Human Factors in Communication of Design, Vol. 177, 2025, 24–31
https://doi.org/10.54941/ahfe1006328

Can Stylized Pale-Toned Public Health and Safety Graphic Signs Become the Mainstream of Design?

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ABSTRACT

As visual identification symbols, graphic signs can help viewers quickly identify and perform relevant emergency actions. This study aimed to content analyze the style and color characteristics of appropriate public health and safety graphic signs, and summarize the current design mainstream. A total of 245 samples were collected from the Getty Images' collections covering diverse materials and graphic signs released from 1995 to 2023. The results indicate that the most common style in the public health safety graphic signs was "abstract symbology", characterized by geometric lines and the absence of textures and shadows. Additionally, the color tone with the highest proportion was "pale", a more white shade of pure color.

Keywords: Abstract symbology, Practical color co-ordinate system, Brightness, Saturation

INTRODUCTION

Following the COVID-19 outbreak, global experts and health agencies collaborated to share knowledge about the virus and to advise the public to take relevant preventive behaviors to prevent the spread of the epidemic (WHO, 2023). The establishment of public health and safety signs can enhance the public's awareness of preventing diseases and protecting their health and safety (Speake & Pentaraki, 2023). Signs are a communication tool that can convey information quickly without language restrictions (Chan & Chan, 2011). The graphics and colors of a sign can help viewers recognize and understand its meaning more quickly (Chen et al., 2018). Observing the signs published on the official website of the World Health Organization (WHO, 2021), its style and colors are diverse, and it seems there is no complete or universal system (Figure 1). Therefore, the motivation of this study was to clarify the style and color design characteristics of public health and safety graphic signs, and to determine the current design mainstream.

The objectives of this study were as follows:

1. To clarify the style and color design features of public health and safety graphic signs.
2. To conduct content analysis of the styles and colors of public health and safety graphic signs, and to summarize mainstream designs.

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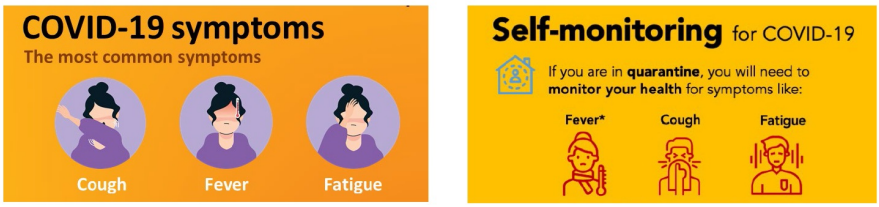


Figure 1: Different styles of graphic signs published on the WHO official website (WHO, 2021).

Previous studies have shown that graphic signs can effectively attract viewers' attention and thus influence their behavior (Meernik et al., 2016). The design elements of safety graphic signs include themes and warning symbols/effects (Gutierrez & Tiong, 2015); see Figure 2. Studies have shown that relevant healthcare signs can more clearly convey the meaning of contact, droplet, and airborne transmission through visual cues (Clack et al., 2019); see Figure 3.

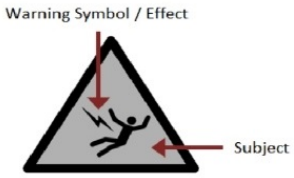


Figure 2: Design elements of safety graphic signs (Gutierrez & Tiong, 2015).



Figure 3: Visual cues in healthcare signs (Clack et al., 2019).

Different styles of graphic signs can affect risk perception (Marom-Tock & Goldschmidt, 2011; Ouyang et al., 2024). Previous studies have shown that safety signs that use abstract and silhouette styles can make people feel at risk (Marom-Tock & Goldschmidt, 2011); see Figure 4. Regarding the classification of graphic styles, Marom-Tock & Goldschmidt (2011) classified graphic styles into abstract, silhouette, neutral realistic, and caricature. While Ryan classified graphic styles into cartoons, line drawings, tonal drawings, and photographs (Ryan & Schwartz, 1956). In the application of related graphic styles, scholars mostly use the five style classification standards proposed by Meyer: abstract symbology, graphic symbology, graphic rendering, pictorial illustration, and natural photography (Chen et al., 2021; Meyer et al., 1980; Wang & Hsu, 2007), so this study classified the graphic sign styles based on this standard.

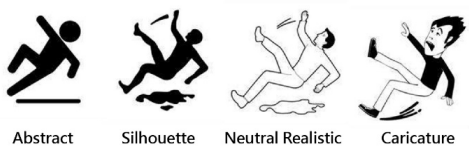


Figure 4: Safety graphic signs in different styles (Marom-Tock & Goldschmidt, 2011).

