



Effect of Temperament on Propensity to Circumstantiality of Color and Potential Application in Military Personnel

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Abstract

Background: People with various mental and physical features show different favorites to colors. The relationship between individual features of humans and their propensities to circumstantiality of color have been evaluated in psychological discussions. According to the generality of concept of temperament and covering physical and mental features of people, it seems that a significant relationship can be obtained between temperamental difference of people and their propensities to circumstantiality of color.

Methods: Temperaments of 100 visitors to traditional medicine clinics at Tehran University were identified by the method of doctor checkup and temperament-assessment questionnaire. Their propensities to 3 components of coldness and warmth of colors, light and darkness of color, and contrast or uniformity in the arrangement of colors next to each other in both fields of colors selection and spaces selection with different tonality were obtained by the questionnaire of assessment of temperament

Results: In total, 100 responders with an average age of 27 years old, 42% male, and 57% female completed the questionnaire. Wet temperaments have more propensity to light colors (significant difference: $P = 0.001$) and also spaces with light tonality than dry temperaments (significant difference: $P = 0.008$). Warm temperaments have a higher interest to warm colors than cold temperaments (significant difference: $P = 0.019$); however, they prefer spaces with cold tonality (significant difference: $P = 0.002$). There was no significant relationship between temperamental groups and propensity to spaces with arrangement of harmonious or opposite colors beside each other.

Conclusions: There is a significant relationship between temperamental differences of people and their propensity to circumstantiality of color. Wetness or dryness of temperament is effective on circumstantiality of lightness and darkness of color and warmth and coldness of temperament is effective on propensity to warmth and coldness of the color. Attention to temperamental propensities of people in propensity to colors can improve the quality of human made physical environment and create human-based and sedative space.

Keywords: Temperament, Color, Environment

1. Background

Humans with different spiritual, physical, and behavioral features show various propensities to physical components of the environment. One of the most important and effective environmental components is color. In all non-verbal forms and communications, color is one of the quickest methods of transmission of messages and meanings. Among types of messages, color is strongly in communication with all human feelings (1). Temperament is one of the main concepts of medical doctrine of Iranians traditional medicine which includes temper and physical characteristics of each person and provides a systematic division of humans based on indexes of coldness, warmth, wetness, and dryness (2). Temperament is specified based

on different indexes such as physique, touch, sleep, hair, fecal material from the body, and more (3). Due to the fact that ignoring effect of users' temperament in determination of their favorite color has led to lack of people's fixation and satisfaction from many of their used environmental spaces, the effect of human's temperament on propensity to color circumstantiality has been considered. This research is trying to find the relationship between human's temperamental differences and propensity to color circumstantiality as an environmental component. The world that we observe has been formed from 2 important visual elements of form and color, which are both correlative to each other. Each creature that is seen first is felt in terms of form and size and then is considered while it has a coverage of color (4). The amount of attraction and repul-

sion is different for people. In modern psychology, colors are considered as one of the criteria of evaluation of personality due to the fact that each one of them makes a specific spiritual and physical effect in a person (5). Environmental psychologists and chromatics believe that people's propensities about colors will partly be related to their personality. Interest in colors can change during the time that shows changes. The component of color has different characters, that in this research 3 factors of bold and the pale degree, coldness and warmth of color and way of placing them beside each other are evaluated. Boldness and the pallor indicate the blackness and white or in other words lightness and darkness of it (6). Division of cold and warm colors is based on the wavelength. Cold colors has a lower wavelength than the warm colors, creates relaxing space, are thought-provoking, and inducer of cold due to the fact that the source of their creation in the nature is water, ice, and moonlight. The blue color is the main representative of the cold colors. Warm colors have more wavelength than the cold colors, create more exciting space, and are inducers of warmth (7). Another property that can be evaluated about peoples' propensity to colors is the way of placing beside each other. Colors can be placed beside each other in a same color spectrum and arranged in conflict with each other. When it is spoken about colors harmony, usually the judge is formed on the mutual effect and operation of 2 or more numbers of color. Different experiences and experiments regarding mental correspondence of colors show that people have different points of view about the harmony or disharmony of colors. Often in people's opinion, the harmonious colors are those that are from a family or show off with the same parade while diversity or colors are placed beside each other without conflict. Generally, the topic of harmony or disharmony is only in relation to human feelings that is propounded as to be desirable or not and attractive or not (4). Furthermore, it should be noted that the selected color is used for which product and in which place (8).

