

Hair Design Study Embodying the Symbolic Image of Water

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Abstract

In contemporary society, the growing emphasis on appearance as a key factor in shaping one's external image has become a criterion for evaluating individuals and plays a significant role in influencing interpersonal relationships. The quickest way to alter one's appearance is by changing one's Hair style. This not only reflects an individual's sense of beauty through the medium of hair but also conveys the cultural elements valued by the society to which the individual belongs. Since color serves as a catalyst in our lives and enables us to distinguish between objects, the images evoked by color can elicit various emotional responses in individuals. Therefore, we develop a functional color plan based on scientific research. Recently, as the demands for functionality, culture, and aesthetics have evolved beyond the mere application of color in various fields, there is an increasing need for objective and rational data regarding the effects of color. As the use of color has expanded across different domains, color planning has become more sophisticated, incorporating complex elements such as image association, symbolism, functionality, safety colors, and restricted colors. It has long been recognized as essential for all living organisms, including humans. Water possesses numerous physical properties, and its transparency gives rise to a phenomenon known as refraction. The refractive properties of water distort the shapes of objects viewed through it and alter the direction and appearance of light passing through. In this study, we aim to convey the visual and sensory experience of water through hair dyeing and hairstyling, drawing inspiration from its symbolism and material properties.

Keywords: Hair Style, Water Droplets Image, Color, Hair Dye, Munsell's Theory

1. INTRODUCTION

In contemporary society, the growing emphasis on appearance as a significant factor in shaping one's external image has become a criterion for evaluating individuals and plays a crucial role in the development of interpersonal relationships [1]. Hair styles not only reflect an individual's aesthetic preferences through their hair but also convey the cultural elements valued by the society in which they reside [2]. Hair design encompasses visual design, form design, and sculptural design; however, the preservation of these forms is nearly impossible to replicate in a permanent manner. Color, whether derived from the natural hue of the hair or achieved through bleaching, dyeing, and hair coating, is a powerful element in creating hair images. It serves as a variable that allows identical shapes and textures to evoke entirely different hair images based on color.

Water is a fundamental element of nature and the source of life, serving as a vital component for all living organisms, including humans. When we examine the essence of water, we recognize the essence of all life on

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Earth. The flow of water symbolizes the flow of life [3]. Water possesses numerous physical properties. One such property, known as horizontality, refers to the state of being flat, not tilted, and aligned at right angles to the direction of Earth's gravity. Flowing water represents a process of leveling due to gravity, while standing water achieves equilibrium through gravitational forces. Surface tension is the result of two forces that affect the surface of water: one is the adhesion between water molecules and other substances, while the other is the cohesive bonding force among water molecules. Tens of millions of water molecules create tension at the surface due to cohesion, but when undisturbed, the surface remains relatively unchanged. However, the interaction of external forces or energy, such as splashes, droplets, and torrents, generates tension on the water's surface, revealing various phenomena that arise from cohesion [4].

In this study, we utilize Munsell's color system to select adjectives that represent each color from a vocabulary related to water. Corresponding images and representative colors are extracted, and RGB values are converted to Munsell values. These values are then analyzed and selected as dyeing colors, which are applied to hair design.

The anticipated outcomes of this research are as follows:

- This research will introduce a novel method for selecting dye colors based on images of natural objects.
- It will offer practical guidelines to assist in the development of new designs.

Therefore, this research aims to understand the convergence of the beauty sector and its relationship to hairstyles. This study is significant not only for providing data on the selection of natural products and hair colorants but also for exploring the development of new designs. It is expected to serve as a foundation for advancements in hair design.

2. EXPERIMENTS

Hair image refers to the overall impression created when the design elements of form, color, texture, and others are applied to the hair. The visual characteristics of these elements, whether considered independently or in combination, evoke emotions and feelings that influence the psychological impact of image perception [5]. Furthermore, Kaiser (1990) noted that the morphological aspects of a hairstyle play a significant role in shaping an image. Various elements, such as how a hairstyle frames the contour of the face, are perceived as a cohesive whole, which affects overall evaluation [6].

