have investigated the relationship color perception may have upon attribution in general. In a direct attempt to investigate the relationship between color and attribution of good and bad, Bazzeo (1972) tested the hypothesis that chromatic diversity alone is a variable in making positive or negative attributions. She presented children with a picture of six identical dogs: five were red and one was blue. The children were told a story about a dog who entered a room and caused some damage, and then the children were asked to choose, from the six colored dogs, the one responsible for the damage. The children consistently chose the blue dog. However, in determining why the damage in the room was attributed to the blue dog, it is difficult to tell if the attribution was a function of chromatic diversity alone or if the attribution was a function of the colors blue and red themselves. In other words,

the frequency of presentation of the two colors was not controlled and therefore represents a rival hypothesis for explaining Bazzeo's results. It is the purpose of the present study to determine if children attribute positive or negative social values with any particular color irrespective of the frequency of each color being presented.

Method

Subject

Seventy-six female subjects were drawn from six privately owned middle-class kindergartens and nurseries. Four and five year old females were solicited for the study, but only those 76 children who secured written parental permission were allowed to participate. The ages of the children ranged from 41 months to 79 months with a mean age of 60.5 months. Six subjects were excluded from this computation, because the experimenters received incorrect birthdates for those subjects. Only female subjects were used in this study to avoid differences in attribution due to sex; also, as Anyan and Quillian (1971) report, between the ages of five and six, little girls discriminate color more accurately than little boys of the same age.

Apparatus

Five 3" diameter colored circles, each displaying a different color, were cut from posterborad. The primary colors--red, blue, and yellow were used in addition to black and white. (Black and white were used to provide neutral contrast). These circles were used to establish baseline data.

The apparatus used to obtain experimental data consisted of caricatures of dogs cut from posterboard. The dogs did not depict any particular species and were all identical in appearance except that each dog represented one of five different color--red, blue, yellow, black, and white.

Procedure

Seventy-six children were randomly assigned to either Group I (to obtain baseline data), Group II (to obtain experimental data).. The experimenters were two females. Subjects were tested at their respective schools; each subject was tested individually by a single experimenter in a private room. The 38 children comprising Group I were individually shown the colored circles and simultaneously asked "Which color do you like best?" The colored circles were randomly arranged for each child. This data was obtained in order to establish color preference for the subjects.

The 38 children comprising Group II were tested using the colored dogs. The dogs were randomly placed in front of each child. Nineteen randomly chosen children from this group were told a stody about a "good" dog who played with children, sat in children's laps, and did tricks for children. Then each child was asked "Which dog do you think is the good dog?" The same child was then told a story about a "bad" dog who knocked children down, bit children, and chased children. Then the child was asked "Which dog do you think is the bad dog?"

The remaining 19 children went through the same procedure except that the "bad" story preceded the "good" story. This counterbalancing technique was used to prevent sequencing errors which might have resulted from the order in which the stories were told.

Results

The frequency of preference for each color was tabulated and converted to a percentage of total responses for each group of subjects. Table 1 depicts these responses. As shown in Table 1, children respectively prefer red, blue, yellow, white, and black. The color preference for red found for Group I, parallels Sharpe's (1974) study in which she found children at an impulsive stage prefer red. Observations suggest that four to five year olds are still largely in the warm color preference category with red as the most popular color and

blue and green sharing second place. Sharpe also supports the general finding of greater female preference for warm colors and male preference for cool colors.

The percentage responses for Group II, depicted in table 1, reveal that the presence of positive and negative social stimuli does influence childrens color preferences. When children were presented with a distinctly positive stimulus (the "good dog" story), children chose the red dog more often than any of the other four dogs. When a distinctly negative stimulus (the "bad dog" story) was presented, the children chose the black dog more often than any of the other four dogs.

