Relationship between Digital Color Image and Semiotics in Peace Posters

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ABSTRACT

Even with the development and progress of science and technology, peace has always been a topic to be explored, and many design competitions about peace had appeared, with people showing what harmony was and the beautiful vision of peace from different perspectives. This paper attempts to analyse from a semiotic point of view what elements of peace symbols the creator's creations were made up of, the reason being that the selection of symbols and the application of the symbolic elements were an indispensable presence in the creation of posters and are utilised for communicating the subject. Therefore, this study adopts a unique children's perspective to explore the direct or indirect relationship between symbolic elements and colour through the software to quantify the selection of poster samples systematically and ultimately to summarise and collate to explore the relationship between colour and semiotics of the analysed posters, hoping that this research can be more effectively used in the subsequent creation of the posters or symbols and colours to assist and help the role of the poster.

Keywords: *Colour, Semiotics, Poster, Peace poster*

INTRODUCTION

For many years, peace has been a topic of common importance to all of humankind. After world wars, rapid socioeconomic growth, and the gradual development of human society and civilization, it does not mean that peace will come forever. According to BBC statistics for 2023, there have been at least 13 armed conflicts and wars around the world since 2020, and most of the injured are civilians. In response to this persistent challenge, Killelea (2020) introduced the Global Peace Index. This index systematically measures the structure of peace, moving beyond war as a simplistic indicator and offering a quantitative assessment of peace levels.

In the face of a world that requires more complex thinking, posters have the functionality of examining issues and can also take on the tasks and presentations given by the new era (Yan, 2020), while scientific evidence shows that 80 percent of information is captured visually, suggesting that images are more receptive to people from different cultural backgrounds (He, 2022).

The theme of peace holds significant importance in the field of design, particularly in the creation of posters that frequently serve as regular themes in international competitions. However, the production of excellent peace posters over the years has also created another problem, as most authors inevitably encounter bottlenecks in creating posters on the theme of peace, which they were unable to overcome in their previous works (Matwick, 2022).

Therefore, this study hopes to explore the work of child creators selected for analysis in an environment where there is a large and rich body of peace-themed posters available, to analyse and research the theme of peace from a unique child's perspective, and hopefully to inspire other creators to create new work.

LITERATURE REVIEW

Theory of Semiotics Analysis

The attention to "symbols" began in ancient times, especially the enrichment and development of words, which makes people begin to examine and examine more concepts and semantics to summarise the vast world (Ding, 2023). Ferdinand de Saussure was a Swiss linguist who pioneered modern linguistics. The semiotics he founded is called "semiology" (1916), a term derived from the Greek word "sign" (Eco, 1986). Saussure emphasised the importance of the vein between a sign and other signs, which determines the sign's meaning, and he argued that Saussure emphasises the importance of the vein between the sign and other signs, which determines the meaning of the sign, and he argues that the proper form of semiotics is that "the sign must be interpretable by other signs", which is concerned with the relationship between the sign and the objective (Chandler, 2001). A single sign is divided into two parts, Signifier and Signified, the former being the colour, sound, and image of the sign, the latter being the content of the sign and determined by the culture to which it belongs, and a body composed of these two parts is called a sign. The expression and dissemination of symbolic meaning is a narrative process with obvious characteristics, and there is also the interaction between subject and acceptance (Zhou, 2020). For example, the pronunciation of the rose "rouz" refers to the surface and appearance of the rose itself, and the rose can symbolise the cultural meaning of "love". Symbols have concepts that are recognized by cultural and linguistic systems (Hsu, 2021).

The relationship between symbols and other symbols is then divided into paradigm and syntagm. The human living environment is full of symbols, from language to patterns to words, from figurative to abstract, and objects, furnishings, and habits in life are understood as a kind of symbol from the perspective of semiotics (Hawkes, 1997). In the theory of linguistics, the former becomes the vertical axis, which is a kind of "selection"; each symbol present in the paradigms has its characteristics, while the syntagm is called the horizontal axis, which is the relationship with the combination of the selected elements of the paradigm with other elements so that the selected symbols may be influenced by other symbols and their meanings may be influenced by other symbols. Other symbols of the same syntagm partially determine the meaning of other symbols (Bouissac, 1998).