Taking the aforementioned studies into account, it can be concluded that shape, color, and texture are the fundamental elements that constitute a hair image, and that these elements work in unison to create a cohesive representation of hair.

2.1 Shape

The shape of the hair refers to the overall hairstyle, which encompasses various forms such as long, short, loose, or styled up. This overall hair shape contributes significantly to the overall image. The shape of the head can influence the hairstyle, with common forms including round, bell-shaped, oval, and triangular. A round shape features a circular outline that closely resembles the head's shape. The bell-shaped Hair style is characterized by hair that is gathered at a single point, creating a sense of weight. In contrast, the oval shape typically features longer hair that gradually increases in length from the top to the nape, enhancing femininity with strands that extend below the jawline [7]. The triangular hairstyle involves gathering the weight of the hair at the crown of the head, often incorporating a mix of waves and a wavy bottom section. Reason: Improved clarity, vocabulary, and technical accuracy while maintaining the original meaning.

2.2 Color

Color as we have observed, refers to the hue of an object and is perceived by the retina of the eye, which stimulates the optic nerve when light interacts with the object whether it is reflected, transmitted, or absorbed [8]. Our perception of color arises from the presence of light, enabling us to see and interpret all substances and objects, not just their colors. This visual perception is fundamentally linked to the properties of light.

‘When classifying these perceptions, we identify several categories: the spatial distribution of light, temporal changes in light, contrast perception, and color perception. Among these, color or hue represents the

specific perception of color that we encounter in our daily lives.

Color standards are the means by which color is consistently and accurately measured, recorded, communicated, and managed. This process involves quantifying and physically measuring a fluid known as light in a quantitative manner, particularly in relation to human emotions, which can be variable and subjective. There are two primary methods for recording colors: one relies on a color palette, allowing colors to be identified through direct visual inspection, while the other employs a numerically predetermined method for ease of recording and storage [9]. These methods include the Color Appearance System, the Munsell Standard of the Korean Standards Industry, the Munsell Standards of the United States and Japan, the Natural Color System (NCS) of Sweden, and the Deutsches Institut für Normung (DIN) color system of Germany [10].

2.2.1 Color Association and Symbolism

As a color stimulates visual perception, the mental image of a concrete object or an abstract concept associated with that color is referred to as an association. Many color names are linked to the general hues of specific objects, such as forsythia, sea blue, and sky blue, which evoke certain experiences or memories. For instance, when we see red, we may think of specific items like the sun, blood, or lipstick. This phenomenon is known as color association, where a past memory in the human mind a blend of sensations, thoughts, ideas, and emotions is triggered by a color stimulus, suggesting various related concepts.

The associations we have with colors can vary based on factors such as age, gender, education, and personal experiences. However, when a multitude of opinions is collected, a common color association or symbol often emerges. Our daily experiences shape a wide range of color impressions. While individual perceptions may differ, the emotions we generally experience tend to be similar. These shared reactions to colors, influenced by our experiences and learning, are referred to as color associations. When we perceive an object, we relive our past perceptions of it, and all our thinking, learning, etc. are based on association. The association of color is influenced by the person's environment, experience, memory, etc. and varies depending on generation, region, age, gender, and the personality, occupation, and education of the individual, so it is an association based on each person's subjective feelings, but there is a commonality within a certain range, so it can be considered to include objective tendencies. This association of color is a customary and fixed feeling, but when it is generalized, the color takes on a certain symbolism. This can be seen as an emotional response from our minds and a social norm based on rules [11].

2.2.2 Fusion Style with a Forward-Looking Vision

Art trends refer to the prevailing styles and movements in art that have defined specific eras. These trends have significantly influenced not only the art world but also broader cultural and artistic domains, including design. Metallic materials, characterized by a futuristic sensibility, along with simple color combinations, became mainstream. Minimalism, which emerged in the 20th century, was integrated into Orientalist clothing, emphasizing simple beauty through the pursuit of straight, concise lines. This approach highlights the elegance of Oriental forms by minimizing materials, carefully selecting patterns, and moderating decorative elements.

