Color design in game development

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Abstract

The thesis has been created to work as a color centered guide to be used as JAMK University of applied science's study material. The thesis aimed to find out how much does the color scheme of a character affect to first impressions the consumer will get when playing the game, what are the things you have to keep in mind, how does the global and religious symbolical meanings affect the colors and do certain color combinations work on a randomly selected audience.

The thesis encompasses surface level touch for variety of areas that need to be kept in mind when designing a color scheme for character, starting with brief insight for color history, color blending options, color psychology and symbolism. Further the thesis focused into giving a summary of the character design process. The background research is conducted in quantitative manner, where books, articles and other sources are utilized. Additionally, for the research, a small-scale survey was produced to test the principles of color theory and color symbolism in practice. As a result, a small guide was formed that provides a look into character creation and the factors that should be kept in mind when designing a color palette which proved to hold great importance throughout the characters design progress to create desired effect, meaning and immersion.

Keywords (subjects) Color Design, Character Design, Game Design,

Miscellaneous (Confidential information)

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Keywords

Hue	Basic color of light
Value	The strength of the color
Chroma	Strength of white and black
Tone/shade/color	Mix of Hue, Value and Chroma
Subtractive	Colors are added eventually resulting in black
Additive	Lights are mixed resulting in white
Diffuse	Two colors are mixed resulting in combination of the two
PC	(In games) Playable character
NPC	(In games) Non-Playable character
AD	(In game development) Art director

1   Introduction

There are numerous factors to keep in mind when creating digital content. Over the past decades, games have expanded their influence among the consumers to become one of the most popular aspect of consumer media. Unlike in the late 20th century, Games are a now a channel to which some people can build their careers on, socialize, relax, or escape the reality. A research conducted by Limelight found, that in the United States in 2018 showed, that an average gamer spent roughly over seven hours every week, with 34% of the people playing 7 – 20+ hours every week. This means that the user will look at the gameplay for extended periods of time. (Limelight, 2019) As the consumer will be watching the game world for extended periods of time, it is important to have the characters, environment and the general visual aesthetics well thought out to keep the player properly immersed and one of the immersion creating factors is the color.

To summarize, aim is to produce a document that covers the subject of color design and symbolism in a general manner. As colors are a global matter with numerous varieties depending on culture, religion, and personal experiences, the purpose of the research is to create a "guide" for people interested of content production or to those who lack any experience about content production and/or color design.

The research will be conducted in a quantitative manner, where the subject is dealt in a general manner. For the research, two notable books are used as a foundation for the research. First book is Värioppi by Seppo Rihlama and Kelervo Varsa, which even though was published in 1997, it holds the basic principle of color theory, which has remained mainly unchanged through the years. The second book is Värit pintaa syvemmälle by Martti Huttunen, which covers the colors in a broader manner also containing information about color history, color research and color symbolism. In addition to the books mentioned previously, other articles and sources will be utilized to create a proper comprehensive collection of information. Furthermore, the theory will be put to test in a survey which will be created utilizing the theories of colors.

2   Colors in general

Colors can be considered as an essential part of human life, the colors are seen on daily basis in warning signs, they are created to attract of divert attention and colors are a factor used in interior design to induce a certain feeling or emotion. Colors have been found out to affect to enjoyment, mood and even into health and that is the reason why colors have such a deep-rooted effect in us. (Rihlama 1997, 5)

2.1   Colors and their six levels of generalization

According to Huttunen Colors can be categorized into six levels, which incrementally go from public and more easily generalized into private and less easily generalized due to the sheer amount of variation between individuals. (Huttunen 2005, 34-44)

2.1.1   1st Archic level

The 1st Archaic level is the most "automated" level of all colors, this makes it also one of the most easily generalized levels of the seven. It is formed of the neurological and biological information of a mammal inherited throughout thousands of years of evolution. The 1st archaic level is rooted basic animalistic primitive instincts, how an animal perceives cold and warm temperatures, day and night cycle, seasons and alike. For a human being this also manifests itself as the comfortable feeling brought by warm colors which represent the day and warm seasons, where oppositely cold colors remind of night and cold seasons. (Huttunen 2005, 36)

The 1st Archaic level is rooted into the basic instincts of an animal, to which a human can be included, and the effects of light and dark influence the central nervous system for example as it effects the so called biological clock of a human. Additionally, this affects people for example in the form of blue and yellow light provided by electronics. (Huttunen 2005, 36)

2.1.2   2nd Archaic level

This is the primitive purely instinctual behavior, it is guided by biological heritage which is either suppressed or enforced consciously by the animal's own psyche, through effects of learned repetition. (Huttunen 2005, 39)

The 2nd archaic level, is another level that affects a human's reaction to color, which is also strongly tied to our primitive instincts. This level of color perception is commonly witnessed with food, how the food looks and whether the color is perceived as edible or not. This level is rooted into the basic survival instincts and is very easy to notice, test and evaluate for example with food. if a meat would be colored blue, a regular person would most likely be hesitant to taste it, as the brain would deem the food inedible. This behavior has been noticed in foods which have been purposefully colored in unnatural way or in a color that is subconsciously deemed unfitting for human consumption. (Huttunen 2005, 40)

2.1.3   Level of culture and history.

This is the affected by information which is rooted from the visual stimuli in cultural history and its influence from surrounding factors into an individual's behavior. This level starts to be less easily generalized as the individual influence and variation emerges, albeit the sheer mass of the population in any certain cultural area make the generalization easier.

The level of culture and history is rooted in our everyday behavior, this level is completely formed by the thoughts, practices, behaviors and legacy left to us by our previous generations. This level is constantly modified, improved, and changed generation after generation as positive influences are respected, improved, and refined while the influences deemed negative are removed, suppressed, or shunned. (Huttunen 2005, 41)

The level of culture and history is completely fabricated by humans and the clearest examples are visible in culturally tied clothing and fashion, architectural style and other general visual features which have been generated throughout generations. On this level the meanings to color symbolism are formed and it can generally be said that how common some certain color symbolisms are, older the symbolical meanings are in terms of history. (Huttunen 2005, 41,104-105)

2.1.4   Social level,

This is the level on which the socioeconomical effects of colors affect human behavior. Due to the variation in global socioeconomical situations, this level is more

difficult to generalized when compared to the level of history and culture, as this level is narrowed down to individual's surrounding communities. (Huttunen 2005, 41). Even inside a cultural sphere, there can be countless social communities and they may not correlate with each other even though the cultural background may be the same.

Due to the social level being affected by any community of individuals, the color symbolism and their direct meanings are deeply affected inside that so-called community bubble. In general, every community has their own respective hierarchy and it affects the social level of colors in the perceived values of color, which indirectly influences the means of communication through color.

In a regular individual's life this social influence can be noticed most commonly in clothing and alike visual material, and it is no wonder why to some individuals a color of the clothes, car or other may have a sizeable communicational significance. (Huttunen 2005, 42)

2.1.5   Cognitive level,

According to Huttunen, this is the level which is most affected by the individual's personal experiences and the rational perception of the color and their links to the said past experiences. This is the second hardest level to generalize, as every individual's personal experiences vary greatly from person to person. (Huttunen 2005, 42)

Throughout the lifetime of an individual a person forms subconscious connections and associations to colors, and those preferences will be a major factor in everyday life where most obvious signs of this are the preference in decoration colors, interior design and what emotions an individual feels about given colors or color palettes. (Huttunen 2005, 42)

This Cognitive level is also important factor in marketing and design. In marketing campaigns, it is crucial to deliver the wanted message to the selected target audience to assert trust or other desired association. The color's must be well thought through and must be sure that the color combinations do not create any unwanted associations to them. (Huttunen 2005, 42). For example, in central Europe it wouldn't be a good idea to have any type of flag which consists of a red

background with a black symbol inside a white circle as this would be instantly perceived to resemble the Nazi flag, this example is also partially tied to the sixth level of colors. (Huttunen 2005, 43)

When a designer is creating a color scheme, the person must keep in mind his own preferences on colors while also trying to avoid creating color schemes that please their own eyes, instead of pleasing the target audience's.