2. Methods

The propounded hypothesis was based on the fact that peoples' temperamental differences cause their different propensities to different color circumstantiality. Temperament is the human grouping in Iranian traditional medicine, which includes psychological and physical characteristics of each person based on body indexes (2). In this regard, people's temperaments and their propensities to different colors should be evaluated. To reach 100 individuals with similar temperamental distributions (25 people of each temperament), temperaments of 154 visitors to clinic of traditional medicine at Tehran University

who were willing to cooperate were determined during 5 days by the temperament-identification questionnaire and physical checkup. They were identified by: 25 people with cold and dry temperament (CD temperament), 35 people with cold and wet temperament (CW temperament), 39 people with warm and wet temperament (WW temperament), and 55 people with warm and dry temperament (WD temperament). A total of 25 people were selected among temperaments of CD, WW, WD, and finally the 100 resulted people were evaluated as the study samples. The propensities of under studied people to color circumstantiality were evaluated by using the questionnaire of evaluating colors (researcher-made). The validity and reliability of the questionnaire were emphasized in the initial research ($\alpha = 0.78$).

The temperament-identification questionnaire includes 32 questions that was prepared in 4 parts of 8 questions and each part has measured as: 1 of parameters of coldness-warmth, wetness, and dryness. The questionnaire of determination of person's propensity to circumstantiality of color including components of coldness and warmth of color, lightness and darkness of color, and also contrast or uniformity in the arrangement of colors next to each other. According to the issue that people's interests in colors may be affected by way of using color, for more accurate and more operational evaluation, these concepts were asked in this questionnaire in 2 different fields, first without considering usage and status of using colors and second about architectural spaces. Questions of the questionnaire included 17 questions related to color preferences, where 7 questions that had been designed about propensity to color without considering its usage and 10 questions had been designed in the field of architectural spaces.

Data of both questionnaires were analyzed by BMI SPSS 22 software and significance and type of relationship between the intended components were tested. The significance level was considered $\alpha < 0.05$.

3. Results

In total, 100 people with same temperamental distribution (25 people of each one of synthetic temperaments), an age average of 27 years old, and with a gender of 42% male and 57% female completed the questionnaire. Differences were obtained significant between selection of 4 temperamental group regarding coldness and warmth of color spectrum as well as darkness and lightness of color in 2 fields of single-color and colorful spaces; however, regarding the component of contrast or uniformity in the arrangement of colors next to each other, no significant dif-

ference was obtained among selection of people with various temperaments.

3.1. Component of Darkness and Lightness of Color

The difference between propensity of temperamental groups based on wetness and dryness of the temperament (temperaments of CD and WD against CW and WW) to quality of darkness-lightness of color in both fields of selecting single-color and selecting colorful spaces was obtained significant; however, there was no significant relationship between propensity of temperamental groups based on warmth and coldness of temperament (temperaments of WW and WD against temperaments of CW and CD) to quality of darkness and lightness of color.

Comparison of propensity of 4 synthetic temperaments showed that temperaments of CD, WD, CW, and WW, respectively, have the most propensity to dark colors. There is the same order for the 4 temperaments regarding people's propensity with various temperaments to spaces with dark or light tonality. [Figure 1](#) shows propensity of temperaments based on wetness and dryness as well as coldness and warmth to darkness and lightness component in both fields.

