

A Study on Color Preferences for Wayfinding in an Open Public Space

Büşra GÜMÜŞAY ÖZBEK¹ & Ekin Can SEYHAN²

Keywords

Color, Wayfinding,
Public Interior
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Abstract

Color could be considered as an effective design element to create easy ways to find and reach specific places in a space. There are some studies that include the usage of color coding to analyze effects of color on finding specific or defined areas in designed spaces. Current study focuses on color preferences of students while they are designing an open public space. The experiment was conducted in Başkent University and total of 67 students participated. Participants were second year design students at the department of Interior Architecture and Environmental Design. The given design problem was firstly creating a maze as public space in total of 1000 m² area. As a second step, students were asked to integrate color codes on their maze design public spaces to guide people for finding exits in an easier and more preferable way. After the design process were completed, design solutions were analyzed with statistical analysis. In the findings of the analysis, most preferred color choices and methods with codes that are created by students were analyzed. In conclusion, most successful methods were highlighted to give information for designers who consider about design solutions to improve design qualities that lead people to find their ways.

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1. Introduction

Dictionary explains wayfinding as the process or action investigating someone's position and following a route to reach an aimed place (Oxford Dictionary ,2006). An article covers wayfinding as "mental processes of orientation in space" (Jesus, 1994: 33). This explanations introduce that wayfinding is a mental activity in a space that people make to understand space and create routes to reach specific places. A compile of further studies focused on environmental design cues to ease people in wayfinding activities in designed environment (Gibson, 2009; Soh & Smith-Jackson, 2009; Passini, Pigot, Rainville, & Tetreault, 2000).

Most of the studies consider color coding as the most important design element to ease wayfinding activity in a space (Arthur & Passini, 1992; Doğu & Erkip, 2000).

¹ Corresponding Author. ORCID: 0000-0002-6832-4197. Research Assistant, Başkent University, gumusaybusra@gmail.com

² ORCID: 0000-0002-5352-0195. Instructor, Başkent University, ecseyhan@baskent.edu.tr

This study includes maze design as open public space and color coding is the design problem that given students to be used as a tool for wayfinding activity in the designed maze. Previous studies used mostly designed spaces with purposes like hospital, school etc. and color used as design element for wayfinding activity. Color usage and wayfinding studies in the previous literature are searched and guided the current study.

2. Color Usage for Wayfinding Activity

Color is an influential design element in a designed environment for wayfinding (Read, 2003; Mahnke, 1996). To get success in completion of a wayfinding task, the user needs to achieve and understand the efficient environmental information (Read, 2003). Color application is a way of conveying to the user environmental information for evaluating the designed environment (Mahnke, 1996).

Read (2003) conducted her research in children's environment and explained that physical settings of environments that designed for children are most commonly varied and complex; therefore, designers of these environment should consider about the significance of creating environment that support users' wayfinding abilities (Read, 2003). Color is an effective element for this defined purpose because it is easily applicate with a variety of materials. Also Olds (2001) explains that color evokes feelings and physical reactions that have impacts on users' space experiences.

Hidayetoglu et al. (2012) conducted a study to understand lighting and color effects on wayfinding in interior spaces. They also searched attractiveness and remembrance of colors (Hidayetoglu, Yildirim, & Akalin, 2012). They found that warm colors are highly ranked as more attractive and rememberable. They also added that these qualities are not changed under different color temperatures (Hidayetoglu, Yildirim, & Akalin, 2012). It means that under all kinds of lighting color temperatures, warm color like red, orange and yellow are considered as more efficient for remember route or specific areas. They also found that both cool and warm colors considered and perceived negatively under low lighting levels (Hidayetoglu, Yildirim, & Akalin, 2012). Also males preferred brighter illuminance levels when it compared with females (Hidayetoglu, Yildirim, & Akalin, 2012). This findings lead conducting hypothesis for current study. It is thought that students would prefer warm colors when they are trying to define wayfinding in a maze.

Gibson (2009) explains that color usage in interior spaces especially for children and healthcare spaces is explored recently. He adds that it is important to use and apply color in public spaces to allow people in wayfinding activity (Gibson, 2009). As Gibson explains the meanings of color, he supports that color greatly influence people's experience of environment (Gibson, 2009). As people easily identify themselves with colors, designers insert them in problem solving and organizing element of a wayfinding design program. Colors could aid people identify, navigate through even bound emotionally to a place (Gibson, 2009). It is known that fundamental color coding system is explored in early twentieth century by traffic engineers (Gibson, 2009). Color is thought as a key element to solve traffic problems and lead people when they are finding their way. After 1950s, color

usage studies in designed spaces as an element to wayfinding has increased (Gibson, 2009).