Axis	Syntagm	Paradigm
Principle	Proximity principle	Similarity principle
Symbol	Indicative symbols	Similar symbols
Rhetoric	Metonymy	Metaphor
Structure	Surface structure	Deep structure

Figure 1 Semiotics of Saussure
(Source: Organised and drawn by the author)

Theory of Colour Image Analysis

Colour is regarded as a part of the culture, and the meaning and function produced will change according to the different environments and use methods. When colour is applied in life, in addition to a direct effect on our eyes and visual changes, colour will also influence our hearts, thus making people have symbolic associations (Chen, 2000). The eye, the brain, and our life experience all describe colour as a visual perceptual feature (Wyszecki et al., 2000). Colours elicit different sensations due to variations in hue, lightness, and chroma, and when people encounter different colors, their brains generate different associations or psychological effects (Lu, 2007).

Colour image is the psychological feeling and emotion that colours produce in people. Colour image is to match the psychological level, the comprehensive consideration of the different attributes of the colour feeling, and colour association is closely associated with, but more important in the abstract symbolism (Masahiro, 2021). From the spirit, color can be discussed by the symbolic meaning, historical and religious role of colour (Horrocks, 2012). Based on my personal experience, I associate the name of colour with anything in my memory, in short, colour association (Yamanaka, 2003). Colour association and colour symbolism will fuse different colour intentions among groups. The adjectives people use for colour imagery are very rich, starting from value judgments, such as beauty and ugliness, likes and dislikes, etc., and then gradually expressing sensual aesthetic vocabulary (Lin, et al., 2021). People's adjectives for colour imagery can be sorted into "evaluative imagery", "activity imagery" and "power imagery" through Semantic Differential Technique (Osgood). "power imagery", containing a range of adjectives and their antonyms. Colour has properties that cannot be replaced by words and language in the process of expressing information, and colour can transcend language barriers, cognitive differences, and even deficiencies caused by different geographic regions, ages, and cultural levels (Zheng et al., 2021). This study concentrates on the ternary colours (red, green, and blue), thereby summarising their colour imagery.

Table 1. Red, Blue, and Green Color Image

RED	Red represents excitement, vitality, enthusiasm, and action in Wester culture. In Asian culture, red is a very important color. It symbolizes good luck, change, prosperity, celebration, and longevity because red is an auspicious color. , brides usually wear red dresses at weddings, and there is also the custom of giving red envelopes to each other during the New Year.
BLUE	Blue represents trust, security and authority in North America and Europe, and is also regarded as soothing and peaceful. In some countries, blue symbolizes healing and exorcism, and is believed to fight evil. In places such as Turkey, Greece, and Afghanistan, blue Blue is a very common color. In Eastern cultural sites, blue symbolizes eternal life, in Ukraine it represents health, and in Hinduism blue represents love and joy for religious reasons.
GREEN	Green represents good luck, nature, freshness, environmental protection, and spring in Western and Eastern cultures. At the same time, green is also the representative color of Ireland. Ireland is called the "Emerald Isle" precisely because of its green landscape. In the Middle East, green represents fertility, wealth and good luck, and is also regarded as the traditional color of Islam.