3.2. Component of Coldness and Warmth of Color Spectrum

The difference was not obtained significant between propensity of temperamental groups based on wetness and dryness of the temperament (temperaments of CD and WD against CW and WW) to quality of darkness-lightness of color in both fields; however, there was a significant relationship between propensity of temperamental groups based on warmth and coldness of temperament (temperaments of WW and WD against temperaments of CW and CD) to quality of darkness and lightness of color in both fields of selecting single-color and selecting colorful spaces.

Comparison of propensity of 4 synthetic temperaments to cold and warm colors showed that temperaments of WW, WD, CW, and CD, respectively, have the most propensity to warm colors. The inverse order of above was obtained for propensity of the 4 temperamental groups to spaces with cold and warm tonality. Temperaments of CD, CW, WD, and WW, respectively had the most propensity to spaces with warm tonality. [Figure 2](#) shows propensity of temperaments based on coldness and warmth as well as wetness and dryness of temperament to warm and cold colors in the both fields.

3.3. Component of Contrast in the Arrangement of Colors Next to Each Other

The relationship did not reach the significant level between propensity of temperamental groups based on wet-

ness and dryness of the temperament (temperaments of CD and WD against CW and WW) and also warmth and coldness of temperament (temperaments of WW and WD against temperaments of CW and CD). Furthermore, their propensities were not obtained significant to contrast or integration in the arrangement of colors next to each other in the selection of colorful spaces.

4. Discussion

This research has evaluated the amount of peoples' propensity with different temperaments to different color circumstantiality for the first time. The evaluated hypothesis was confirmed based on results of the research. By evaluation of propensities of 4 responder temperaments to color circumstantiality, the 2 temperaments of WW and CD had the most difference in the selection compared with other temperaments in both fields of the selection of single-color and colorful spaces. This difference was obtained significant in both circumstantiality of darkness-lightness and coldness-warmth of color in both fields of selection of single-color and colorful spaces.

Placing 2 temperaments of WW and CD as the completely temperaments in terms of temperamental components in the both heads of the range shows the direct effect of temperamental differences on propensity to qualitative indexes of color and because these 2 temperaments have a perceptible difference in their selection, the differences were obtained significant. According to propensities of temperamental groups to color circumstantiality, the relationship has been analyzed between components of temperament and peoples' propensities.

4.1. Component of Darkness and Lightness of Color

According to the significant difference of propensity of 2 temperamental groups of wet and dry to quality of darkness and lightness of color in the both fields of selection of single-color and colorful spaces, order of propensity of temperaments to dark colors, and a space with dark tonality as CD, WD, CW, and WW it can be said that dry temperaments have more propensity to dark colors and spaces with dark tonality than the wet temperaments. The wet temperaments have more propensity to light colors and spaces with light tonality. Therefore, the factor of dryness and wetness of temperament can be known as an effective factor in peoples' propensity to quality of darkness and lightness of color in the both evaluated fields.

Life, flexibility, and vitality are features of the wet temperaments while people with dry temperament accept laws more and are more invincible (9, 10). In this regard, it seems that people's propensity with wet and dry temperaments to darkness and lightness of colors is in line with

Figure 1. Comparison of Propensity of Warm and Cold Temperaments and Wet and Dry Temperaments to Quality of Darkness and Lightness of Color

Field	Difference between propensity of hot and cold temperaments		Difference between propensity of wet and dry temperaments		Comparison of propensity of 4 temperaments to quality of coldness and warmth of color
	Significant	sample size	Significant	sample size	
Selection of single color	$p = 0.126$	Hot: 50 Cold: 50	* $p = 0.001$	Wet: 50 Dry: 50	
Selection of colored spaces	$p = 0.257$	Hot: 50 Cold: 50	* $p = 0.008$	Wet: 50 Dry: 50	

P (significance level) was obtained significant for wetness-dryness component and was specified with *.