A Bayesian statistical analysis for a two-by-k contingency table was computed between frequency of responses to "good" and "bad" stories for Group II subjects to determine if attribution of good and bad is dependent upon color. A liklihood ratio of $L = 3.34 \times 10^{-7}$ was obtained, indicating that the null hypothesis can be rejected, i.e. attribution of good and bad is not independent of color. A second liklihood ratio was computed to determine if attribution of good and simple color preference is differentially dependent upon different colors. The ratio was computed between simple color preference for Group I subjects and the colors which children in Group II associated with the "good dog" story. The ratio obtained was $L = 3.14$; this does not permit rejecting the null hypothesis. In other words, there does not appear to be a significant difference between attribution of good to a color and color preference as a function of color; attribution of good to a specific color appears to be a function of preferred color.

A third liklihood ratio was computed to determine if attribution of bad and simple color preference is differentially dependent on different colors. The ratio was computed between simple color preference for Group I subjects and the colors which children in Group II associated with the "bad dog" story. The liklihood ratio was $L = 9.66 \times 10^{-12}$, which indicates rejection of the null

hypothesis, i.e. there is a significant difference between attribution of bad and color preference. Attribution of bad to a color is not a function of color preference, but seems to be governed more by the color associated with a "bad" stimulus.

Discussion

The results of this study have revealed that the attribution of good or bad is dependent upon color and that the attribution of good to a stimulus is a function of color preference while the attribution of bad to a stimulus is not. Children's predominant attribution of good to the preferred color red and their attribution of bad to black may be a function of the interaction of many environmental variables e.g. television, existing social attitudes and expectations, etc. This seems to be particularly true for the attribution of bad to the color black. In cartoons for children, the "bad guy" almost always wears a black hat. There is also an association between black and dirt as seen in the expression "the child's hands were black as dirt." A child may also associate black with a fear of darkness, thereby giving black a bad connotation. The Wordless Book is another example of bad being attributed to black. Each of the five colored pages in the book is used to illustrate a particular religious concept; the black page represents sin.

It has been hypothesized by Renninger and Williams (1966) that the attribution of positive or negative affect to color appears to develop early in life, during the third, fourth and fifth years, and may influence a child's formation of social attitudes. This hypothesis is strongly supported by the research conducted by Williams and McMurtry (1970) as previously mentioned in the introduction. Also, Williams (1969) reported a significant positive correlation between skin color, as reflected in color code names of black and brown, and attitude toward Negro people.

It is interesting to note that in this study, two of the subjects were black,

and they also associated the "bad dog" story with the black dog. Consequently, the attribution of bad to the color black seems to be a consistant mode of response.

The tendency to associate the color black with negative evaluations also appears to transcend cultural boundaries. Williams, Morland, and Underwood (1970) found that cross cultural color ratings obtained from children in Germany Denmark, Hong Kong, and India were similar to those found in the United States. While minor differences did exist in reference to positive and negative associations, white was more consistently positive, and black was more consistently negative.

The failure to find a difference between color preference and attribution of good to a specific color, suggests that attribution of good is a function of preferred color i.e. the children associated the red dog with the good actions simply because they preferred red. This process of labeling color preferences as being "good" can be seen as a manifestation of consisting theory. The dog performed a good deed (+) and the color red is positive (+), therefore, it must be the red dog that performed the act. This phenomenon is often experience in social situations when we assume people who are attractive to us must be "good", or similar to ourselves.

There are many potential applications of this research, expecially in the area of child attitude formation. At present, the results are only generalizable to preschool aged females, but the results may be similar in regard to young males. The differences in color attribution which might arise from sex differences and/or sociocultural variables offers a potentially fruitful research area to both child and social psychologists.

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Table 1

Percentage Responses for Preference and Attribution Tests

	Preferences	Attributions	
	Group I	Group II	
Colors		Good	Bad
Black	0.00	10.53	71.05
White	7.89	15.79	5.26
Yellow	15.79	15.79	13.16
Red	44.74	34.21	0.00
Blue	31.58	23.68	10.53