Another study used kind of maze design and searched the effect of color on performance in wayfinding activity (Jansen-Osmann & Wiedenbauer, 2004). This study tries to analyze colored and non-colored space to help wayfinding results shows that color helped people for wayfinding (Jansen-Osmann & Wiedenbauer, 2004). In the mentioned research, researchers tried to conduct a survey for analyzing the effect of color (Jansen-Osmann & Wiedenbauer, 2004). However, they explain that wayfinding activity and the drawing strategy is not same so that survey knowledge could not be suitable for explore color effect on wayfinding activity (Jansen-Osmann & Wiedenbauer, 2004). With the consideration of explained literature and scopes of previous studies shaped the aim of current study.

This study mainly focuses on color usage of young adults for wayfinding activity. As the previous study explains that survey is not a suitable way to conduct wayfinding studies, current study uses design problem for design students to analyze effects and usage of color in the maze for wayfinding activity. The main aim is to analyze the color usage and its effects on wayfinding activity in a maze as a public interior space in an open area. To achieve this aim, following research questions and hypotheses are set:

RQ1: What are the color preferences of design students for wayfinding activity in a public space?

RQ2: Do design students mostly prefer tints or shades of colors when they define route to access a space?

H1: Students mostly prefer warm colors for wayfinding activity.

H2: Students mostly prefer tints of chosen colors to define specific places.

3. Method of the Study

This study conducted in computer aided design course in 2018-19 spring semester. The scope of the course includes short-term design problems and maze design is the problem for sixth week. The students had four hours to finish their design. The total area of 1000 m² was given and students did not have any other restrictions. Students are asked to make their maze design as much as difficult. Extra four hours were given.

3.1. Participants

Participants were second year students in interior architecture department. All of them at the ages between 19 and 22. Total number of 67 students finished their color study. 12 students were male and 55 of them were female. Because of this inequality, gender effect is not taken into the consideration for this study. Table 1 reflects the demographical data of participants (table 1).

Table 1. Demographic data of participants

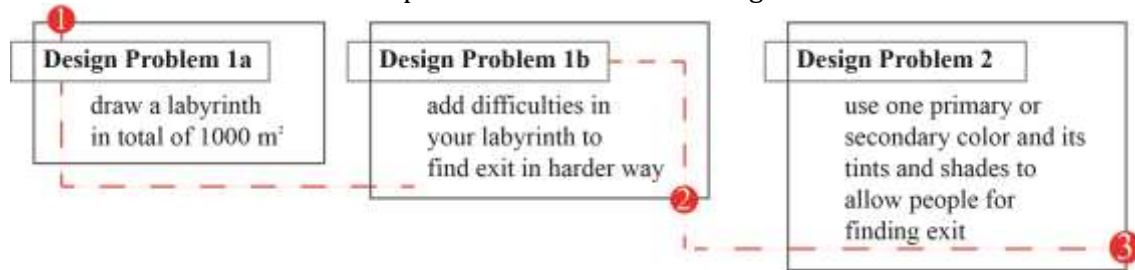
Characteristic	Category	Frequency	Percentage
Gender	female	55	82
	male	12	18
Age	18-20	37	55
	21-23	30	45

Table 1 demonstrates that age group is young adults. Gender distribution is not equal and female participants are 82% of total participant number. All of the participants are interior design students in the same university. Thus, the color knowledge could be accepted as the same for all participants.

3.2. Experimental Process

The experiment conducted in Interior Architecture and Environmental Design department Başkent University. In the scope of Computer Aided Design course, students were given a design problem as maze design in an open area. Table 2 reflects the experimental design process (Table 2).

Table 2. Experimental Process for Design Problem



As the first step of the process, students designed a maze in an open area that is limited as 1000 m². Before this point, wayfinding studies and open public spaces are basically introduced. In the second step, color coding for wayfinding activity is defined and examples were shown. Public spaces like schools and hospitals with color coding for wayfinding are explained and importance of color for public spaces are introduced. Then, they are asked to apply color on their maze design to allow people find their way easily. At that point, basic color terminology was repeated. Primary and secondary colors explained. Color harmonies and natural law of harmony was defined. As the problem, they asked to choose one primary or secondary color and use tints or/and shades of chosen color to define the route for exit.