Color is related to risk communication, and plays an important role in conveying hazard messages (Edworthy, 1996; Williams & Noyes, 2007). Previous studies have shown that color tones can affect viewers' emotions (Kim & Suk, 2015). Color tone refers to a set of various hues with the same perceived brightness and the same saturation (Kim et al., 2022). Some scholars suggest that warning signs should use bright colors to attract people's attention (Chen et al., 2008; Hu et al., 2011). Bright, warm tones of red are suitable for use on warning signs (Imsuwansakorn, 2012; Ongkrutraksa, 2017). This study observed the safety sign colors set by ISO 3864–1 (International Organization for Standardization, 2011), which roughly fall within the bright tone range of the PCCS color system (Practical Color Co-ordinate System); see Figure 5. The PCCS color system was developed by the Japan Color Research Institute in 1964. It presents 12 tones through different degrees of brightness and saturation, including Dark grayish, Grayish, Light grayish, Pale, Dark, Dull, Soft, Light, Deep, Strong, Bright, and Vivid (Sato & Tajima, 1995; Wakata & Saito, 2013; Wang et al., 2020). The PCCS color system combines the advantages of the Munsell and Ostwald color systems, and is more commonly used in color attribute analysis (Han, 2022; Xie et al., 2024). Therefore, this study used this standard as the color classification of graphic signs.

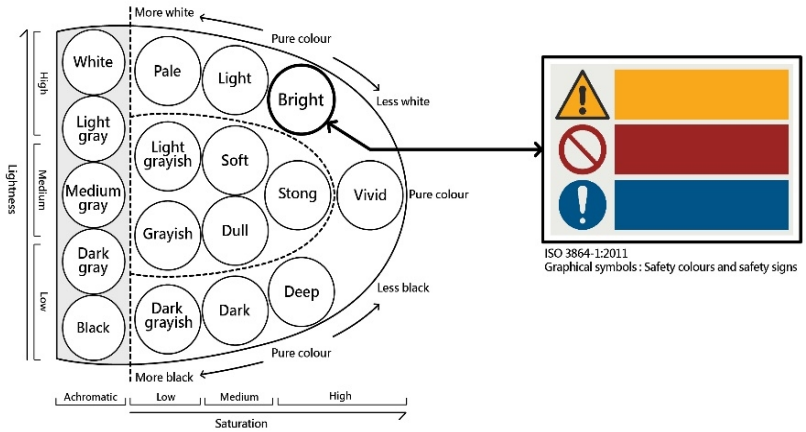


Figure 5: PCCS color system and ISO-defined safety sign colors (organized for this study).

The effect of color on emotions depends not only on the color tone but also on the color with brightness and saturation, with high brightness and saturation inducing higher arousal (Wilms & Oberfeld, 2018). Camgöz et al.

(2004) found that colored squares with the highest brightness and saturation attracted the most attention. Studies have also shown that disability signs with different brightness contrasts can affect the recognition of people with low vision (Zhang et al., 2024). Icons of different degrees of brightness and saturation will affect the viewer's discrimination and reaction time (Chen et al., 2024), as shown in Figure 6.

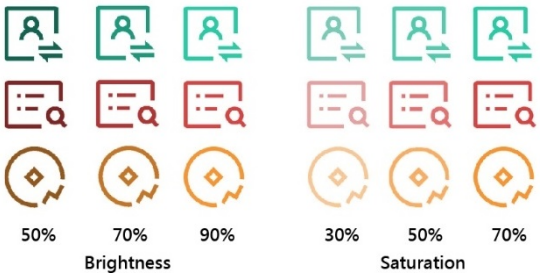


Figure 6: Icons of different degrees of brightness and saturation (Chen et al., 2024).

RESEARCH METHODS

This study classified public health and safety graphic signs based on content analysis. Content analysis is a method of analyzing the content of various materials, such as visual and verbal materials, to classify phenomena or events into defined categories to better analyze and interpret them (Harwood & Garry, 2003). This study collected 245 samples of public health and safety graphic signs from materials released by the Getty Images library between 1995 and 2023. The keyword search included words commonly used during the epidemic, such as Epidemic, Infectious disease, Flu, and COVID-19. Getty Images owns the iStock and Unsplash stock brands (Getty Images, 2024). It recently merged with Shutterstock to offer more than 500 million materials, including 3D objects, illustrations, vector graphics, and so on (Associated Press, 2025; CNBC, 2025; Getty Images, 2024; Shutterstock, 2024).

