

THE POWER OF COLOR IN GAME DESIGN

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Abstract. *According to this study, color plays a fundamental part in each facet of human life and games are not an exception. A universal approach to color is essential for the game design industry, considering factors like color blindness and cultural nuances. Commonly comprehensive palettes not only expand the audience, but also enhance accessibility and entertainment. Besides, color does not solely transcend mere aesthetics, but it henceforth acts like a strategic visual utensil that shapes behavior. By toggling pigments, designers can profoundly influence player experience, and as a result create pattern reflexive performance. Initially, the color palettes barely set the mood, different schemes triggering various psycho-visual associations from past experiences and, as a consequence, shape the state of being of the individual. Ultimately, visual feedback mechanisms that rely on hue interchange, mold a habitual impulsive chain of actions, as a result manipulating the individual into taking specific actions. On the whole, comprehending color theory and its implementation in game design enables the creative team to craft immersive experiences that have an impact on the individuals.*

Key words: *visual feedback, psychology manipulation, pattern reflexive performance, palette, psycho-visual associations.*

Introduction

Color represents the visible spectrum of the electromagnetic radiation, also known as light. Being one of the main stimuli of the autonomic nervous system and hormonal activity color does not solely depend on vision and light, but also on subjective interpretation, as it affects both physiology and psychology of mankind [1]. Color constitutes the central subject of capturing human attention, so that it is feasible to perceive its decisive role in the visual communication report. In game design, color is one of the most structured weapons that control the player-behavior.

In order to comprehend the significance of color sensitivity within the game building process, it is vital to be judiciously aware of its roots. One of the main contrivance in this sphere of knowledge consists of the color wheel, which was primarily introduced by Sir Isaac Newton, and later on embellished by the American painter, Albert Henry Munsell. The artists carved a system that measured and demarcated colors, by introducing three dimensions. Chroma, also known as saturation, portrays the intensity of color. Color value, alias brightness defines the lightness or darkness of color. Lastly, the hue states for the mixture of primary colors in varying ratios [2]. On the whole, understanding the interconnection between color, psychology and physiology is essential for dismantling human behavior and subsequently assembling an alluring game.

1. Universal approach

Color vision deficiency represents the incapacity of the human eye to catch the true tone of the surroundings, occurring when eyes' photopigments do not work properly or are totally missing [3]. As the global population continues to rise [4], so does the prevalence of colorblind individuals. It is essential for game designers to take this segment into consideration, in order to enlarge the audience. One effective way is to create universally comprehensive games that

maintain contrast whether the person has a color vision deficiency or not. Complementary colors, while providing a high rate of contrast, often are troublesome and may require saturation or hue adjustments. For instance, most of the categories of people with color blindness struggle to distinguish red-green pairings, however, if the brightness of those colors is drastically divergent, they are easy to be depicted. In contrast to that, blue-red-yellow palette is color-blind-friendly and can be diversified for healthy-viewers by toggling the purity and hue of those colors [5]. Sometimes, opting for monochromatic schemes or lightness-based contrasts, rather than color based contrast, can ensure inclusivity, because all people can differentiate tints regardless of color vision status [6]. In essence, fostering equal access to resources in design not only accommodates a particular section of the population, but also augments the gaming experience for everyone.

2. Inducing in a state of being

Human beings are naturally inclined toward sticking to their initial impressions and tend to stiffen their stance, even when confronted with compelling evidence arguing the contrary. Taking into account the fact that the brain takes roughly 200 milliseconds to decode and create an initial perception of a facial expression, it is readily understandable the swiftness of its processing a plain color palette [7]. In video games, colors set the primary consideration and instantly adjust the gameplay tone even before it begins. Not only that, color is a cogent way to summon players' emotions. A monochromatic palette, built with blocks of different shades of a single color, fortifies the message and mood of the game. However, each of those might broadcast two opposite connotations, some illustrative examples of that are: single chroma blue, that is very calming, but simultaneously evokes a state of distance and coldness, and red that might induce the player into feeling courageous, excited, but also angry and endangered. In due course, single-colored schemes' emotional feedback is strongly relying on the rest of the game structures, such as audio-design and illustration style. Following, achromatic schemes, originated from the minimalistic correlation of black, white and shades of gray, may evoke feelings of anxiety or sadness. In this case, it is important to take into account the hues, due to the fact that the yellow-tinted palette has the capacity to induce the player into a depressive mood way faster than the blue-hued one, due to its lack of evident contrast. Conversely, analogous colors, that are adjacent on the Newton's wheel, create a sense of harmony, due to their common existence in nature. For instance, yellow-orange-red palettes in games provide a sense of peace, because human beings subconsciously associate those hues with sunsets or flowers. Even so, it is important to keep in mind that if during the gameplay, the shades suddenly get dull, the player will feel promptly jeopardized and taken out of their comfort zone. This state of being can also be hewed with another chromatic scheme, the triad combination, forming an equilateral or isosceles triangle on the color wheel. Nonetheless, harmony might be maintained, if one of the colors is dominant, while the other two are subservient. Additionally, if all those schemes combine dull and bright shades the game will induce the player into a mysterious state. Overall, different colors can create a specific atmosphere depending on the lightness, hues and combinations, and as a result be a useful tool to chop an immersive video game.