2.3 Properties of Munsell's Color System

Munsell (1858-1919) was a renowned American painter. As a color researcher, He utilize color as a quantitative physical measurement. The common senses of human beings are not measured or evaluated according to a specific system. Sensory Color According to Human Centered Perceptual Registration. The system was conceived, and even though the color was not measured, the eye Efforts were made to make it observable. The resulting color and brightness were carefully analyzed. The stages of saturation are grounded in the ancient Greek theory of the three attributes of color [12].

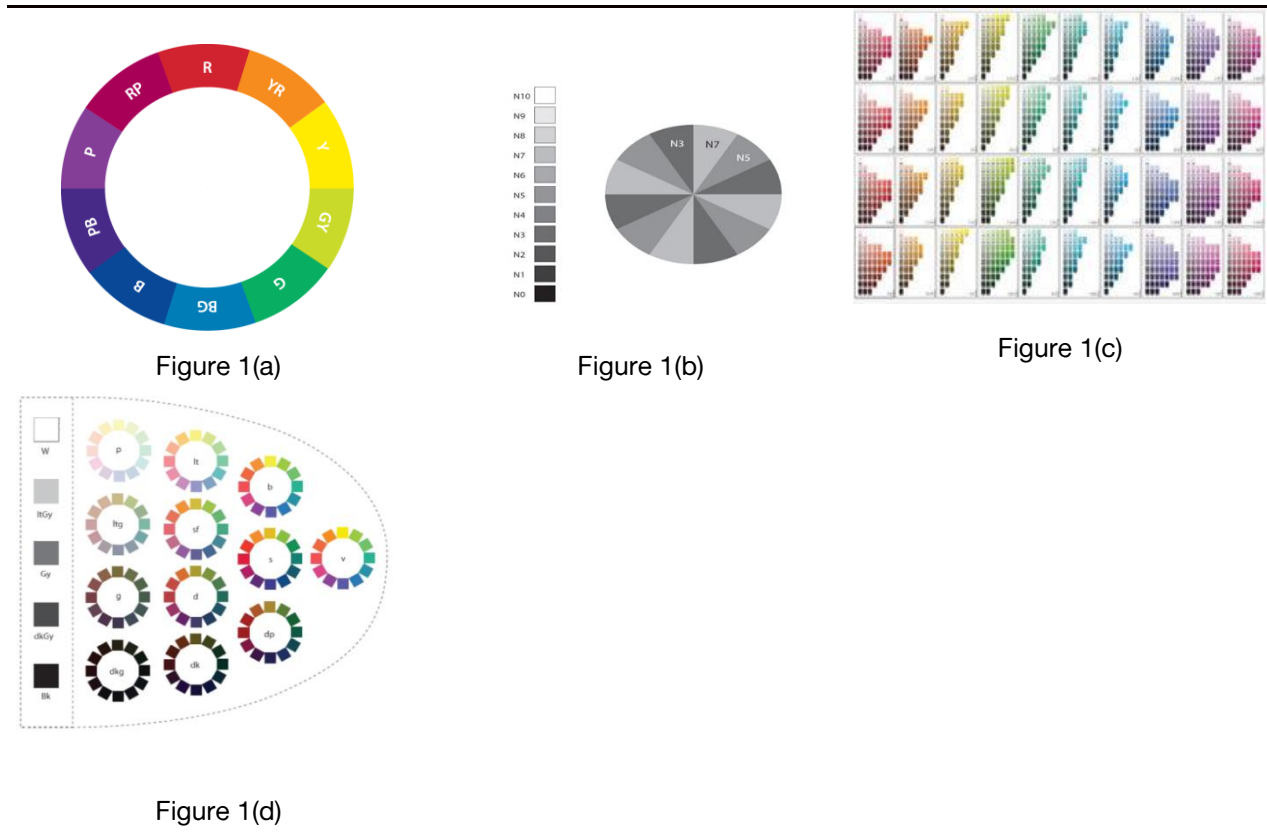
2.3.1 Hue

Munsell's color system is based on three primary attributes: hue (H), value (V), and chroma (C). The primary colors are represented by the symbols R for red, Y for yellow, G for green, B for blue, and P for purple. As illustrated in Figure 1(a), there are 10 distinct hues, with intermediate colors such as yellow-red, green-yellow, blue-green, purple-blue, and red-purple positioned between each primary color. Each of the 10 hues is further subdivided into 10 levels, resulting in a total of 100 unique colors. This system is three-dimensional,

effectively encoding and expressing the attributes of color [13].

As shown in Figure 1(a) [14], eleven tones from the Munsell color system were introduced in a previous study to describe general color settings. These tones include the basic colors: red (R), yellow (Y), green-yellow (GY), green (G), blue-green (BG), blue (B), purple-blue (PB), and red-purple (RP). Additionally, three achromatic colors were classified as white (W), black (B), gray (G), and multi (M) when the primary color was ambiguous, or the pattern was diverse.

Table 1. Munsell Color System



2.3.2 Value

Luminance refers to the degree of lightness or darkness of a color, determined by the reflectance of light. It is important to note that reflectance differs from lightness. Luminance possesses an isometric nature, meaning it corresponds to the L* value in the steps perceived by the human eye. In contrast, reflectance is an absolute physical quantity that is measured using specialized equipment. For instance, a reflectance of 19.8% represents the midpoint of the brightness scale, which encompasses approximately five levels. Munsell's concept of luminance is based on a scale ranging from 1 for ideal black to 10 for ideal white, as illustrated in Figure 1(b) [15], with the perceived difference in brightness between these extremes being visually equidistant [16].