2.1.6   Emotional level,

This is the irrational emotional level of the colors, which are controlled by the associations related to the colors and the subconscious strong emotions brought with them. This is the hardest level to generalize as this level is shaped and formed by every individual through their own feelings, experiences and alike. (Huttunen 2005, 43)

The emotional level is the target most advertisers are trying to target with their campaigns. Especially in advertisement campaigns they aim to repeat some aspects of every advertisement, it may be color combinations, clothes of the people in the advertisements or even visual effects. The purpose of the method above is to teach a individual to associate certain colors to their product, which is why for example coca cola logo has had the same color style for decades. The former is also one of the crucial parts in building a brand, and it can be considered successful if the wanted model of thinking has been built into the minds of possible customers. (Huttunen 2005, 43)

2.2   History of color research

As previously said, colors are a subject that are studied and researched in variety of ways and especially in modern days not only colors are studied to be used in arts and graphics, but they are also studied for their uses in physics, psychology, medicine and information technology.(Huttunen 2005, 46)

The research of colors has been an ongoing practice among the people who have used colors in their professions and practices like tanners, dyers, merchants and alike

to which colors have had the importance in sales. According to Huttunen one of the earliest researchers of color has been Aristotle who lived in 384-322. (Huttunen 2005, 47)

Aristotle was a Greek philosopher who noticed that looking the sunlight pass through blue piece of glass creates green color, from this he noted that green color is formed from mixture of yellow and blue. Additionally, Aristotle noticed that the change in day / night cycle affects the tonality of the mixed color due to changes in the amount of light available from sun. Aristotle's thoughts and theories have been used by numerous color scientists in building their own color theories.

The research conducted by Aristotle has been utilized throughout the history as a foundation stone to create color theories to form the modern idea of color theory. Among the list of contributors to the list of remarkable contributors to modern color theories two people have been taken as an example in this chapter. Sigfrid Forsius and Johann Wolfgang von Goethe.

Figure 1: Visualisation of the Natural Color System (NCS)

Sigfrid Forsius, was a Swedish philosopher who used Aristotle's color theories to create his research about colors. In his research published in 1611, Forsius presented four chromatic colors (red, yellow, green, and blue) and a median color of gray which was formed of black and white. Forsius is thought to be one of the influential contributors to a system known today as the Natural Color System or NCS. (Huttunen 2005,48-49; Rihlama 1997, 53-54)

According to Huttunen and Rihlama, another significant contributor was Johann Wolfgang von Goethe, who created one of the fundamentally important distinction between colors. Using the views of Aristotle Goethe believed that all the colors are formed between light and dark. Using Yellow and blue as primary colors he placed red, orange, yellow, green, blue, and purple into a circle, with early concepts of opposite color theory implemented into the colors. Additionally, Goethe believed that colors and lights affect an individual's senses and ethics. Goethe published two

books, Die Faberenlehre (1808) and Geschichte der Faberlehre (1810) in which he categorized colors in three categories.

- Physiological, subjective colors which eyes perceive.

- Physical, opaque, and transparent colors, which need colorless objects itself to be produced i.e. glass prism.

- Chemical, fabricated colors or colors which manifest themselves in objects or into the substances themselves.

The color theories of Goethe and his works have been widely considered as the first proper books about color theory, which resulted to his books being still referenced in works on the color theory field. (Huttunen 2005, 49; Rihlama 1997, 55)

2.3　Hue, value and chroma.

Every color is formed from two basic qualities: Hue, value and chroma. These three are only wavelengths of light, which together create the perception of color in any given object.

In his book: A color notation, Albert Munsell describes Hue to be one of the three qualities with which we can differentiate a color from another. Hue is the factor that tells the eyes what colored the color is, but itself it doesn't tell anything how light or dark the color is or how strong/weak the color is, but instead only dictates the perceived color of light that bounces from the object, into the receptors in the human eye. (Munsell, 16-18)

 Hue is nothing more than the tone of the color what is completely formed from the wavelengths caused by the light traversing into the cone cells of the eyes. The tones of hue can be categorized into two subcategories, first being the group of primary and secondary colors and tertiary colors.

Value dictates the darkness or lightness of the color. When talking about color, it is common to talk about tint or shades of color, but tint in color itself stands for the lightness of color and shade for darkness. Even though color strength can be categorized into tint and color by its light level the term shade has become the popular term for both. (Munsell, 19)
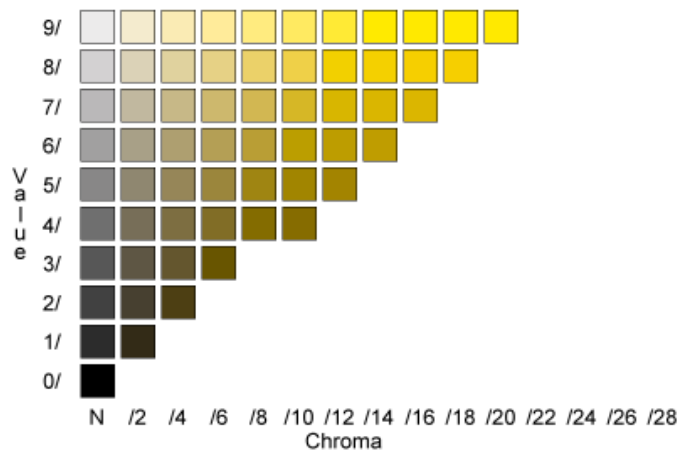
Figure 2: Color chart according to Albert Munsell's color theory. In the image one can observer the changes of yellow hue when the value and chroma

According to Munsell, chroma is the strength of the color which essentially can be described in how clear the color is. On the highest peak of chroma, the color is also clearest in its color.(Munsell, 19 -20) "Take two autumn leaves, identical in color, and expose one to the weather, while the other is waxed and pressed in a book. Soon the exposed leaf fades into a neutral gray, while the protected one preserves its strong chroma almost intact." (Munsell,1907,19). Quite commonly, if a color's chroma level decreases due to time and external influences the term fading is used, even though color's hue and value stay unaffected and only the chroma decreases.

Primary colors according to the RA-color circle are: Red, blue and yellow, while the secondary colors are orange, purple, violet, green and turquoise.
Tertiary colors are mixed colors between primary and secondary color and they are the mixtures of colors which don't mix according to the primary/secondary color mixing ideology. As an example of these color mixtures are the combinations of red and green, blue and purple, purple and green and so on.

2.4   Color blending methods

"It does not matter to the brain in what way the energy distributions of the light coming from the point of view are born." (Huttunen 2005, 56)

The way colors are formed have been the one of the prime subjects of intrigue and research when it comes to color theory and color research. As there are numerous theories about colors and how they work inside the human brain, there is no one and correct answer for it, only a variety of possible answers.

Most common color blending/color forming methods are divided into three categories: A light increasing additive method, light decreasing subtractive methods and diffuse, where two colors mix individually to give the impression of a different color. (Huttunen 2005, 57, Rihlama 1997, 72)

2.4.1 Additive color blending

Additive color blending method is formed of the RGB-color system, where all color mixtures are formed from red, green, and blue.(see figure 3) In the process the lightness of the different color tones multiplies in lightness, eventually leading to a pure white tone. (Rihlama 1997, 72; Huttunen 2005, 58)

The human color perception is mainly based on the additive color blending as the brain perceives and handles color formed through like or other methods of color formations. Even though this has been in the focus of the scientific research for a while, it is still mostly unknown how this happens in the neurological and nervous level. (Huttunen 2005, 58)

This Rgb-system of color blending is most popularly used in screens for example in color televisions and computer screens. Of the usage of rgb-system in screen-electronics one of the main contributors has been English Thomas Young, who presented that to see colors, an individual human being doesn't need individual cone cells to see all colors, but only three cones in the eyes are enough.

The RGB-color system is widely in use for screen based graphics, as the monitors and screens are itself built to operate on RGB-color.

2.4.2   Subtractive color blending

According to Rihlama (1997, 72,74-75) and Huttunen (2005, 57-59), subtractive color blending forms the CMYK-color system. (See glossary) This system is formed from the mixture of cyan, magenta, yellow and black. In the process, the amount of light in the color is subtracted from the blended color resulting into a gradually darker color for every blended color with the result being completely black color. (see Figure 3)

The CMYK-color system is most used in prints. due to its subtractive color behavior. Where RGB-color system starts from black and gets additive light into the color on every color addition, CMYK-color system starts from white and gradually creates darker color on every color addition. This is a favorable approach for printing purposes, as by default the printed paper is white. Additionally, CMYK-colors conserve ink during the printing process, as white tones can be created by decreasing the amount of ink instead of adding it, causing the lightness of the material create the perceived white.