4. Findings

Used colors and the way that are tried in use are analyzed in findings. Each design is evaluated. Drawings divided mainly two groups; first has warm color schemes and the second has cool color schemes. After that division, usage types are evaluated. Findings shows that there are three types are preferred; first type is

usage of both tints and shades, second type is the usage of only tints and third one is no tints or shades, only one tone of the chosen color.

First part of the analyze includes numbers of preferred colors. Results shows that 22 students preferred red color, 18 students preferred blue, 8 students used green, 7 students used purple, 6 students used yellow and 4 students used orange for wayfinding activity. 2 students preferred achromatic color schemes (black, grey, white). This finding shows that almost equal numbers of students preferred warm (N:32) and cool (N:33) colors for wayfinding activity (Table 3).

Table 3. Color preference distribution

		frequency	percentage	frequency	percentage	
PREFERRED COLOR	WARM	RED	22	32,8	32	47,7
		ORANGE	4	5,9		
		YELLOW	6	8,9		
	COOL	BLUE	18	26,8	33	49,2
		GREEN	8	11,9		
		PURPLE	7	10,4		
		ACHROMATIC	2	2,9		

Table 3 demonstrates that most preferred color is red (N:22), and the second high used one is blue (N:18). Findings also reflects that primary colors (red, blue and yellow) are preferred more than secondary colors (orange, green and purple). Frequency of primary color usage is 46 (68,6%) and frequency of secondary color usage is 19 (28,3%). It is obvious that secondary color choice under cool color scheme is higher than warm color scheme. It means that green (N:8) and purple (N:7) preferred more than orange (N:4). When warm and cool color usages compared, frequencies are almost same. This results means that hypothesis 1 that comes from the previous literature is rejected (*H1: Students mostly prefer warm colors for wayfinding activity*).

Color tones, tints and shades, are also examined. Results shows that students mostly preferred usage of tints colors (N: 33). 25 students used shades and tints together. A few of participants preferred to use only one tone of the chosen color (N:9). Table 4 shows the numbers of students who preferred color tones for each color (table 4).

Table 4: Frequencies of color usage

	Red	Blue	Green	Purple	Yellow	Orange
tint	12	12	2	1	4	2
tint and shade	9	6	5	3	0	2
one tone	1	0	1	3	2	0

Findings reveal that tints and shades of colors allowed designers to create efficient environments for wayfinding activity. This study shows that most of the design students used tones of colors for this purpose. Almost all of them used tints and shades. Most of the students preferred tints for wayfinding activity (table 4). This finding proves that H2 is approved (*H2: Students mostly prefer tints of chosen colors to define specific places*).

4.1. Warm Color Schemes

Findings for warm color schemes shows that most of students, who preferred warm color, used tint tones to define correct path for wayfinding activity. As we consider 32 participant used warm color schemes, 22 (68,7%) of 32 people started with darker tones and finished with tint tones. As table 4 demonstrates the frequencies for each color, 25 of 32 people (who used warm color) did not used shades of the chosen color, they only applied tints.

Figure 1 includes three example designs created by students. Left side includes red color and its tints and shades. Visitors starts with shade tones and when they walk closer to the exit, colors get lighter and at the finish point, the most tint colors are preferred. Second example includes yellow color and tints, student preferred usage of higher chroma on the correct route that lead people for wayfinding (Figure 1).