Figure 2. Comparison of Propensity of Warm and Cold Temperaments and Dry and Wet Temperaments to Quality of Coldness and Warmth of Color

Field	Difference between propensity of hot and cold temperaments		Difference between propensity of wet and dry temperaments		Comparison of propensity of 4 temperaments to quality of coldness and warmth of color
	Significant	sample size	Significant	sample size	
Selection of single color	* $p = 0.19/0$	Hot: 50 Cold: 50	$p = 0.661/0$	Wet: 50 Dry: 50	
Selection of colored spaces	* $p = 0.02/0$	Hot: 50 Cold: 50	$p = 0.217/0$	Wet: 50 Dry: 50	

P (significance level) was obtained significant for wetness-dryness component and was specified with *.

Table 1. Comparison of Propensity of Warm and Cold Temperaments and Dry and Wet Temperaments to Quality of Coldness and Warmth of Color^a

Field	Difference between propensity of hot and cold temperaments	Difference between propensity of wet and dry temperaments
Selection of colored spaces	Significant $P = 0.809$	Sample volume Hot: 50, Cold: 50 $P = 0.315$

^aP (significance level) was not obtained significant for any one of components.

their temperamental features. Psychologists believe that there is a relationship between physical needs of body and selection of light or dark colors (6).

4.2. Component of Coldness and Warmth of Color Spectrum

According to the significant difference of propensity of 2 temperamental groups of warm and cold to colors with warm and cold spectrum in the 2 fields of selection of single-color and colorful spaces, it can be said that the factor of warmth and coldness of temperament is effective on propensity of people to quality of cold and warm colors. The order of propensity of temperaments to warm colors

as WW, WD, CW, and CD shows that warm temperaments have more propensity to warm colors than the cold temperaments and cold temperaments have more propensity to cold colors. The results were obtained opposite of the above sequence in selection of spaces with cold or warm tonality. Temperaments of CD, CW, WD, and WW, respectively, have the most propensity to spaces with warm tonality against spectrum of cold colors. The existence of difference in propensity to color and colorful spaces shows that people have different opinions in propensity to colors according to function of color.

Human discriminates a temperature by observation of

colors. It's an instinctive feeling that has been hidden in the humans' existence and enabled him to feel coldness and warmth by the help of colors. The experience has proven that humans can feel 7 grades of heat or cold at his workplace by his feeling. In a workshop that its color is blue or green and has 15 grades of temperature, a temperature is felt and another workshop that has been painted red or orange and has temperature of 11 to 13 grade, the same temperature is perceived. Therefore it becomes clear that cold colors such as green and blue reduce temperature and warm colors such as red and orange increases heat (5).

According to the issue that humans move in line to reach to inner balance, it seems that people with warm temperament who have the heat of temperament from inside and are basically sensitive to heat, have more propensity to a space with cold tonality that leads to feel more coolness. In this regard, people's propensity with cold temperament is to spaces with warm color spectrum. In the selection of space, due to the person who imagines himself in a setting of high volume of color, he prefers to select a color complementary to his temperament and in line with balancing his inner status. In view of traditional medicine, health means balancing the temperament and whatever the temperament to become closer to the balance point, the feeling of spiritual and physical health will become more (11, 12). The obtained results in this part are in line with results of psychologists' experiments. Psychologist doctors found that as in the Korangi test, people can be divided into 2 groups of sensitive to warm and cold colors. Furthermore, it can be accepted that visual and conceptual apparatus of a group of people, amount of warm colors, and on another group amount of cold colors will be more. It seems in this way that people who are more sensitive to warm colors have extroverted personality and strong emotions and vice versa people who are more sensitive or cold colors have introverted personality (7).

The following figures relatively shows a difference of temperamental groups' interests to each other to light and dark colors, cold and warm colors, and spaces with light and dark tonality and also cold and warm.