Additive color mixing   Subtractive color mixing
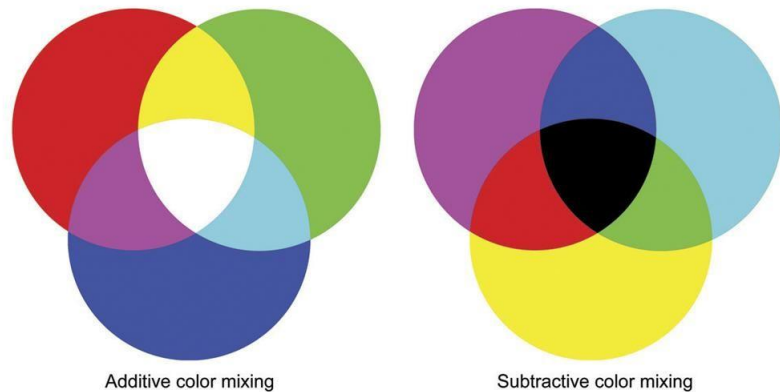
Figure 3: Principle of additive and subtractive blending. On left is demonstrated the mixing of three basic lights, and on the right the combination of three basic colors.

2.4.3   Optical blending / Diffuse

Optical blending is a form of color blending, which is formed solely from optical illusion. In this, a group of color sectors are mixed to form a consistent color. For example, if a disk colored with three different colors is rotated on a high velocity, the result is perceived visually to be a mixture of the three colors, due to the eyes inability to correctly keep track of all the three colors simultaneously.

In painting, this type of blending method is often referred to as pointillism, where the artist uses paint dots to create the image, in the process forming a visually understandable color mixtures even though the colors are just dots. One of the notable artists that follow the principles of pointillism and optical blending is Georges Seurat who used this color theory in his works. (Figure 4) (Huttunen 2005, 60-61; Rihlama 1997,78-79.)
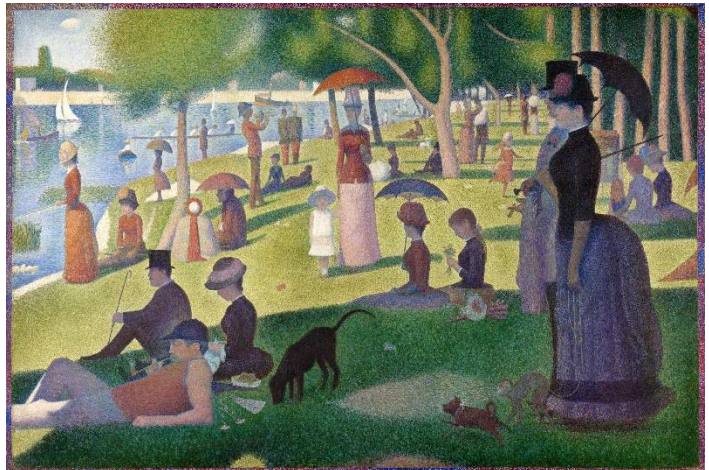
Figure 4: A Sunday Afternoon on the Island of La Grande Jatte, Georges Seurat, 1884

A common term used for optical blending is diffuse blending. The key principle of diffuse blending is to form consistent color when a pattern is shrunk down and repeated in iterative manner. When repeated and shrunk, the result will eventually be a mixed color of the original given pattern as shown in Figure 5.

c. David Briggs, 2007
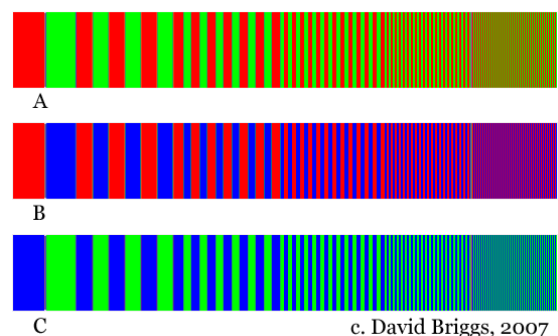
Figure 5: Examples of diffuse blending

In Diffuse blending, even small changes to the original pattern may change the result. For example, if in example A (Figure 5) if a person would add a white line in the middle of red and green, due to the iterative repetition of the color pattern, the

resulting color would me noticeably brighter when compared to the original color pattern.

Additionally, one part of the diffuse category is the mix of red, yellow and green colors most prominently seen in nature for example in leaves during fall. As the leaves are generally green. During the fall season the leaves start to have slight pigment changes and a mix of yellow and red discoloration starts to appear in them, causing a human eye to perceive them as a mixture of green, yellow and red. This phenomenon causes an issue when compared to pre-existing theories, for example when compared to the opposite color theory (according to which all colors could only blend with colors opposite to them) this situation should not be possible. (Huttunen 2005, 61-64)

When this aforementioned discoloration happens, without any specific term for these coloration changes more common terms are used, some examples could be faded green, dirty green, autumn leaf color and so on, as for their natural aspects most people who hear these terms can easily understand what type of coloration the individual is talking about.

3   Color and color psychology

Even though some may consider colors as a mere aesthetic aspect of life, it has numerous influences in human psychology.

In 1901 a critic named Carl Sceffler wrote in the journal Dekorative Kunst "People today have a remarkable relationship with color. Out time, which depends on the past more than any other for its forms, has produced a kind of painting in which color is independent" (Cage 2002, 249). This statement hold value even today, as colors are an aspect which surround people wherever we are. Those people with unimpaired color vision can on an estimate see about 2,3 million different colors (Maier and Elliot, 2013, p.96) which is the primary reason colors affect a large portion in an individual's decision making. As told in chapter 1.1.4, colors affect our decision making when doing purchases, buying objects, interior color palettes and other. Additionally, certain colors have been noticed to affect the enjoyment of an individual in any given space.

Often when spoken about color psychology the term "color language" comes up, which in general, is the very same aspect of color psychology. One of the contributors to the research on this topic was previously mentioned Goethe, who studied the effects of psychology in his book Theory of colors (Zur Farbenlehre, 1810/1967) in which he collected his observations about possible relations of psychological effects to color stimuli. In his observations, Goethe categorized colors into two categories, plus colors and minus colors. In the plus category he listed yellow, red and the combination of the two as colors which induced positive emotions(Goethe, 1810/1967,p. 306) and in the negative side he categorized color combinations between red and blue, which according to Goethe induced negative emotions, namely emotions of sadness, coldness and alike. (Goethe 1810/1967,310-312)

Even in his observations, Goethe noticed that even though some colors were categorized into negative and positive side respectively, small changes in the color combinations could take their perceptiveness to the other category, as an example he took as an example the sea-green color, stating the following

"*When blue partakes in some degree of the plus side, the effect is not disagreeable. Sea-green is rather a pleasing color.*" (Goethe, 1810/1967, 312)

As in color theory, Goethe's observations about color psychology/color linguistics have been widely used in further research on the psychological effects in human emotion. Furthermore, it is to be noted that even for a person of his time, Goethe's theory about the color temperature and its effect on emotions, mood, perception have been quite accurate and even regarded as useful information even today, (Gage, 32) though further studies have proven that the colors hold additional effects on emotional level. This chapter focuses on the psychological effects of color with some mentions of physiological effects which are associated with colors.

3.1   Psychological effects of primary hues

Red is a color, which according to Goethe's observations was often considered to induce positive emotions when pair with yellow (Goethe, 1810/1967, p. 306) induced negative associations with failure when used without any additive color. (Maier and Elliot 2013, p.102-104) In studies conducted between 2007 and 2012 had shown results of exposure to red color affecting a test subjects cognitive and motoric response with noticeable results on their general performance. With notable examples being their hesitation to interact with doors marked with red, physical avoidance of testing scenarios, taking longer to evaluate risks and on writing tests the subjects took more time to answer the given questions. It is also worth noting that red color is observed to be associated with failure even when no specific evaluation or testing scenario is present, for example a teacher writing text with a red pen has observed to cause associations with failure.

Alternatively, contrary to exposure to red or gray, exposure to green and blue, seemed to result more confident/positive results in the test subjects. (Maier and Elliott, p103-104)

Even though the red color used as an example above was often associated with danger, failure or uncertainty, color red has been observed to be used in social encounters as one of the means to attract attention. It was observed that men approached/interacted with woman wearing red colored objects more easily when compared to women wearing other colored objects. This was also a note observation when women were observed while interacting with a woman wearing red, additionally It was noted that women rated a woman wearing red more attractive than a woman with another color. (Maier et. al., 106-107)

Blue color is an opposite color for red, where red is observed to be warmer and more vibrant, color blue and especially light blue(also known as sky blue tones) is perceived cool, calming, focus improving and giving the feeling of spaciousness, where darker blue is felt to induce emotions of melancholy and sadness (Rihlama 1997, 109; Maier and Elliot p. 99,101-103). Even though the effects of blue tonality may vary from the individual's historical, personal, and cultural background, numerous findings have gathered observations of the soothing emotional effect when exposed to blue color theme. (Rihlama 1997, 109; Maier et. al., 109; Ruth Brent Tofle et. al. p. 05,15–16). Additionally, it has been observed that in social interactions women expressed attraction towards men wearing blue in similar fashion as men expressed attractions to women wearing red. (Maier and Elliott, p. 109) This could be explained with the observations made from green and blue, which were perceived as colors associated with confidence and reliability.