RESEARCH METHODOLOGY

This study primarily utilises the content analysis method, initially subjecting the gathered samples to colour quantization. ImageJ is a Java-based image processing software developed by the National Institutes of Health (NIH). It is extensively utilised in the early stages of medical research. Nevertheless, as science and technology progress, there is an increasing prevalence of multidisciplinary studies, with ImageJ frequently employed for image analysis. Thus, this project represents a novel endeavour to integrate posters with ImageJ. The ImageJ software has the capability to perform various image processing tasks such as scaling, rotating, distorting, and blurring. Additionally, it can determine a range of geometric properties of the examined item inside a specified area, including length, angle, circumference, area, long axis, and short axis. The content analysis method employs impartial and methodical approaches to examine the content of the poster. The findings will be evaluated based on the data acquired from the ImageJ analysis. Subsequently, the proportions and relationships between symbols and colours will be extracted from the analysis results using the generated numerical values. Ultimately, we conducted a rigorous statistical analysis to examine the correlation between signs and colours.

Date Collection

Lions Clubs International hosted an art competition in which young contestants created peace posters to convey their vision of peace and inspire the world through art and creativity. The poster was titled "LIONS", with "L" representing Liberty, "I" representing Intelligently, "O" representing Our, and "D" representing Ours. We have completed the design of a poster sample titled "LIONS" for Lions Clubs. In this design, the letter "L" represents Liberty, "I" represents Intelligently, "O" represents Our, "N" represents Nation's, and "S" represents Safety. The Peace Poster Competition (2006–2023) has announced the winners of the Grand Prize. Out of a total of 15 entries, the international panel selected the poster samples as the winners.
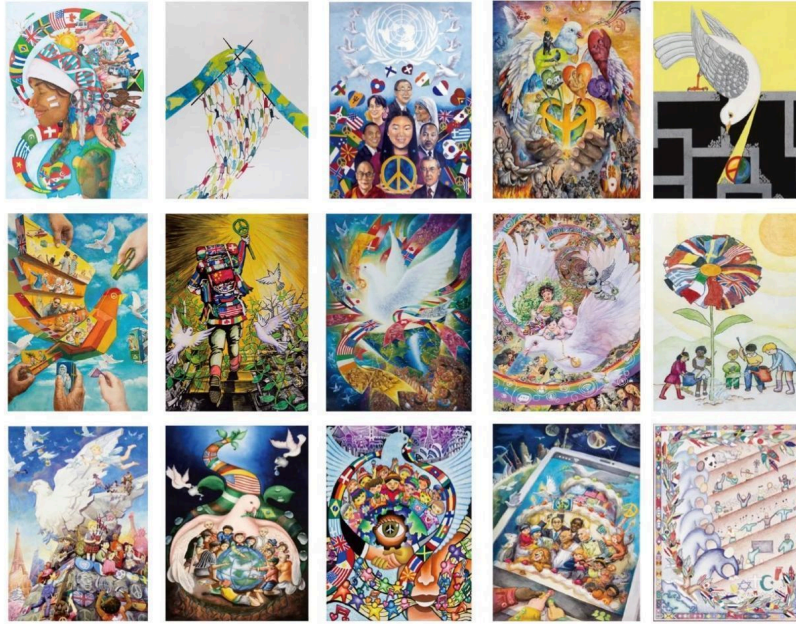
Figure 2. Poster Sample Collection
(Source: Organised by the author)

Color Quantification of Samples

For this study, we utilised ImageJ software to conduct region and pixel counting of images, measure digital image analysis, and tally the frequency of the three major colours in each sample.

Biomedical image analysis software primarily uses ImageJ to automatically count the number of cells or count the number of stained cells. This software was developed by the National Institutes of Health using the Java programming language. It allows for use across many platforms and calculates the number of tertiary colours in an image by computer calculations.
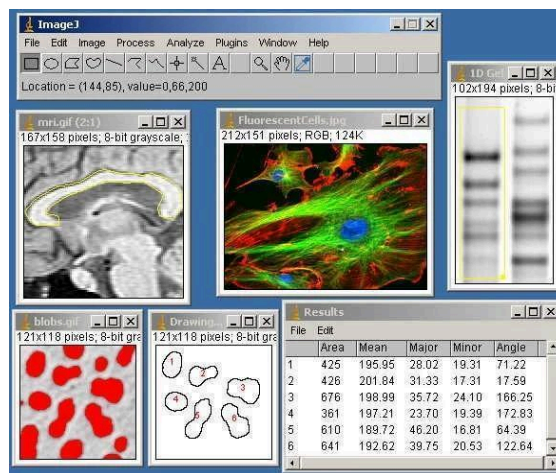
Figure 3. ImageJ Software Page
(Source:https://imagej.net/ij/docs/concepts.html)

