

Psychological implication and geographic differences of colours in national flags

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Abstract No national flag is just black and white. Each colour in a national flag has its defined meaning, or psychological implication, which has been regarded as a best representation of that nation and its creeds. This article will firstly report the statistic results of colour application on the national flags, and the geographic distribution of basic colours and their interpretations. Red, white, blue, yellow, green, black, orange, brown, and purple are used in the flags of countries around the globe, according to the descending order of frequency used. Secondly, the meanings of red are interpreted as brave, courage, blood, life, and warm, etc., according to our studies on the record from different resources. Even the same colour holds different meanings in different countries and/or in different stages of a country, in relation to their history, culture, and religious belief. The colour distribution in national flags shows geographic differences, and the consistency and diversity of psychological implication of these colours were reported and discussed in relation to history and culture among sovereign countries, in relation to the recent empirical studies on the psychological effect of red colour on human behaviour. The Context Hypothesis of Red Effect on human behavior was used to explain the results.

1 Introduction

National flags were invented and are demonstrated at every important or historic location (e.g., governmental department, customs, borderline, monuments, etc.), events (congress, exhibition, diplomatic signing ceremony, etc.), and even by citizens during national celebration occasions. Why is flying the national flag so important? Simply because it is the representation of the nation, with all of the nation's creeds. There are many considerations, history, cultural heritage, religious belief, and even physical outline embedded in national flags. These were designed through the thoughtful combination of colours and figures. For example, the Chinese national flag was designed by placing five yellow pentagrams, representing the leading group and common citizens on a red rectangle as a background representing the blood dedicated by thousands of martyrs in the long history of the development of the nation (Lin, 2011; Zhao, 2013).

Man has been living in a colourful world, and enjoying colours in many ways. Along with a long history, colour has embedded psychological meaning, specifically strengthened by a specific carrier, such as clothes or a national flag, and induces certain kind of aesthetic appreciation with common agreement. Through colour, hue and form, each nation and its civilians is expressing its culture, its sense of belonging and pride.

One interesting phenomenon observed recently is that Red enhances human performance in contests, as Hill & Barton (2005) found from observing the Athens Olympic Games in 2004. They found that wearing red is consistently associated with a higher



probability of winning, including in the individual sports of boxing, taekwondo, Greco-Roman wrestling and freestyle wrestling, and explained that signals biologically attributed to red colouration in males may operate in the arena of combat sports. This conclusion of course inspired several other studies, but generated some different conclusions (Rowe, Harris, & Roberts, 2005). However, experimental study did confirm the enhancing effect of red colour on human performance, e.g., red (versus blue) colour induces primarily an avoidance (versus approach) motivation, and enhances performance on a detail-oriented task, whereas blue enhances performance on a creative task (Mehta & Zhu, 2009).

There are normally settled definitions of colours used in national flags, given that this changes sometimes depending on the political situation. However, the reason why so many colours are used in national flags, the psychological consideration, and the possible pattern they take as a symbol of nation, remain unclear. This study intends to uncover the rules and explains the phenomenon in relation to empirical studies on the psychological effect of colour (and specifically red colour) on human behaviour and performance.

2 Methods

Colours used in all the national flags and their psychological implications were calculated based on a published book (Zhang, 2002). Some information concerning the latest changes were retrieved from websites such as Wikipedia (both the Chinese and the English version), [HYPERLINK "http://www.mapsofworld.com" www.mapsofworld.com](http://www.mapsofworld.com), etc. Data were analyzed with SPSS 17.0.

3. Results

3.1 How many colours are used in national flags?

Our calculation showed that 41% of all countries used 3 colours on their national flag. Other nations used 2 (20%), 4 (22%), 5(8%), and/or over 6 colours, as indicated by Table 1.

Table 1. Number of countries in according to number of colour used on the national flag

Number of color	Number of nations	Percentage (%)
2	39	20
3	80	41
4	43	22
5	16	8
6	15	8

Apparently people use colour to differentiate countries in many situations, e.g., on battle fields or on ocean routes, given the limited number of colour similarities. Such similarities are acceptable because they simply are a kind of historical record of colonial or cultural heritage.