Yellow as a primary color has noted to result in positive, energizing, and dynamic emotions. Yellow can be used with darker tones to create contrast as well as lighter tones to create more luminous color. Alone as pure color it may cause irritation due to it is strong stimulating influence, but when used on a very light tone and paired with white for example it can bring a more comfortable colored lighting into the given space with observed positive effects into the mood. (Rihlama 1997,108; Maier et. al , 97) As light yellow (yellow hue with high chroma on low value) is considered as pleasant and "warm". A strong yellow is considered as alarming, for example it is quite common to see warning signs utilizing the yellow's ability to create additional contrast to the color mixture. For example, a yellow and black combination. This

color contrast makes the intended message not only clear to see, but also it makes the warning stand out from the surroundings.

3.2 Psychological effects of secondary hues

Orange is the color out of the secondary colors, which out of the three is the warmest colors and affects emotions in an arousing manner even though in more mildly manner than red. Orange hue works as a contrast enhancer, which makes this color highly used also in warning signs as its other forming parent color, yellow and like yellow it is used as a light tone to create extra warmth to a given color scheme. For example, orange has been in frequent use in the surroundings of the elderly, for example in wooden surfaces. (Rihlama 1997, 108; Maier et. al. 97; Ruth Brent Tofle et. al. 19)

Green borrows its effects from blue and yellow, respectively. Qualities of green have been observed to be perceived as relaxing, concentration enhancing and strong emotion suppressing while none of the effects appear as strongly as the pure hues themselves. Furthermore, Orange has been observed to enhance emotions/stimulus for example with food, as in one conducted experiment in which the participants were feeling a cup of hot chocolate tasted more richer when consumed from a orange or brown cups.(Rihlama 1997, 109 ;Maier et. Al., 110)

Shades of Purple is the color which is the darkest in its effect not only visually, but also psychologically. When presented in its darker form it gives the feeling of mystery, sadness, or uncertainty, but when presented in lighter tone it creates feelings of purity, hope, and calmness. (Rihlama 1997, 110,)
Shades of purple vary from the amount of red, blue, and white used when creating the color, and even different combinations have their own name. Of these different combinations, names like pink, violet and purple are used even though they all are formed from the hue, value and chroma combination of red and blue.

3.3 Achromatic tones in psychology

Black and white are both achromatic colors, which literally means "without color", White and black are consisting only of lightness without any type of chromatic colors in them. As the colors themselves are very strong, they are usually "softened" by combining them with other colors or by mixing them with each other. White is often softened with yellow colors to create more warmer shade of white, and black is often mixed with dark blue. (Rihlama 1997, 110)

White is the most luminous color with the highest lightness of all colors. When used as itself, white causes uneasy emotions of coldness, emptiness, and unnerving solitude but it can also be used in combination with other colors when the white becomes peaceful, clean, and pure.

Black is the darkest color and is almost globally associated with negative emotions. These emotions include but are not limited to aggression, sadness, and death (Rihlama 1997, 107,110; Ruth Brent Tofle et. al 31-32; Maier et. al.97,102)

As previously stated, white and black are both high contrast colors, which make them stand out of other colors easily. This makes both convenient to use in warning signs, information signs and alike graphics which require that the text stays clearly visible from the background color Additionally, white text with a black border stands out of every color. (Rihlama 1997, 110)

As such, black color could be considered as means to express human emotions, for example it had been observed that in pre-school, one child who had previously used variety of colors to express his emotions, one day colored everything that he drew black. This sudden shift in color tonality raised concerns between that staff and further investigation revealed that the child had received a spanking at home earlier in the morning. (Rihlama, 1997, 105)

From the examples stated above, one can draw the conclusion, that a single color may have numerous changes in their emotional effect to which even a slightest change in hue, value or saturation can change the emotion gained from exposure to the said color. Additionally, the psycho/physiological effects gained from colors are

linked to the situation the individual is currently in. However, outside the psychological interpretations of color, any given color may just be part of individual's color preferences, which are highly individual and can be categorized and generalized difficultly. (Rihlama 1997, 108; Maier and Elliot, 110;)

4   Color symbolism

Color symbolism is an important factor in the daily life, it is deeply rooted into human psychology and the emotions colors create upon exposure as well as being deeply tied into several aspect of every community and individual human being.

The color symbolism is a broad subject, which when placed into the six level of cultural generalization described in chapter 2.1 could reach from the third level into the sixth level, which makes the subject not only broad but also very convoluted on a foundational level.

When talking about color symbolism, color symbolism is formed from history and culture, refined by community and learned influences and finally personalized by a individual's personal experiences, color preferences and self-created symbolical meanings. All the areas of influence will additionally change even further under religious influence.

Due to the cultural influence into color symbolism, there is a wide variety of symbolical meanings in every culture, which may vary even drastically from community another. For this in this chapter, the color symbolism is categorized in to two main categories, eastern and western cultures as trying to create a suitable median point between these cultural frames would prove itself more than difficult.

Furthermore, this chapter will focus into color symbolism by several examples around the given regions, separated into cultural and religious frames.

4.1   Color symbolism in western culture

4.1.1   Color symbolism outside religion

Red in western cultures is commonly associated with love, passion, power, danger, and flame. In seasonal symbolism red is associated mostly with Valentine's day and Christmas (latter when paired with green). Even though this color is mainly associated in positive situations, for example in Russia color red sends negative symbolical meaning, as red was the main color in communistic symbolism even though red is also a wedding color.(Rihlama, 1997, 107-109; Morton 1997, 24-25)

Blue is a color which hold several symbolical meanings depending on the lightness of the color. Blue color as itself is associated with authority and calmness, while darker blue is associated with sadness and grief. When someone is feeling sad, they might say that they are "feeling blue". Light blue colors are associated with peace, purity, and innocence. (Rihlama, 1997, 107-109; Morton 1997, 28-29)

Yellow is associated with the sun and as such, is associated with warmth, happiness, and optimism. As stated in previous chapter, it is also a cautious color. In countries like France and Germany however, yellow color is associated with envy. Additionally, in a slight association with envy, yellow is often associated with Gold. (Rihlama, 1997, 107-108; Morton 1997, 32-33)

Green is the color of with numerous symbolical associations. Most on positive associations it is thought to symbolize nature, luck, and wealth, where for negative it is associated with envy, which is also apparent in a phrase "green with envy". Country wise, it is associated also with Ireland, as Ireland's national symbols are the four-leafed clovers and green color. This is also noticeable during the St Patrick's Day.

Purple in western culture is mostly associated with royalty, wealth, and spirituality. Purple has been historically in wide use in several noble emblems, coat of arms and insignias, and is also one of the heraldic colors, as well as the imperial color of ancient Rome. It is also associated with honor and as an example in the US military, the award named purple heart is one of the oldest awards awarded.

Orange is the color of fall, warmth, and energy. In Netherlands, orange is the royal color and for this the royal palace has been named house of orange.

Black is a color mostly associated with power, formality, and death. Most commonly black color is used to convey feelings to the symbolism stated to these.

White is a neutral color. It is mostly associated with purity, innocence, and peace. In symbolism it is used for example in white doves which represent peace.

4.1.2   Color symbolism in religion

Red shares symbolism with common symbolical meanings. In evangelical Lutheran symbolism it symbolizes flame, passion, and love (Divine love to be specific), with the added symbolical meanings to life and freedom (Rihlama 1997, 110) and red is also one of the four liturgical colors in evangelical Lutheran religion.

Additionally, red color in Christian religions symbolize the Holy Spirit and as such is used in context where dedication and servitude to the Divine is underlined as in the days of the apostles and martyrs. (Rihlama 1997, 111; Palmer (01.06.2020))

Blue, unlike its profane counterpart is symbolizing the sky, heaven, and hope. It is often used in connections with holy/sacred entities and it is also the alternate color for Advent to make the Advent differentiate itself from the season of Lent. (Palmer, wou.edu)

Yellow lends its symbolism commonly from profane symbolism representing light, purity, happiness, and strength. Alternatively, though, yellow being an off-white color, it is also connected to symbolize damnation, degradation, and cowardice. (wou.edu, Rihlama 1997,110)

Green is the most commonly visible symbolizing fertility, prevalence of life, and plentifulness. Additionally, in liturgical colors, green is prominently portrayed alongside red during Christmas season.