As shown in Figure 1(b), the surface color of an object perceived by humans is represented as gray, which corresponds to an intermediate stage achieved through gradual isopathy. This representation uses a scale that expresses brightness in terms of light and dark, independent of color, with ideal black designated as 0 and ideal white as 10. The maximum white observed for the object's color is 9.5 steps, while the maximum black is 2.5 levels; colors below 1 do not exist as object colors.

2.3.3 Chroma

The degree of greyness refers to the extent to which a color appears clear or cloudy. The intensity of a color is determined by the level of color perception, which ranges from white to grey, as illustrated in Figure 1(c) [17]. With achromatic colors at zero, chroma increases as the viewer's perception becomes more evenly distributed, with the purest color exhibiting the highest chroma. Munsell's original design specified a maximum saturation of 10 ; however, advancements in paint formulations have increased this limit to 16.

As shown in Figure 1(c), saturation refers to the degree to which color properties are present in an object's hue. Lightness, in terms of brightness, remains constant when discussing saturation. This concept includes whiteness in relation to white surfaces and serves as a measure of the distance between white and black concerning achromatic colors. In other words, saturation indicates the level of color intensity within the Munsell color system. It applies to the color of an object and is defined solely based on the reflected color of a pure object, excluding fluorescent materials or reflective surfaces.

2.3.4 Tone

Tone is a concept that encompasses three attributes: color, hue, and saturation, as illustrated in Figure 1(d) [18]. It is distinct from chromaticity, which is a composite term that includes color and saturation (note that chromaticity does not incorporate the concept of lightness). The ISCC-NBS color naming system identifies colors using adjectives based on their hue, a practice also adopted in the Practical Color Coordinate System (P.C.C.S) developed by the Japan Institute of Color Research. Tone not only conveys the meaning of a color but also evokes sensory and emotional imagery, serving as a linguistic tool for communication [19].