3. Providing feedback

Feedback is one of the main tools to identify the strengths and weaknesses of an individual [8]. Reckons of all kinds are a pivotal part of the game that serves as a basis for improvement. Whether it is a subtle change of color, or a bright color indicator, those are fundamental guide elements. They can indicate the players' actions and the consequences of those, that make the player learn to make better choices, improve their conduct and subtly enrich the gaming experience. For instance, red lightning might indicate lowering health points due to wrong players' decisions, and green lightning due to right ones. Through those visual narratives, players dissolve into a virtual world. On the other hand, a light green color might indicate the poison's presence. Chroma cues can also serve as storytelling devices. An interpretive example is the gradual modification of the screen lightness ratio as the player gets closer to the victory point, while the

blinking of red indicates the vicinity of the hazard. In conclusion, fostering colorful visual cues assembles the pillars that sustain the player's journey.

4. Level division

As satisfaction is an interim state of mind that individuals experience when fulfilling instantaneous necessities, it is staunchly important cutting the whole game structure into levels in order to maintain the dopamine level [9]. Color delineates a critical part of spatial design. More primitive games use direct level division through colors, by differentiating the palette of the first level from the second one as in “Anodia” or by creating a day-night cycle [10]. In the sophisticated three dimensional games, artists employ a technique known as reverse color dynamics, they use the brightness changes of colors to form the dimensional relationship of the scene and mold the point of focus. In this case, the elements meant to be situated in a significant distance from the player have lower purity degree, a vague contrast balance but higher brightness, whereas the objects situated in close proximity are depicted in a solid dyed manner and have a higher differentiation capacity in juxtaposition. The subtle toggling of color contrasts not only empowers the visual realism, but also guides players' attention. The focal spot, being an important part of level division, catches the players attention where the designers desired it, in order to create safe or dangerous zones. The simplest way to supply a portion of the screen with a focus center is to ascend the contrast and color purity, for instance, menacing areas are duller than the shielded ones. Additionally, the screen can be hued with red when the individual steps into the danger area or with green either when he or she follows the right path or is near the poisonous source.

5. Creating behavioral patterns

It is undeniable that guidance is an important educational utensil in generating the orientation in each aspect of a human life from its early beginnings [11]. In the gaming world, where players explore challenging environments and dive into their stories, the strategic use of counseling becomes of crucial importance in maneuvering the player's journey. By gluing the color utilization to reflex behaviors, designers have the power to reach the final level of consciousness and ultimately to manipulate the player's motivation. Contrasts, in particular, become prominent as powerful mechanisms for capturing and directing focus. As data reveals, color perception accounts as a notable part of general object analysis, so it is pivotal to employ chromas in order to guide the players into the desire to take the actions you want them to. Reflex behaviors can be generated through repetitive exposure and conditioning within the environment. By consistently associating a specific color with a particular outcome, designers can train players to instinctively react in a predetermined way. An explicative example of that is using the blue lightning in a maze, in order to indicate the right pathway taken towards the destination, while the purple one shows the vice versa.

This subconscious conditioning can be caught by the human brain, and ultimately dictate the decisions taken by the individual, even though the color differentiation is subtle. Besides, in shooter games, a subtle change in screen hue and brightness can be used in order to indicate danger, and the necessity to seek for shelter. Moreover, the presence of a day-night cycle or a level design interplay of color value and category conditions the players to adapt and take action in accordance with the changing environments and the preconditions of those. Another way of sculpting involuntary and rapid responses is to use traditional stimulus. For instance, the presence of yellow signals the existence of a valuable treasure, like gold or money, so a trail of glowing yellow will prompt mechanic reaction, driving the players to investigate the area and reveal the hidden riches. Similarly, the presence of lurking mistic green will indicate a poisonous area that should not be crossed. On the whole, by leveraging reflex behaviors and capitalizing on color perception, designers have the power to foster the decision-making process of individuals.

Conclusions

Color acts a profound part of game structure, influencing not only the aesthetics but also player status and behavior. Understanding color susceptibility and adjusting it in the game-building process is pivotal for attracting and retaining an extensive audience.

Hewing universally intelligible games that consider the color-blind segment of the population, benefits the player base expansion and magnifies the gaming experience for each individual. Additionally, we ought to bear in mind that apart from setting the tone and evoking emotions, chromas do also supply precious feedback, sustain a crucial division level and create involuntary praxeological patterns.

Altogether, by comprehending and carefully manipulating the reverberation of color in games, designers can effectively mold and lead player experience and conduct.

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