Purple in Christian belief stands for faith, penance and lent and such is used mainly during seasons associated with them. Especially deeper tones of purple are associated with the sovereignty of the Christ. (wou.edu)

Orange in Christian belief stands for warmth, life coming from sun and strength. In Christianity, often orange is associated mostly with fire, which in Biblical meanings symbolizes strength or power.

Black in Christian religion symbolizes the end. With it mostly being associated with death, void and absolute. These colors are most used in association with death, grief or the inevitable. For example, in liturgical colors, the color black is used during good Friday. (Rihlama 1997, 111; wou.edu; Palmer)

White is the color of purity, holy and divine. It is primarily used seasons where it is underlined that the matter of the subject is associated with holiness and purity ie. weddings, baptism and alike.

4.2   Color symbolism in eastern cultures

This chapter will focus onto color symbolism eastern cultures. As a term "Eastern culture" can cover a very large amount of countries and cultures, this chapter will use couple example countries with their common symbolical meanings for each.

4.2.1   Color symbolism in outside religion

Red shares its symbolical meanings with the west in some parts of the east. For example, in India and South Korea, color red is symbolizing passion and love. In China red symbolizes prosperity and celebration. On opposite side, in middle east red symbolizes danger or evil. (Sherwin Williams, six degrees (referenced 04.08.2020))

Like red, Blue color also has its symbolical meanings like in the west. In countries like South Korea and Indonesia, blue color is linked to emotions of sadness and mourning, while other countries like China, Iran and Turkey, blue is considered to represent wealth, spirituality, immortality, and trust.

Yellow in Eastern cultures is often deemed to symbolize sacredness and royalty. The latter is most prominent in countries like china, where yellow was the royal color of the emperor (Morton, 2001). Yellow is also considered as a color of sovereignty, power, and prosperity in other eastern countries like Saudi-Arabia, India, and Thailand alongside other countries in the middle- and far-east. (Six Degrees, Morton 2001)

Green shares partially its symbolical meanings with the western countries, as in some eastern cultures green is connected to nature, wealth, life, and fertility. (Six Degrees, Shutterstock). Additionally, green symbolizes virtue and peace. Green also has completely opposite symbolisms in countries like Indonesia, where green is completely forbidden color. In china however, while green is a color of nature, fertility, and desirability. It also is a symbolical color for infidelity. (Six Degrees, Shutterstock)

Purple is mainly a color of mourning and sorrow in eastern cultures. Whereas in japan, purple is linked to royalty and wealth, in other countries like India and Thailand purple symbolizes sorrow and mourning. (Six Degrees, Shutterstock)

Orange is generally linked with courage and happiness in the eastern cultures. In several countries orange also is deeply tied to spiritual meanings.

Black in eastern color symbolism is close to western symbolism. In several eastern countries black represents Formality, mystery, mourning, death and evil. In china however, black is often paired with red when it comes to weddings. (Six Degrees, Shutterstock)

Where White in western culture is generally associated with purity, life, and light. In several countries in the eastern region white color is associated with mourning and death. Prime examples of this are countries like Japan, China, Thailand and India, where in the latter two white color is associated with birth and reincarnation. (six degrees, Shutterstock)

4.2.2   Color symbolism in religion

Red is often connected to purity or life in eastern religions. In Hinduism red is often used as a color for events connected to purity like marriages, birth, and other festivities. It is also considered as a color of bravery or protection and is also color of Shakti which means for prowess. (wou.edu, 2015) Even though in Islam, red doesn't have a major religious significance it was seen in Muslim battle flags(Classroom,2018), even though it could be due to red color being globally used in flags and battle standards alike.

In Buddhist religion, red is in a way connected to life and wisdom. Itself red is connected to life, blood, and flame but the Buddhists hold the belief, that through meditation of the color, person can achieve wisdom of discernment free of attachment.(wou.edu, Sherwin Williams) It is worthy to mention, that in Buddhist art the Buddha Amitabha is often pictured with red skin color. (wou,edu, 2015, Sherwin Williams, Kumar 2002)

Blue color in eastern religion holds a variety of meanings, In Islamic tradition blue is believed to have ties to mystical or universally unknown events, this is especially believed with variant of blue color turquoise. (Rodriques, 2008; Williams 2018). The use of turquoise in relation to mysticism is also apparent in Buddhism, where turquoise is believed to bring good luck and at parts protect from evil or assure safety while also symbolizing eternal ascension. Buddhists also believe that blue is a color that transform anger into wisdom. (wou.edu, Sherwin Williams)

Protection from evil is also a prominent theme in Hinduism, where blue color is often associated with bravery or ability to overcome hardships through determination and strength of will. In Hindu art this is prominently shown with deities which have overcome major evil forces, most notably deities Rama and Krishna which are both often portrayed with blue skin. (wou.edu, Kumar 2002)

Yellow color does not hold any significant meaning in Islamic tradition unlike in Buddhism and Hinduism, where in Buddhism yellow is among the most symbolically significant colors and often associated with the Buddhist Saffron robes. This is due to Buddhist belief that yellow is the closest color to sun and therefore daylight.

(Wou.edu, Sherwin Williams). In Hinduism tradition, yellow is also significant color and shares partially it is symbolical meaning with Buddhist tradition. In Hindu religion yellow represents knowledge and peace, this is prominently shown in Hindu art, where powerful deities like Vishnu, Krishna and Ganesh are shown to wear yellow attire. (Wou.edu; Sherwin Williams ; Morton ,33)

In Buddhist and Hindu religions, the color saffron is often linked to the yellow tonality. In both religions saffron is deemed as significant, while in Hindu religion saffron is considered a sacred color. In Buddhist tradition it symbolizes humility, purity, rootedness, and freedom from material needs and desires. Where in Hindu religion it represents burning of impurities and as such is used in the clothing of the holiest men in the religion.

Green holds variety of meanings in eastern cultures with the joined symbolical association to nature and life that follows of it. However most prominently, of the three religions mentioned previously it holds the most significant association in Islamic tradition, where green has been represented for centuries and even in modern times Islamic countries, green can be seen in country flags and other national insignias in Saudi Arabia for example. There are several speculative reasonings for green's significance in Islam, some say that green was the favorite color of the Prophet Muhammad while other believe it's significance is rooted into the Quran, where it is mentioned that people wear green robes in the paradise. (wou.edu; Palmer; Rodriquez; Williams 2018)

In Buddhism and Hinduism, green holds symbolical significance, albeit not as significant as in Islam. In Buddhism, green is connected to nature as mentioned previously, as well as being the color symbolizing harmony, youthfulness, and action. Alike motives are found in Hinduism as well, where green is connected to the nature. However, green is also connected to happiness and stability and as such, is used during festivities. (wou.edu, Palmer*)

Black is a color with mixed symbolism. In Islamic tradition black can be associated either with good or bad. It is told the prophet Muhammad wore black tunic when he

conquered Mecca, but otherwise black is associated with malicious symbolism and as a bad omen (Rodiquez, 2008).

In Hindu faith, black doesn't hold any particular religious symbolical value through religion unlike in Buddhism, where black color is mostly associated with anger and desire to kill, which both are malicious emotions of which an individual should meditate and learn to steer away from.

White holds primarily positive associations in the three religions which have been used as an example in this chapter. In Islam, white color is used in the cloth covering deceased, in clothing of students and in the ruler's clothes. In Islamic tradition, white is also considered to be associated with beauty femininity. António Rodriquez states followingly in his article published in the Portuguese Army magazine Jornal do Exército: "For example, some Muslims believe that 'the whiter and stronger a woman is, the higher hypothesis that she will find a husband.'" (Rodriquez, 2008*)

In Buddhist and Hindu symbolism however, white color is not considered as a color itself, but as a combination of all bright colors. In Buddhist tradition, white symbolizes knowledge but in a sense that it is combination of all colors. White color symbolizes the clarity and light waiting at the end, after a individual has experienced all other colors, which together create an additive white. (Hansen, Kumar (2002))

A similar belief is present in Hinduism, where white is symbolizing knowledge and deeper meaning. As the white is believed to consist of other seven primary colors, it is believed to contain partial aspects and qualities of each of them. Most prominently in Hindu art, white is seen in the coloration of the goddess Saraswathi, who is often seen wearing a white robe. In other Hindu religious aspects white is also prominent, for example the social caste called Brahmin is associated with white, widows wear white clothing during period of grief and other deities in Hindu religions have parts of white color in them. (wou.edu)

5   Character design process

As mentioned throughout previous chapters, character design is an aspect of game development which can either enhance, immerse, and expand the game world and the experience following, or ruin the emotion, feeling and immersion completely.