3.2 Geographic feature of basic colour usage in national flags

3.2.1 Frequency of basic colours on national flags

The most frequently used colour on national flags is red, as indicated in Table 2. This number decreases in the order of red, white, blue, yellow, green, black, orange, brown, and purple.

Table 2. Frequency and percentage of basic colours used by national flags

Basic color	Number of nations	Percentage (%)
Red	149	77
White	140	73
Blue	99	51
Yellow	97	50
Green	96	50
Black	51	26
Orange	15	8
Brown	10	5
Purple	7	4

3.2.2 Continental differences in colour usage on national flags

There are apparent frequency differences concerning the basic colour usage between continents. One way ANOVA (analysis of variance) showed that there is no difference for red, $F=0.89$, $p=0.472$. This means that nations on each continent love to use red in their flags – that is why red is the most popular colour on national flags. However, yellow was most used in America, $F=6.96$, $p<0.001$, $\eta^2=0.129$; while in Asian countries it is the least used. A similar case holds for blue, $F=5.00$, $p=0.001$, $\eta^2=0.096$. African countries seem to like white on their national flag the least, $F=3.22$, $p=0.014$, $\eta^2=0.064$; but green is most welcome here, $F=10.75$, $p<0.001$, $\eta^2=0.186$. Surprisingly, black was most used in America but not in African countries, $F=3.32$, $p=0.012$, $\eta^2=0.066$. Figure 1 indicates the details of the frequency distribution.

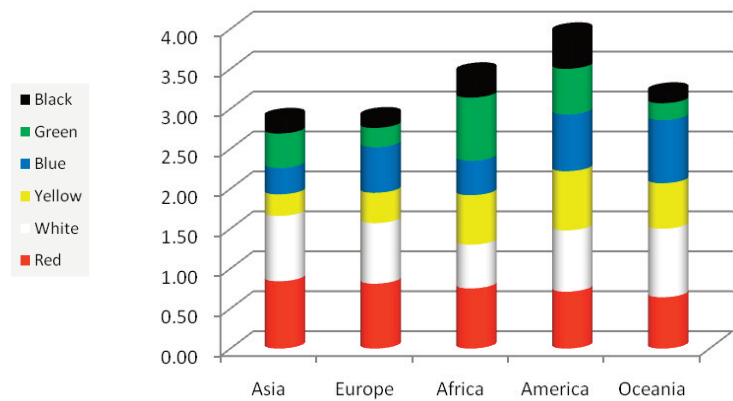


Figure 1. Continental difference of basic colour usage

3.3 Definition of colour on national flags

The implications of colours on a national flag are usually defined by a nation in official documents. However, it is not easy to find the most dependable ones – Chinese Wikipedia and English version Wikipedia often provide different definitions for a certain country. We tried our best to count on dependable resources, and figured out the frequencies of different definitions for the same colour among nations, as indicated in Table 3 for red. The most frequently used definitions for white, blue, yellow, green, and black are purity (43%), ocean (48%), wealth (35%), agro-forestry (53%), and black people (41%) respectively, among many others.

Table 3. Definition of red on the national flag in descending order

Definition of red	Number of nations	Percentage (%)
Blood	75	50
Bravery	22	15
Struggle	10	7
Revolution	6	4
Victory	6	4
Independence	4	3
Passion	4	3
Freedom	3	2
Love	2	1

With regard to the colour red, a national flag as a symbol is a mimic record of the bloody history – not only for that nation, but also for the continent, or even for the world – partly because of the colonial history, partly because the original aim of the flag was leading and differentiating a group in political hassles, territorial dispute, or even religious conflicts.

4. Discussion

It is obvious that colour selection in national flags is a process of political negotiation, compromising, and agreement. Given the apparent cultural difference in the philosophy of flag design (Lin, 2005, 2007), each individual colour was selected carefully and bearing one or several meanings on behalf of the political regime. We understand that a colour has its surface meaning and sub-surface meaning as well. In any case, the meaningful feature of colour was well taken and used in national flags, and its psychological effects are also explicit.