Qualitative Analysis of Samples Based on Semiotic Theory
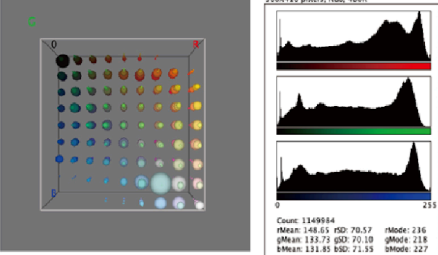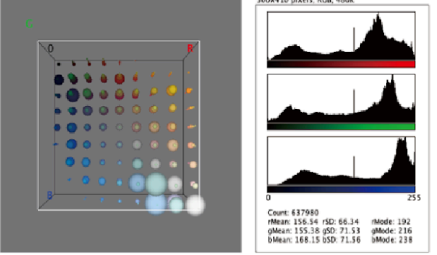
Additionally, we examined whether these symbols belonged to the paradigm or syntagm and provided a concise description of the sample's utilisation of colour. This analysis delved into the connection between colour imagery and symbols. Ultimately, we tallied the symbols that were examined from the samples, quantified the number of symbols employed for each symbol, organised them into a table according to the count, and compared the colours associated with the greatest frequency of usage. We compiled the results and derived inferences from them by organising them into a table.
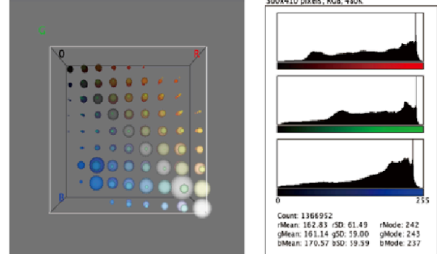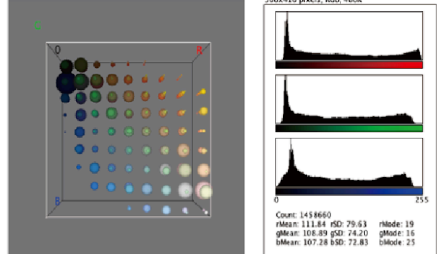
FINDINGS

Sample Analysis Results

The qualitative analysis of the sample and the quantified color data were established in a table due to limited space and listed 4 items.

Table 2. Sample Analysis Case

Title: Peace, Love and Understanding	Title: Our World, Our Future
Concept: Children from various countries wore traditional costumes and played traditional musical instruments. Children and angels worked together to create sculptures of doves of peace and painted national flags.	Concept: A huge dove of peace is holding children in a tree hole. The children are painting the world with paint brushes. The tree trunk is composed of national flags.
Signifier: children, flags, pigeons, musical instrument	Signifier: children, tree, flags, pigeons, earth
Signified: The poster uses traditional costumes and musical instruments to highlight the differences in cultures around the world, but the desire for peace is the same.	Signified: The dove of peace is personified to protect children, expressing the appeal for peace and the innocence of children.

parameter	red	green	blue		parameter	red	green	blue
mean	162.832	161.136	170.567		mean	111.839	108.890	107.279
std.dev	61.492	59.001	59.586		std.dev	79.631	74.197	72.830

Brief description of color application:
Blue and white are the main colors.

Brief description of color application:
The background is blue and the main visual is white.

Color Analysis

Statistical quantification of the colour can be found in the selected 15 works; the use of red is the most, compared to the total number of green and blue, which are higher than 111.097 and 116.846 levels, respectively; the average 0 to 256 levels higher than green and blue are 6.8 and 7.78 levels, respectively; and the difference is not significant.