During gameplay, whether the character in question is the player character (PC) or non-playable character (NPC) their role is to fit into the given world and through that create the immersion of the surrounding world in physical and social level. The PC role in games is to work as a sort of an avatar for the players, which creates the danger of player being pushed away from the immersion if the pc does not act, interact or behave the way the player wants it to. This situation can happen in cases where either the pc is not capable of doing what the player expects it to do, or alternatively does more than it should be able to do. (Isbister 2007). Furthermore, a well-developed character with its own motives, morals, and disposition steers player's playstyle to follow the character's intended playstyle. (Thompson, 94-96)

In Jim Thompsons book The Computer Game Design Course (2007, p. 95), Thompson has stated this followingly: "For example even though it is a militaristic game, Tom Clancy's Splinter Cell by Ubisoft requires the player to perform acrobatic levels of stealth and concealment in order to be successful. Attempting crude levels of violence leads to failure"

Due to the importance of character design in games, the whole development of a individual character could be described as iterative. Often, the early stages of character design include several variations of the character and its aspects, with several iterations from backstory all the way to the character's appearance.

According to Thompson (2007, 94-97), the whole character creation process can be broken down into steps of backstory (including information about background, abilities, relationships and so on), behavior, importance, and appearance. These parts will be explained further in the following pages.

5.1 Initial Design phase

5.1.1 Theme

When it comes to character design, one could even describe the process as arduous. Designer is expected to design the character from scratch, while constantly adjust to the possible changes other aspects of the game development will bring into the project.

At the beginning of the character design process, most designers collect various references relating to the theme at hand, a collection of these references is often called a mood board. These mood boards often consist of everything that can help to create the theme and the setting of the game or character in question. Of the mood board, the designer or possible other designers can seek references to get the same idea of the intended idea of what the character will later be like. Additionally, during these stages of development, the rough outline of the character's appearance, clothing and place in the world will be formed, even though these will not be the final iterations. (Thompson , Solarski)

In the design of the character's theme, designer must create the character to fit into the surrounding environment of the game, as the internal logic of the game world or verisimilitude is one of the crucial factors when it comes to the created game world. Even though this is not that important in the primary PC, it is more important in NPC-characters. (Thompson, 2007, 70-71) As an example if a game was set into a world where humans and orcs were fighting against each other, it would feel very out of place and immersion breaking if one of the npc-characters happened to be an orc in the middle of a city habited by humans without anyone even noticing.

5.1.2 Background

As stated in the beginning of the chapter, characters motives, morals, and disposition guide player action during gameplay. This however differs according to the importance of the character in play as for example the PC needs more character backstory than an NPC where additionally, the importance of the npc character defines the amount of backstory needed as well. The PC backstory defines how the

playable character would act in the game world, what are his/her motives, what are the pc's relationships to other characters, what is the character's history and how it affects the character in the story. This information gives the player the important information they need to know about the playable character, which tell what the character did before to lead to what it is now and why the character does what it does. Thompson (2007, 94-95) has taken Bruce Wayne from the Batman comics as an example for the backstory design, as audience can tell very quickly what drives him in his pursuit for criminals. The backstory of Bruce Wayne leads the audience to understand how the murder of his parents lead Bruce Wayne to become Batman.

 When it comes to the NPC backstory, a briefly seen character does not require as in-depth story behind them, as for example a recurring character does, which usually is a sidekick for the protagonist, or otherwise significant plot related character, but still the same questions need to be answered as when creating a PC's backstory. (Thompson 94-95)

5.1.3   Behaviour

Behavior is one of the noticeable details in character no matter what the character is. After the background, skills, and reason to be has been designed, it is time to create how the character acts, behaves and interacts. Behavior is a sort of an umbrella term for every aspect of a character's personality. How does the character speak move, dress, react to things? These are among the questions which provide information of the characters, which not only defines the character and intertwines with the aspects mentioned in 4.1.2, but also builds a base of which a designer can go create the character's appearance at later stages. (Thompson 94, Rogers 60-21)

As one of the examples of a character's behavior almost defining a character is the Doom slayer from the Doom franchise. Throughout the series, the doom slayer rarely speaks but instead lets his physical behavior define who he is and how he acts. Most notably, in the beginning of Doom (2016), player is met by a monitor where a significant plot related character informs the player of what is happening, while providing basic exposition of the game's story. Where in other videogames

protagonists would react into the given information and possibly ask additional questions, the protagonist instead just swings the monitor aside, without any further interest for the exposition at hand. This type of behavior is recurring throughout the game and shows the audience without any verbal methods, what the game's protagonist is like, what are his driving factors and how he interacts with the world.

5.2   Concepting phase

After the initial design of the character has been created, it is time to start creating the visual style of the character. Before the concept artist/artists can start working, they will review, utilize, and follow the visual guidelines created by the designers. For concept arts, it is critical, that the artists follow the theme provided by the mood boards and make the concepts art fit the description provided by their background information, behavior and other information created by the design team. Usually in cases where there are several artists, they are working under an Art Director or AD, who's task is to assure, that the vision of the characters intended appearance is formed. At this point the character artists work with the design team and the AD to get the full picture of what the character is meant to be like, which assists them in creating the visual appearance of the character in the making.

Like the non-visual character design, this could be described as an iterative process, often requiring multiple design variations until the final appearance is accepted, and often in video game art books, one can see numerous variations from a characters appearance, to equipment, poses and overall feeling.

5.2.1   Shape and appearance

When creating a character, the character's overall shape plays a significant part in how the character will be perceived by the players and other intended audience. Regarding shapes, primarily three shapes are believed to be triangle, square and triangle. Characters shaped in circle manner are often used when creating characters that are expected to seem harmless, friendly, or otherwise peaceful. (source*) Squares often are used in relation to power and strength, albeit often

these characters are often portrayed as less intelligent than others. Triangles are used in two opposite ways, triangle pointing downwards is usually used in connection to evil characters while triangle pointing upwards is often used for heroic characters.

These three shapes are often used in various ways, often by mixing shapes and rotating the parts to create the intended visual shape. (Rogers, 94). Another method some character designers use, is creating silhouettes. Creating a silhouette has its advantages as one can easily distinguish the character just by the silhouette alone. In his book level up! guide to great video game design (Rogers, 2014) Rogers lists four reasons why a clear character silhouette can be considered important:

- Tells you the character's personality at a glance.

- Helps distinguish one character from another

- Identifies "friendly" or "enemy" characters

- Helps the character stand out against background and world elements

For the above example, Rogers has picked the character roster for Team Fortress 2 by Valve. For the characters in that games, each of the six characters can be easily distinguished from another just by their shape alone (see figure 6)

Figure 6: Silhouettes of the Team Fortress 2 characters.

Of the characters shown in the image, all characters stand out individually and the user can effortlessly notice the in-game characters outside and during gameplay. (Rogers, 94-95) This also brings added benefit during the concepting phase of the development,

as the artist can quickly sketch out the rough design of the character without having to spend time in creating details. The methods mentioned above however, are not the only ways to create concepts as every designer and concept artists have their own ways to work. In concept art the primary task is to create characters in quick succession which are clear enough, so they can be turned into in game assets. Some artists may even utilize 3d-modelling software to create models if they feel that they can create quick iterations efficiently through that method. A mixture of silhouettes, 2d-art and 3d-sculpting can be seen in the concept art of Killing Floor 2 (Tripwire Interactive, 2016) Where the artist has made quick 2D-silhouettes of the overall shape of one enemy type and then done several iterations of shape in 3d.

Figure 7: Killing Floor 2 - Zeds (andrew quintiliani, 2018, Tripwire Interactive)

In the above image one can clearly see the iterative process what comes to designing a single character. First in the lower right corner what may be the first silhouette designs of the creature, as during the gameplay player can see numerous characters on the screen, it is vital that the different characters can easily be noticed from the masses. Furthermore, in the other images one can see the various concepts and iterations of head and body to create the correct theme to the character.

5.2.2   Color and detail

After the overall shape and form of the character has been created, the artist starts
to implement the theme and the designed color style of the other game into the
character. Color palette of an individual is a feature of the character, which also
makes the character stand up from the others and through that be clearly
distinguishable. For example, according to Rogers super heroes in comic books used
to use more bright and patriotic colors, which in United States are red, white and
blue where the antagonists and other morally ambiguous characters wore more
darker and more toned colors like purple and green. (Rogers, 95) This varying color
palette in characters made it possible, that one could have several characters in view,
and they could still distinguish which every character was.