Figure 1: Three example for warm color schemes



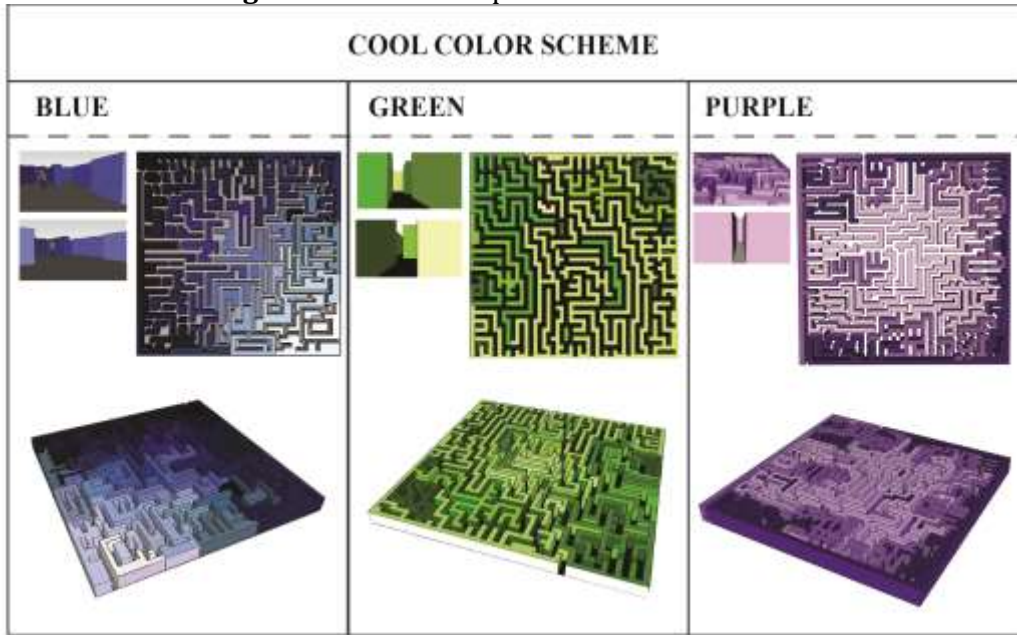
The study shown in the right column on figure 1 uses orange as the main color. Only tint tones of orange are preferred. This study also uses black on the floor and it increased contrast with tint tones. Shade tones are not applied for this study because student aimed to increased contrast to make easier wayfinding activity. When these three warm color compared, usage of tints could be considered more successful in red and orange color schemes. As the yellow reflects tint quality in its original Chroma, making tints of yellow creates less contrast and wayfinding activity is not easy in an environment without contrast usage.

4.2. Cool Color Schemes

Findings shows that design students who preferred cool colors tints and shades equally. Table 4 demonstrates that 14 students preferred only tints of a cool color and other 14 preferred tints and shades together. 12 students of 33 (36,3%) started darker Chroma and used tints for correct ways for exit. 10 of 33 students (30,3%) preferred shades to define correct path. As table 4 reflects the frequencies, 4 people over 33 that used cool color schemes used only one tone to lead people for wayfinding activity.

Figure 2 includes three example for cool color schemes. Left side show the blue color usage for wayfinding activity (Figure 2). It shows that student preferred tints and shades of blue. She started with shade and applied tints for correct path. She used floor with white. Design in the middle demonstrates the green color usage. Student used black on the floor and to increase contrast, she preferred tints of green. She applied tints green on the walls in the way of correct path (Figure 2). In the right side of the figure 2, usage of purple included. As the purple reflects shade quality naturally, student included only tint tones with natural Chroma (Figure 2). She applied tints for correct way and included darker values for the wrong direction. It seems that contrast value is higher in cool color usage and contrast creates visibility.

Figure 2: Three example for cool color schemes



5. Results

The aim of the study is to search about the color effects for wayfinding activity. Design students faced with a design problem and applied colors in their designs (maze design). Findings revealed that preference for color usage equally included warm and cool color schemes. Previous studies mostly mentioned that warm colors are more preferred in an environment for wayfinding activity. However current study has no difference on the warm and cool color schemes.

When design qualities are evaluated, it is found that contrast increased design quality for wayfinding activity. To increase contrast effect;

- Tints of cool color schemes are preferred mostly,
- Darker Chroma preferred on floor
- Shades mostly preferred in warm color schemes.

Another finding reflects that primary color choices (68,6%) higher than secondary color choices (28,3%). Secondary color preferences higher in cool color schemes (green and purple) than warm color schemes (orange). Only 4 students preferred orange and it could be considered as surprising because orange accepted as dynamic and positive color. Most preferred color is red and second preferred one is blue. Only 2 students did not prefer Chroma, they used achromatic color schemes (white, grey, black) to define correct paths.

In further studies, this study could be conducted in real environments. Maze is not defined for a function, if this study conducted for a space with a function, preferences could be changed. In some examples, entrance and exit is not defined clearly, for further studies, entrance and exit could be given. If this study could be conducted with student who are not study design, preferences could be changed. In this case, a comparison study between design students with different disciplines could be conducted.

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