2.4 The Symbolism of Water

Water is often regarded as a symbol of mystery and purity due to its sparkling and transparent nature. Although it is a common substance encountered in our daily lives, it also serves as a source of inspiration for many artists, as it takes on various forms depending on external conditions. First, water droplets small, round bodies of water spark endless imagination. These droplets can range from tiny spheres to dynamically fluctuating clusters, and even to large circular or oval shapes that vary in form. The diverse imagery associated with water droplets is influenced by their surrounding environment. Polka dots, in contrast, create a level of interest that water alone cannot achieve, capturing attention more quickly than even natural objects. Table 3 summarizes the meanings attributed to water in existing studies.

Table 3. The meaning of water revealed in existing research





Physical Implications	Symbolic Meaning	Sculptural Attributes	Material Properties
Transparency	Cleanse and Heal	Rhythm	Horizontality
Horizontality	Creation and Destruction	Repeat	Refractivity
Reflectivity	Cycles and Flows	Incremental	Transparency
Amorphous			Cohesion
Hearing			

2.5 Artwork Created from the Shapes of Water Droplets

Artists across various fields utilize water droplets as a subject, expressing their unique interpretations and perspectives through diverse formats. As shown in Figure 2(a) [20], the theme of 'nothingness' representing the extinction of the ego, is conveyed through the vanishing droplets in the painting. Furthermore, Figure 2(b) [21] captures falling water droplets using a high speed shutter, revealing the beauty of these droplets that often goes unnoticed by the naked eye. As shown in Figure 2(c) [22], the act of throwing water into the air and

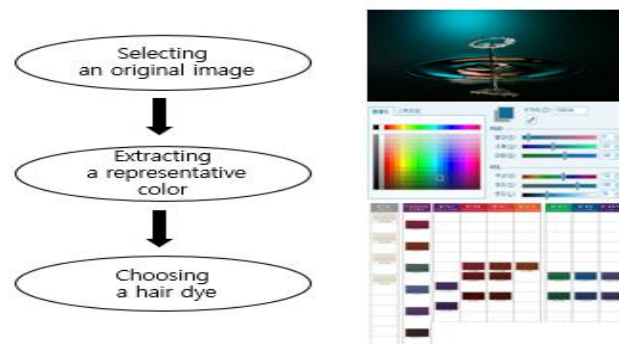
allowing it to fall under the influence of gravity enables the camera to capture the ever-changing shapes of water. This process employs the temporal and spatial qualities of water to create a piece titled 'Water Sculpture,' which embodies beauty in fragility and imperfection. By photographing both human creations and natural phenomena at precise moments, the artist has produced a work that signifies the essence of existence. Additionally, the abstract figurative piece, realized as a sculpture that naturally deforms under gravity with minimal manipulation of water, is represented as 'Fish out of Water,' as shown in Figure 2(d) [23].

Table 4. Artwork Featuring Droplet Shapes

			
Figure 2(a)	Figure 2(b)	Figure 2(c)	Figure 2(d)

3. RESULTS

3.1 Research Methods



Among the adjective words representing each color, the words related to water droplets were selected, and the corresponding representative images and representative colors were extracted, and the RGB (Red, Green, and Blue) values were converted to Munsell values for analysis and selected as dyeing colors as shown in figure 1.

Figure 1. Representative color extraction method and Munsell value conversion process