When designing the color of a character it is good to choose few colors which are the
"primary colors" for the character and then break them down into primary,
secondary, and tertiary colors. This way, the artist can easily dedicate the parts into
which it is intended, that the audience concentrates their focus on. As in character
design in general, too much colors in certain parts can turn the character into too
"detailed" which in turn makes the character seem to be slightly difficult to observer
due to numerous detail to focus into. (Valve ; Thompson, 96)

In Valve's "Dota 2 Workshop - Character
Art Guide" they describe that among the
color selection methods are listed
complementary, split complementary,
analogous, or triadic color schemes. In
these color schemes Valve has visualized
the process with a color wheel, which will
be used in this chapter to visualize the
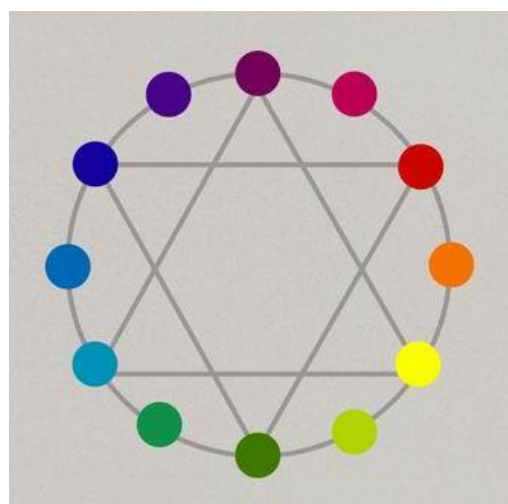color palettes.
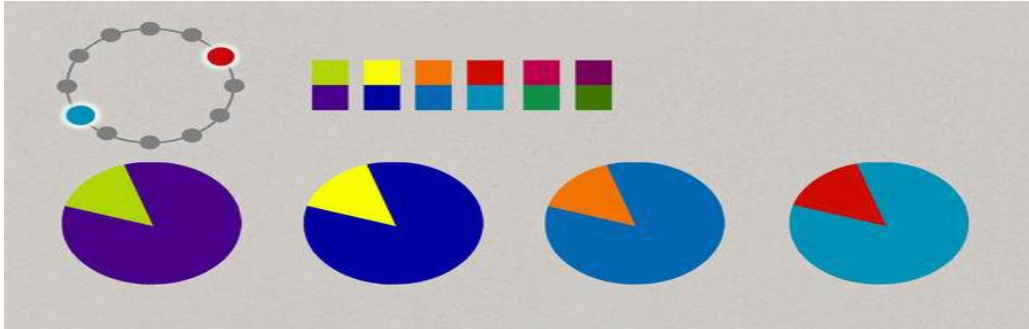
Figure 8: Color wheel visualisation

Figure 9: In complementary color schemes, the idea is to deal with opposite colors. This is often used with high contrast colors which demand attention from the audience.
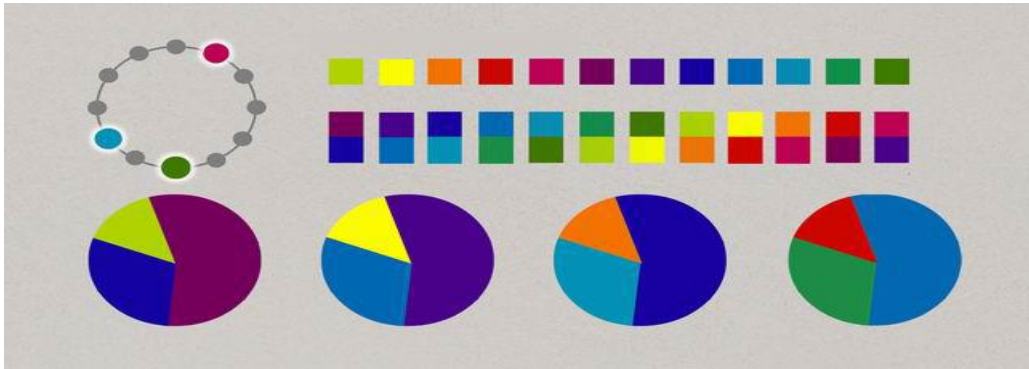

Figure 10: Split complementary color palette works with the same principle as complementary palette. However, in split complementary palette one of the colors is partially mixed with one of the neighboring hues.
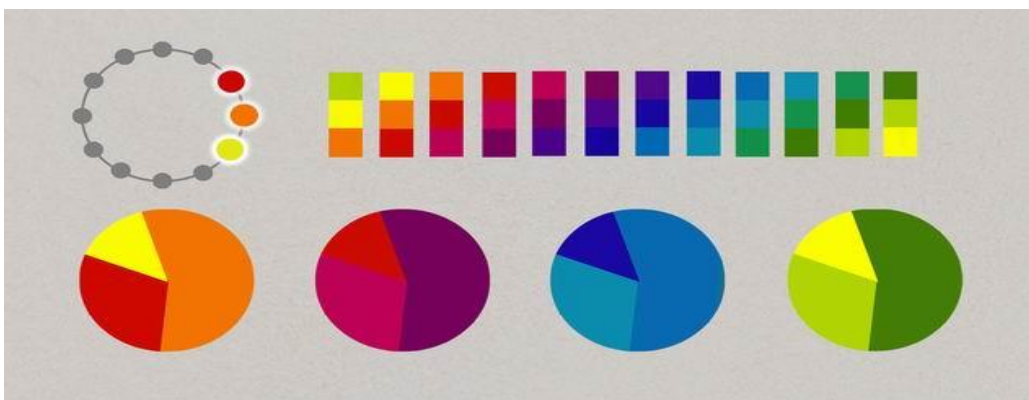

Figure 11: Primary principle the of analogous palette is that the colors used are adjacent to each other in the color wheel, This causes each of the colors seem to take gradually larger portion of the colors the more it is focused into.
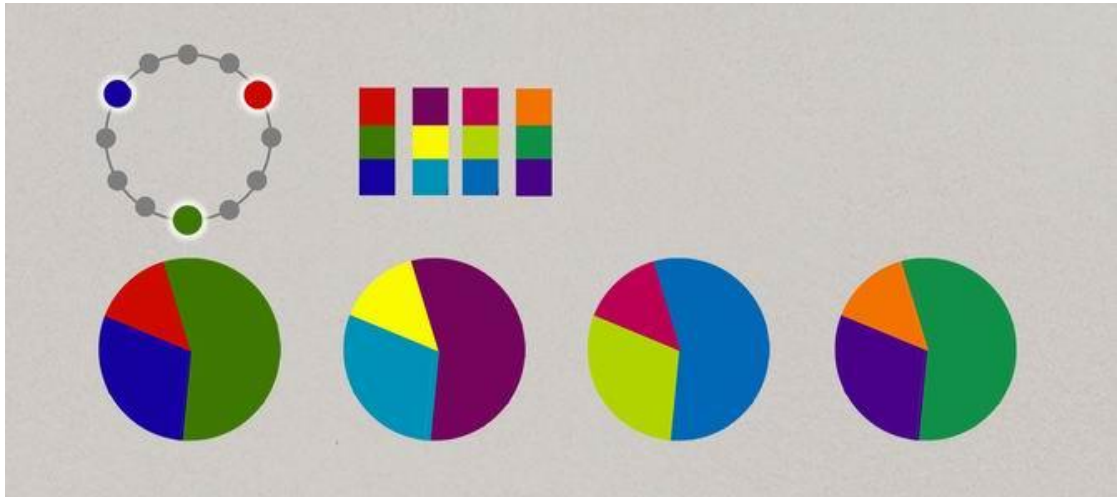
Figure 12: Triad color palette is equally distant from each color hue in the wheel

With these colors in mind, to uphold the color schemes so called "harmony", it is a good practice to create all other colors my blending the colors of the chosen color palette. This way, the artist can not only prevent the color palette to become too complicated, but also the individual character becomes more noticeable with their own limited color palette. (Figure 13)

Figure 13: Example of a character with original complimentary color schemes and its finished color scheme with blended colors.

When colors have been planned, the further details can be added. It should be kept in mind, that the details should as well be used in slight moderation to prevent the details becoming too surreal in a way, that it breaks immersion. (Thompson, 94).