Why has the colour red been so welcomed around the globe? Why can the definition of a specific colour be so different? Due to the limited time and space, we did not analyse the interpretation of all basic colours, but focused on red. The empirical studies mentioned above provide some evidence for the aggressive and defensive role of the colour red (e.g., Hill & Barton, 2005; Mehta & Zhu, 2009). In addition, we (Zhang & Han, 2012) proposed a Context Hypothesis of Red Effect on human behavior and found that it can be used to explain the results we found in this study. According to the Context Hypothesis, colour selection when designing national flags depends on two kinds of external contexts, either an achievement oriented context or a relationship context. The former one focuses on aggressive fighting, in memory of the revolu-



tion and sacrifice of national heroes in representing their blood, signifying avoidance of the opponent with associated meaning of attacking and dominating. On the other hand, the relational context signals love and affection, inspiring approaching behavior towards friends or allies. Red is the only and the best symbol that is well situated for both contexts, with its double function in either context.

One thing we have to bear in mind is that colours on national flags could be misleading. Becker et al (2012) found that exposure to the German flag increased out-group prejudice among highly nationalistic German respondents, which contradict prior research illustrating that exposure to the US flag reduced out-group prejudice among highly nationalistic American respondents. This research indicated that a national flag (together with its settled colours) has an emotion-inducing effect, which of course differs between in-group or out-group.

The limitations of our study are obvious. Firstly, we calculated the definition based on the documents available, while not all definitions are from official resources. There is no way to confirm the definition of each colour for every country, although we put every effort in trying to make it correct and dependable. This leads to possible inaccuracy in the frequencies. Secondly, countries are changing with regard to their political compromises and international movement, which leave the conclusion of this study open to change. Thirdly, as there are many sub-groups in any country, a similar case holds for the interpretation of the colours in the national flag. So more careful consideration of these sub-groups in each nation would be helpful to make a precise conclusion (Seyle & Newman, 2006).

5. Conclusion

Basic colours are used in designing national flags in the descending order red, white, blue, yellow, green, and black. Basic colour usage in national flags, and its psychological implications, differs according to geographical features. Red, as the most used colour, represents Blood, Bravery, Revolution, Victory, Freedom, Independence, Passion, etc. This could be explained by the Context Hypothesis of Red Effect on human behavior.



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Biography of the authors



Buxin Han received his BM on Traditional Chinese Medicine (TCM, 1986) and his MS on Physiology of Acupuncture (1989) at Anhui College of TCM, and his PhD in Cognitive Psychology (1993) at the Institute of Psychology, Chinese Academy of Sciences (IPCAS). He is currently a full Professor at IPCAS, and the Deputy Secretary-General of the Chinese Psychological Society, President of the Division of Aging Psychology of the Chinese Society of Gerontology, and Member of Board of the Directors of the International Association of Applied Psychology (IAAP). His research focused on mental health of the elderly population and cognitive aging. His hard work has been recognized widely, as provided by the awards by the International Union of Psychological Science (Distinguished contribution, 2004), The China Association of Science and Technology (Distinguished contribution, 2006), China Society of Gerontology (Distinguished research, 2007,2010), and China Association for Mental Health (Distinguished service providers on mental health, 2011). The list of his publications contains nearly 200+ items. He has supervised 24 students for their master degrees and PhD on cognitive ageing and mental health issues in last 15 years.



Tengxiao Zhang (Mail: zhangtx@psych.ac.cn) was born in 1988 at Anhui province, China. He was graduated from Anhui University in 2009 with a bachelor degree of Applied Psychology, and study as a PhD candidate in the IPCAS, under the supervision of Professor Buxin Han. He is interested in the psychological functioning of colour, especially colour red and its signal mechanism. Specifically, he intend to explore the direction and strength of the red effect under the various ex-

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