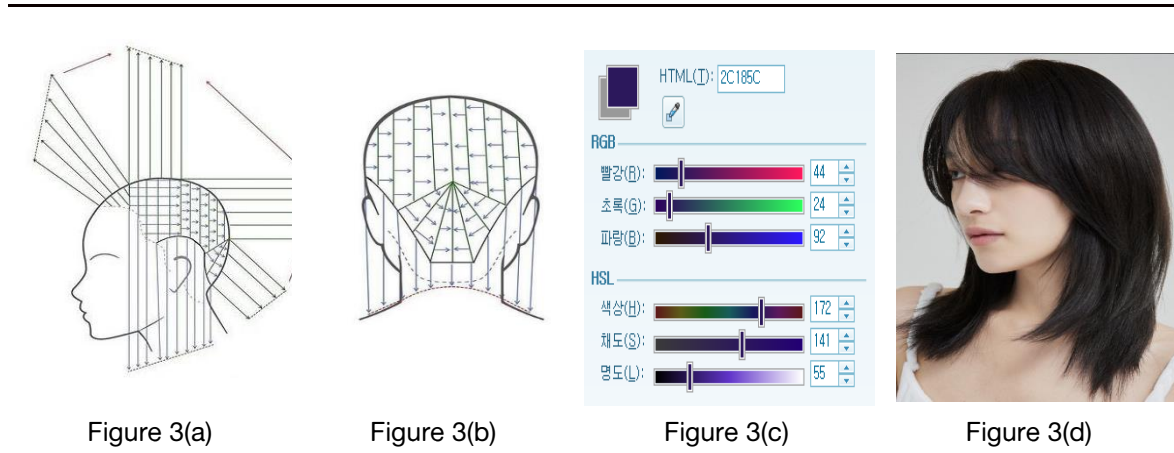
3.2 Representation of Hair styles

When creating the hair design, the length and style were determined based on the diagram. The result is as follows.

3.2.1 Shape

The curved, dynamic shapes that capture the moment water droplets fall are unified by a consistent arrangement of form and direction, creating an appearance reminiscent of hair in both volume and shape. Hair zoning was accomplished by dividing the entire head into six to nine distinct zones, resulting in a geometric and varied silhouette, as shown in Figures 3(a) and 3(b). The hair color was strategically applied to enhance the design, making the outline of the shape and the edge of the cut appear sharper, as shown in Figure 3(c). Additionally, gradients and contrasts were utilized to further enrich the design. The hair was also textured appropriately to showcase its flexibility, as shown in Figure 3(d).

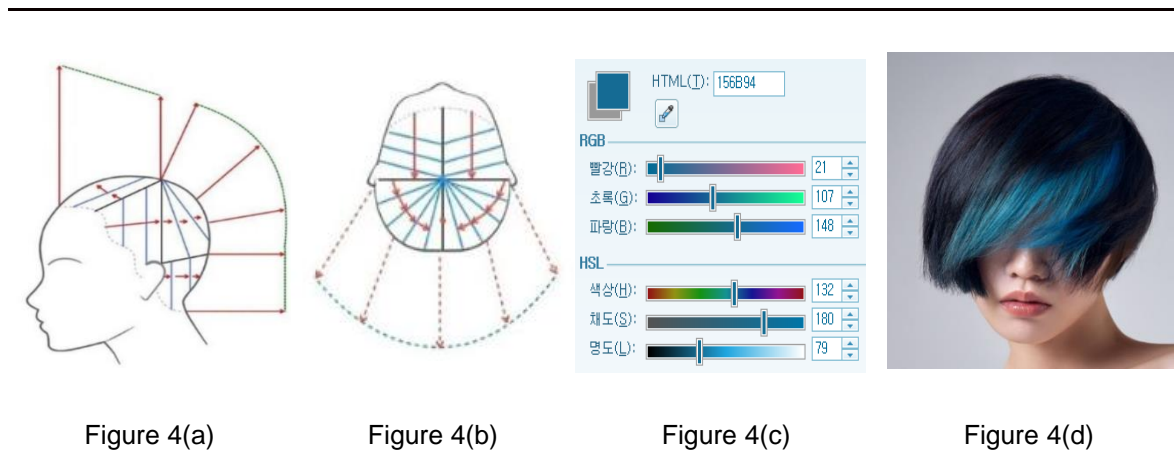
Table 5. Representation of Hair style Shapes



3.2.2 Spaces

The dynamic space created by the curved motion of falling water droplets is continuously composed, with the expansiveness of this space illustrated through positive intersections. This spatial representation stimulates the imagination. The color palette features a series of traditional Korean colors that evoke the innocent and delicate essence of water, reflecting the pure vitality of life. The hair design was organized by dividing the entire head into six zones, as shown in Figures 4(a) and 4(b). The hair color was rendered as a gradient of a single hue, as shown in Figure 4(c), utilizing blunt cuts and sliding techniques to achieve a light texture, as shown in Figure 4(d).