The 245 samples were discussed by two research participants with more than 10 years of relevant experience, and were adopted after reaching a consensus. The intercoder reliability was tested using the Holsti index (Holsti, 1969). Researcher A has experience in visual communication design work and teaching, while Researcher B has experience in design and outdoor safety rescue. The sample style analysis is classified using the five graphic styles applied by Meyer et al. (Chen et al., 2021; Meyer et al., 1980; Wang & Hsu, 2007). The sample color tone analysis was performed using the 12 tone classifications of the PCCS (Practical Color Co-ordinate System) (Sato & Tajima, 1995; Wakata & Saito, 2013; Wang et al., 2020). For brightness and saturation, we used the eyedropper tool in Adobe Photoshop to extract the color that occupies the largest area of the graphic signs, and calculated its HSB value (Hue, Saturation, Brightness) through the color picker.

RESULTS

Among the 245 samples of public health graphic signs, the study participants analyzed that 220 samples could fully agree with the style and color tone attribute classification defined in this study, and the remaining

25 samples that were different were adopted after discussion and consensus. The reliability test uses the Holsti formula, which is the coefficient reliability = 2×M/(N1 + N2), M is the total number of decisions both participants agree on, while N1 and N2 are the decisions made by participant 1 and participant 2 (Holsti, 1969; Mao, 2017; Nili et al., 2017). The reliability test result was 94.6%, which is within the acceptable range. Scholars explain that reliability <60% is insufficient, 60–79% is moderate, 80–90% is strong, and >90% is considered close to perfect (McHugh, 2012; Nelson & Rhoney, 2023).

Results of the statistical number/percentage of public health graphic sign styles (Table 1): The most common subject graphics were in the "abstract symbology" style (24.9%, $N = 61$), followed by the "pictorial illustration" style (21.6%, $N = 53$), and the third is the "graphic symbology" style (20.4%, $N = 50$). It was further found that most of the subject graphics did not add auxiliary symbols/effects (62.3%, $N = 153$) to convey the meaning.

Table 1: Style and symbol/effect statistics of public health and safety graphic signs.

Style of Subject Graphics	N(%)	Symbols/Effects	N(%)	Total N(%)
Abstract symbology	61(24.9%)	None	35(14.2%)	245(100%)
		One	21(8.6%)	
		Two	5(2.1%)	
Graphic symbology	50(20.4%)	None	27(11.0%)	
		One	21(8.6%)	
		Two	2(0.8%)	
Graphic rendering	42(17.1%)	None	20(8.1%)	
		One	19(7.8%)	
		Two	3(1.2%)	
Pictorial illustration	53(21.6%)	None	38(15.5%)	
		One	13(5.3%)	
		Two	2(0.8%)	
Natural photography	39(16.0%)	None	33(13.5%)	
		One	6(2.5%)	
		Two	0(0%)	

Results of the statistical number/percentage of color tones of public health graphic signs (Table 2). The largest proportion is "pale tone" (12.3%, $N = 30$), followed by "light tone" (11.1%, $N = 27$). The third is "bright tones" (9.4%, $N = 23$). Further analysis of brightness and saturation revealed that high brightness (25.5%, $N = 62$) and low saturation (20.8%, $N = 51$) accounted for the largest proportion.

Table 2: Color tone statistics of public health and safety graphic signs.

Color	Tones	N(%)	Brightness	N(%)	Saturation	N(%)	Total N(%)
Color	Dark grayish	5(2.0%)	Low	5(2.0%)	Low	51(20.8%)	245 (100%)
	Grayish	10(4.0%)	Medium-low	10(4.0%)			

Continued

Table 2: Continued

Color	Tones	N(%)	Brightness	N(%)	Saturation	N(%)	Total N(%)
	Light grayish	6(2.5%)	Medium-high	6(2.5%)			
	Pale	30(12.3%)	High	30(12.3%)			
	Dark	7(2.9%)	Low	7(2.9%)	Medium	40(16.3%)	
	Dull	6(2.3%)	Medium-low	6(2.3%)			
	Soft	0(0.0%)	Medium-high	0(0.0%)			
	Light	27(11.1%)	High	27(11.1%)			
	Deep	4(1.6%)	Low	4(1.6%)	High	35(14.3%)	
	Strong	3(1.2%)	Medium-low	3(1.2%)			
	Bright	23(9.4%)	Medium-high	23(9.4%)			
	Vivid	5(2.1%)	High	5(2.1%)			
Achromatic	Neutral	119(48.6%)	none	119(48.6%)	None	119(48.6%)	

CONCLUSION

This study found that the mainstream designs of public health and safety graphic signs are "abstract symbology" style and "pale color tone". It is worth noting that past studies have suggested that warning signs should use bright colors to attract attention, but the results of this study showing the use of pale tones are inconsistent with this. It is recommended that future research further explore whether different shades of pink can effectively convey risk messages in public health signs.

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