Table 3. Color Analysis Results

Color	Total (up to 156*15=3072 levels)	Average (rounded to the second decimal place)
Red	2389.121 levels	159.27 (Total level 256)
Green	2287.024 levels	152.47 (Total level 256)
Blue	2272.275 levels	151.49 (Total level 256)

In addition, from the colour mode of each analysis, it can be observed that each poster mainly uses secondary colours and, less often, direct red, green, and blue, so the three basic primary colours have a probability of being used. Red is the most used colour because red itself has the colour imagery of courage and strength; many national flags and other colours must be used; the colour association of red is also related to ideals and hope; followed by green because red and green are complementary colours, and using them in the same picture can make the picture coordinated; and some creators use olive leaves, which are a symbol of peace, to create their work, so they need to use green. Some creators used olive

leaves, a symbol of peace, and the natural environment to create their work, thus requiring the use of green. Creators primarily use blue, the second most used colour after the first two, to express the colour scheme of the sky and the earth.
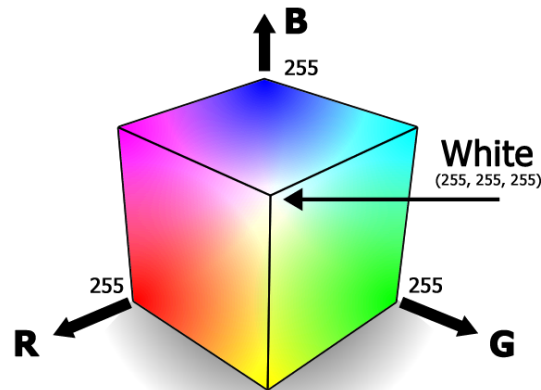

Figure 4. Color Mode
(Source: Antoniadis, 2014)

Signifier Analysis

From the signifier analysis statistics in Table 4, it can be observed that more than five items are the flag, dove, earth, and child, which are signifiers themselves belonging to the relatively direct and commonly used elements of peace on the genealogical axis, and most of these signifiers are composed of red colour in the flag and the child's clothes, so that it can be observed the reason for the comparatively high usage of red colour. The rest of the signifiers, from highest to lowest, are earth, peace sign, olive branch, green leaf, president, sun, love sign, sky, candle, musical instrument, and others. Most of these symbols are also directly associated with peace. Cake and kettle, on the other hand, are syntagm signifiers that are only associated with people who have thought about them or shared experiences with them. There is only one signifier for DNA: feathers, cakes, dogs, ribbons, paint, helicopters, woollen needles, and other unique peace elements. Additionally, the creators no longer focus on peace elements like flowers and trees, despite their frequent use in the past.

Table 4. Signifier Analysis Statistics

Unit Project	Quantity	Unit Project	Quantity
Flag	12	Candle	3
Dove	12	Musical notes	3
Olive branch	6	President	4
Peace sign	2	Rainbow	3
DNA	1	Ribbons	1
Earth	8	Doctor	2
Feathers	1	Firefighter	2
Electronics	1	Policeman	2
Sun	3	Helicopter	1
Knitting needle	1	Sky	3
United Nation logo	2	Robot	3
Child	13	Musical Instrument	2
Love logo	3	Paint	1
Green leave	4	Panda	3

Kettle	2	Lion	3
Cake	1	Dog	1
Total: 119			

CONCLUSION

This conclusion explores the relationship between Saussure's semiotic theory and colour; in the design of peace posters, the colour imagery of red is the most direct and often chosen, and it is a paradigm of the peace symbol; the colour imagery of red is a colour with greater visual stimulation and higher luminance, which is solid and exciting to the human psyche, and the colour red contains emotional meanings such as blood, courage, faith, perseverance, yearning, and hope. Red carries emotional meanings such as fervour, courage, faith, persistence, aspiration, and hope, among others. People also view it as a symbol of vitality. By quantifying the colours and comparing them with the signifier analysis, it becomes clear that the flag, dove, child, and other related paradigm signifiers remain the primary signifiers of the peace theme. Additionally, creators often combine these selected elements from the syntagm with other elements to complete their creations. Therefore, this study reveals that creators seeking to deviate from previous peace theme works must employ the syntagm's signifier, resulting in a relatively reduced use of green and blue colours, although the difference is not statistically significant.