Table 6. Representation of Hair style Spaces

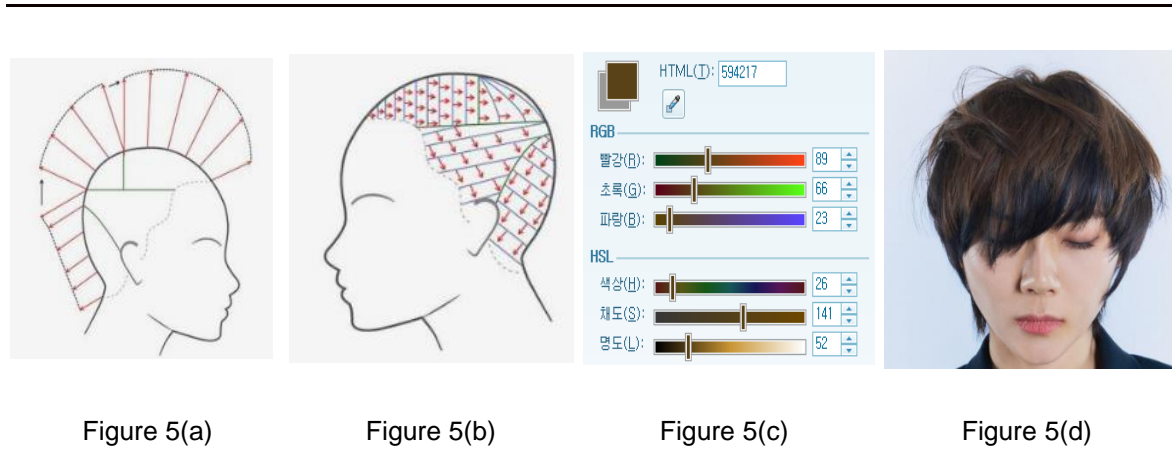


3.2.3 Volume

By creating a variety of sensations that change, such as the evaporation of water vapor resembling mist or

the effects of light, we enhance the variability of sensory experiences associated with water droplets. The hair zoning was established by dividing the entire head into eight distinct zones, as shown in Figure 5(a). Additionally, the hair color was manipulated to create multiple cut lines in the occipital region, ensuring that darker colors did not dominate, as shown in Figure 5(b). The techniques of blunting, sliding, and layer tinting were employed, with the result is shown in Figure 5(c).

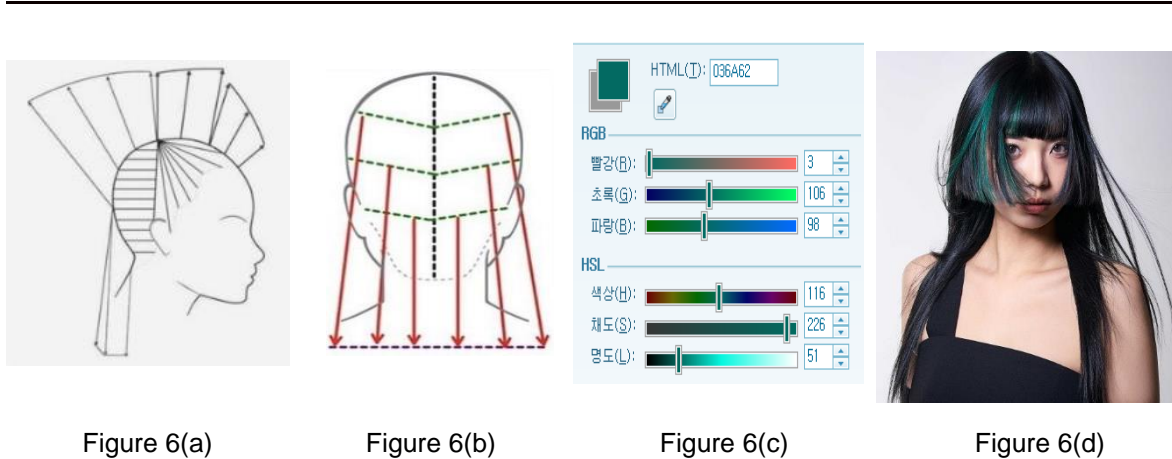
Table 7. Representation Hair style Volume