Generally it can be said that people's temperaments have a significant relationship with their selective color. However selecting a character of color for people can be affected by several factors. Individual experiences, gender factors, culture, age, and special mental conditions such as depression or passion can be effective on selecting the favorite color or environmental color. Due to the fact that the principle of the present research has been founded on human's physical and mental indexes, the process is passed according to involved factors and the obtained results are not definitely. Morals and moods of humans are placed in a

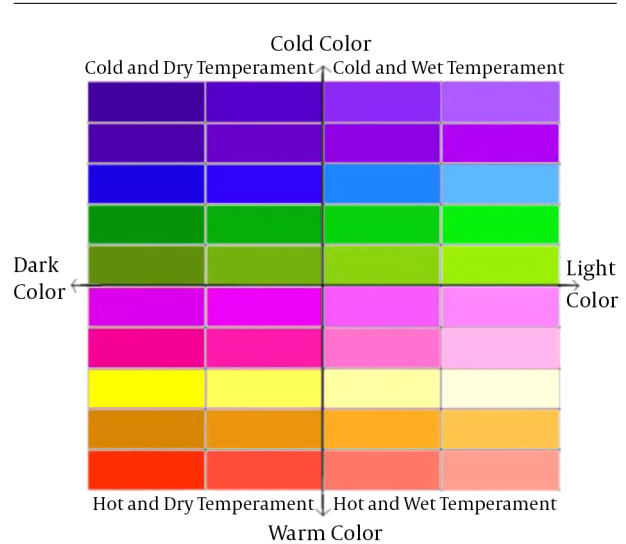


Figure 3. Relationship Between Tendency to Colors and Temperaments

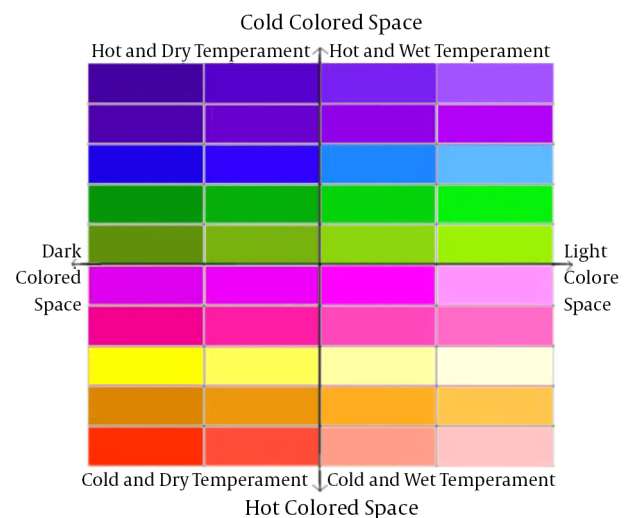


Figure 4. Relationship Between Tendency to Colored Space and Temperaments

range as well as spectrum and gradual change of some temperamental features is possible based on an increase of age and changing the environmental conditions. According to the thin border between the 4 temperaments, the accurate temperamental division of people seems difficult and requires the high accuracy. However relying on the passed way, the temperament-assessment of users, and evaluation of their propensities, it seems that the obtained results to be extensible. Familiarity with this principle helps designers to pay attention to humans' differences with each other in designing architectural spaces and urban bodies.

It can also be used in designing important workplaces like military rooms for improving work efficiency. In the case of not knowing these differences, the architect considers his conditions and spiritual propensities as the basis in designing. According to quick change of time and stability of propensities as well as the general mental and physical needs of a human, it seems that it is necessary for urban designers and architects to become familiar with temperamental principles, which include physical and spiritual conditions of users of spaces to be respected anthropological principles along with modernity of methods and building tools.

The temperamental rooting of propensity to color has not been conducted yet. Due to the fact that the basis of resulted principle has been founded on mental and physical condition of humans, it can be effective on the world styles of architecture as a human-based principle. It is obvious that by not complying with physical principles, based on anthropological indexes, certainly a responder and relax-

ing space will be not designed for human's living.

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