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REFERENCES

Antoniadis, P. (2014). *Color Mode* [Image]. Baeldung. https://www.baeldung.com/cs/convert-rgb-to-grayscale

Bouissac, P. (1998). *Encyclopedia of Semiotics*. Oxford: Oxford University Press.

Chandler, D. (2001). *Semiotics: The Basics*. London: Routledge.

Chen, Q. (2000). Study on the relationship between color aesthetics and urban and rural landscape. *In Proceedings of the 2000 Color Application and Color Science Workshop*.

Ding, L. (2023). Discussion on the relationship between music form and content in semiotics. Xinjiang Art College Newspaper. 21(3). https://doi.org/10.3969/j.issn.1672-4577.2023.03.004

Eco, U. (1986). Semiotics and the Philosophy of Language. Bloomington: Indiana University Press.

Hawkes, T. (1997). *Structuralism and Semitics*. North Yorkshire: Methuen Press.

He, Z. X. (2022). *Research on motion poster creation of symbolic expression of moon image in poetry* (Master's thesis, National Taiwan Normal University). NDLTD in Taiwan. https://doi.org/10.6345/NTNU202201166

Horrocks, C. (Ed.). (2012). *Cultures of Colour: visual, material, textual* (Vol. 15). New York: Berghahn Books.

Hsu, Y. S. (2021). *A study of the influence of different learning mediums on sustainability education* (Master's thesis, National Taiwan Normal University). NDLTD in Taiwan. https://hdl.handle.net/11296/5gux23

ImageJ. (n.d.). ImageJ. Retrieved July 29, 2024, from https://imagej.net/ij/index.html

Killelea, S. (2020). *Peace in the age of chaos: The best solution for a sustainable future*. Hardie Grant Publishing.

Lin, C. Y. (2021). *A study of synesthesia for visual design and taste of laminated aluminum toil bag snack's package* (Master's thesis, National Taichung University of Science and Technology). Airiti Library.

Lu, X. (2007). Semiotic solution of design color a slight pause in reading. *Journal of Nantong University (Social Science Edition)*, *23*(3), 114-116.

Masahiro, S. (2021). "East Asia as a Method of Research," illustrated by an interpretation of Japanese Edo-Period Haiku by a western art historian. *International Journal of Buddhist Thought & Culture*, *31*(2), 15-27. https://doi.org/10.16893/IJBTC.2021.12.31.2.15

Matwick, K. (2022). Comics and humor as a mode of government communication on public hygiene posters in Singapore. *Discourse, Context & Media*, *46*, 100590. https://doi.org/10.1016/j.dcm.2022.100590

Wyszecki, G., & Stiles, W. S. (2000). *Color science: Concepts and methods, quantitative data and formulae*. New Jersey: John Wiley & Sons.

Yamanaka, J. (2003). *The foundation of colour science*. Taipei: Liuhe Press.

Yan, J. C. (2020). *The application of horror aesthetics to the poster creation of bullying issues* (Master's thesis, National Taiwan Normal University). NDLTD in Taiwan. https://doi.org/10.6345/NTNU202001170

Zheng, H., Liu, D., & Liu, Y. (2021). Design and research on automatic recognition system of sports dance movement based on computer vision and parallel computing. *Microprocessors and Microsystems*, 80, 103648. https://doi.org/10.1016/j.micpro.2020.103648

Zhou, Q. (2020). Symbolic interpretation of narrative design. *Journal of Nanjing University of the Arts (Fine Arts and Design)*, *(4)*, 127-131