3.2.4 Texture

The artwork conveys the elasticity of life through the repetition of water droplets and the stimulation of texture and sensation. The image of a water droplet suggests infinite diversity; water, a liquid that disperses into microscopic droplets and is transformed by light, serves as a medium of extreme variability. It flows freely, deforms, and changes into gases and solids depending on the environment. The hair design features a hime cut that gracefully frames the sides of the face, dividing the entire head into four distinct zones, as shown in Figures 6(a) and 6(b). It is crucial to partition the zones around a central point when working on this section. As you approach the center point, the amount of hair decreases, necessitating careful cutting. The hair color is green, as shown in Figure 6(c), and the blunt, slicked style is employed to achieve the result as shown in Figure 6(d).

Table 8. Representation Hair style Texture



4. DISCUSSION

Through a vocabulary of adjectives related to the various material properties of water and Munsell's color scheme, We explored the works of other artists that depict water and water droplets. We categorized these works into four main elements: form, space, volume, and texture, which We then incorporated into hair design.

In terms of form, 'Water Sculpture' in Figure 2(c) is characterized by a gradual transition to darkness. Regarding space, the depiction of falling water droplets in Figure 2(b) is inspired by the work and is expressed using cool colors. For volume, Figure 2(a) represents the evaporation of water vapor, resembling mist or the reflection of sunlight. This piece captures the sleek and luminous quality of reflections in expanded water droplets. The texture is derived 'Fish out of Water' motif in Figure 2(d), which is naturally deformed by gravity, flowing and transforming freely. This work illustrates the transition of water into gases and solids, showcasing maximum variability and infinite diversity depending on the environment.

5. CONCLUSIONS

The results of this study on hair design, which embodies the symbolic image of water droplets, are as follows. Based on the diverse material properties of water and Munsell's color system, the works of other artists who captured the characteristics of water were examined. These works were categorized into shape, space, volume, and texture, which were then utilized as elements in hair design to enhance the final creation. First, in understanding the concept of shape, the hair was reimagined as a dynamic, curved form that captured the moment water droplets fell. The hair area was segmented into distinct sections of the head to create various silhouettes, and textures were applied to emphasize the hair's flexibility using a gradient. For the hair color, RGB values were set to 44, 24, and 92 to enhance the visibility of the cut line, resulting in a rich purple hue. Second, the section that conveys the sense of space is created by repeating the dynamic, curved motion of falling water droplets, enhanced by imagination. The RGB color values are set to 21, 107, and 148 to evoke a sense of life through a light hue. A gradient technique and blunt cut were employed for the hair cut. Third, the volume demonstrated variability in changes by producing a range of altered quantities. For hair color, the RGB values were set to 89, 66, and 23, resulting in a brown hue. The haircut employed blunt cutting, sliding techniques, and layered tinting methods. Fourth, the texture was designed as a hime cut, utilizing blunt and sliding techniques to create a slimmer appearance in the front side zones, thereby enhancing elasticity. For the hair color, the RGB values were set to 3, 106, and 98, achieving the desired result. It is hoped that this study will provide an opportunity to create a variety of hairstyles through a more expressive representation of natural elements, such as water and water droplets, which are abundant materials. A limitation of this study is the scarcity of previous research, resulting in a lack of objective data. Therefore, future efforts should focus on the continuous organization and collection of data. In subsequent research, it is anticipated that innovative designs inspired by natural objects, utilizing various cutting techniques and colors, will continue to appear.

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