After the design including the color schemes and alike have been approved, it is time to create the final concept. This concept is intended to stay mostly unchanged during further development and the shape, color, and possible details are already present in the given image. After the concepts have been finished, the concepts will be used to create the final version of the model. The importance the character concept comes

to play in this phase, as a well created concept reduces the amount of planning and "artistic freedom" and through that radical changes in development. when it comes to the finished model.

For example, as shown on the image about an enemy in the killing floor 2 (see image 7.)

The finished model looks like following:

Figure 14: Killing floor 2- Final model of an enemy type named "Crawler", In the image one can easily distinguish the unique shape, coloration and even fine created details. (Source: Andrew Quintiliani, 2018, Tripwire Interactive)

6   Polls

6.1   Introduction

Colors are a global subject, with slight distinctive variation ranging from cultural and sociological level into personal and individual major variation described during chapter 1.1. To test how the color combinations and color variations affect a general audience, a small poll was created to test the perceived colors, symbolism, and the first impression a given color combination will provide.

6.2   How the poll is created and distributed

The poll will contain primarily three parts. First part will ask questions about the audience's background. These questions consist of gender, age, area of the world they live in, and their general experience of games. Second part will focus onto a drawn image of a knight, with varying color scheme. The goal of this part is to find out, what kind of thoughts the given color scheme brings into mind of the selected audience. The evaluations scale will range from one to five, with one being most trustworthy/good, and 5 being the most untrustworthy/evil. Furthermore, in addition of the numerical selection, the audience will also get text based questions which focus on the emotional impact of the character, for example "What lead you into this decision" and "If the knight was told to be opposite to your rating, what would you feel?".

The third part will also focus on colors, but in this part the focus is more into what emotions / symbolism the given color combination gives to the audience.

6.3   How the results are analyzed

The answers will be analyzed as a group, the numerical answers will be taken as a graph basis and the text based answers will not only give a clarifying meaning to the answers in case the answers are rather obscure, but also will be grouped up to other equivalents to produce clear answers which can be used. Due to some of the answers being written in Finnish, some answers of the survey will be written in Finnish instead of English, therefore the linguistic unity may be affected.

7   Survey Results

The poll was given into open circulation around various social media platforms including Discord, Facebook, WhatsApp and LinkedIn in addition to the request to pass the poll forward to the recipient's friends and other social circles which yielded in total 57 answers . Statistically the amount of answers is too low for global generalization, but the results present certain patterns to such extent, that the answers can be used on a short scope about a small audience.

7.1   Part 1: Background

Of the 57 the answers 41 answerers were men forming 71,9% of the overall answers, with 15 being women forming 26,3%. Only one of the responders were reluctant to tell their gender while none assigned themselves as none.

From the 57 answers most answers came from Europe, with 46 (80,7%) answers coming from Europe, nine from North America, one from Oceania and one from Asia. Even though it was listed, no answerers were from Latin America / Caribbean or Africa.

Of the age-related questions 35 of the answers were on the age range of 25-34 forming 62,5% of the responses with the age range of 18-24 being the second with 12 answers or 21% (see Figure 15) .
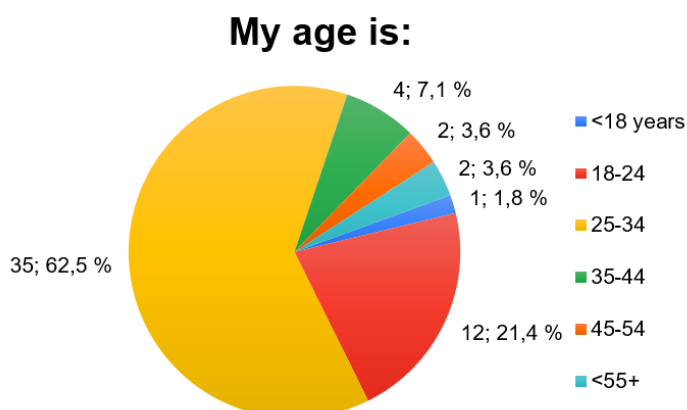

Figure 15: Distribution of answers in this question.

Lastly, when asked about the overall experience with games, 36 (63,2%) answered to have high experience of games. With moderate, low and no experience with 11(19.3%),9(15,8%) and 1(1,8%) respectively.
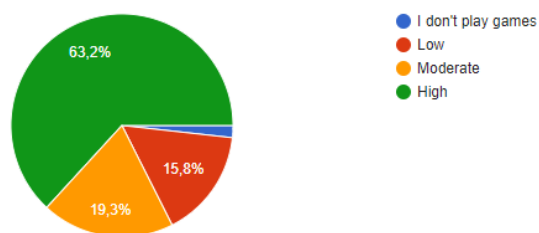
Figure 16: Distribution of answers about past game-related experience.

7.2   Part 2: Colorful knights

In this chapter the six knights were introduced to the viewer. These knights were presented individually. in the order presented in figure 15

Figure 17: The six knights with different color variations introduced to the viewer in this chapter of the polls.

7.2.1   Knight #1

The first knight proved to be considered rather neutral and slightly trustworthy/good. To be more precise, out of the 57 answers 23 (40,4%) considered the first knight as neutral and 23(40,4%) considered the knight as slightly trustworthy/good. Six people considered the knights slightly untrustworthy/evil and only one person considered the first knight very trustworthy/good and very untrustworthy/evil.

When asked what lead the viewer to this rating, the majority mentioned its color scheme to be neutral, some perceived the pose to be trustworthy and protective and some answers even pointed out the cross in the knight's mask to give a trustworthy good feeling. Some however, were rather unsure of the knight's "alignment", as the color was neutral, but the pose seemed rather threatening.

When asked how they would react if the presented knight would be told to be opposite of their perceived first impression, some answered that they would wither be surprised or bit careful regarding them, those who answered the knight to be neutral, they asked what is the opposite of neutral. Out of the gathered answers however, most answers were towards surprise due to the neutral / rather friendly color scheme of the character, some even describing possible ways to rationalize the shift in alignment, when it comes to the character.

7.2.2   Knight #2

The second knight from Figure 17, was primarily perceived as untrustworthy/evil with 28 answers (49,1%) rating the knight as most untrustworthy/most evil, 21 answers (36,8%) being at very untrustworthy / evil. Rest of the answers were neutral with 6 answers (10,5%), slightly trustworthy with 2 answers (3,5%) and only one on good.

When asked on what led the person to this decision, the significant majority considered the knight to be evil solely on the dark color scheme, with several people noting that the red highlight color even emphasized the evil first impression. Some however were unsure of the knight's alignment, as they thought that the knight might be a good person who does good things in morally ambiguous ways.

When asked how they would react if the character were told to be the opposite of their decision, the majority would have been surprised. Some even pointed out that the character's color would feel to be so out of place, that they would see it odd or even suspicious if the character would present itself as good.

7.2.3 Knight #3

When it came to the third knight (see figure 17), it seemed to divide opinions. The Majority of ratings rated the character neutral with 19 answers (33,3%), where the opinion was almost equal between ratings 1,2 and 4. with 13 people (22,8%) rating this knight to 1 and 2 respectively and 10 answers (17,5%) rating the knight to 4.

When asked what lead to this decision, majority of text-based answers described the knight to be good due to its golden color scheme. Out of the answers several who had voted the knight to be neutral had brought up the question of "how good is he?" as the knight's armor itself is near gilded, but the other clothes around the character are black, this seemed to bring the virtue of the knight into question.

When asked how the respondents would react if the knight were told to be opposite of their verdict, the majority once again would be surprised, where some would even bring the claim itself into question. Some however, thought that as the knight is wearing dark clothes, maybe the knight is a part of a story, where the good virtuous knight slowly turns evil.

7.2.4 Knight #4

Even though the knight's deep purple color scheme is often associated with royalty due to purple being a regal color, it was generally considered to be between neutral and evil throughout the answers. 22 answers (38,6%) of the answers perceived the character as neutral, 11 (19,3%) considered the character as slightly evil and 13 (22,8%) thought the character to be very evil by the color scheme alone. Rest of the answers were distributed to eight answers (14%) for slightly good and only three (5,3%) rated the character to be most good.

When were asked what led the responder to this decision the results were mixed. Some answers had pointed out how the color scheme was uncommon or unusual in regards of a character color palette. Some answers also were verbally unsure about the character's alignment, as the knight wore regal color, but general appearance was rather menacing, this could be due to subtle change in the tone of the color which causes the mixed opinion.

Like with the previous knights in the poll, when asked how the people would react if the presented knight would be told to be the opposite of their rating, most of the responses told, that they would not be surprised. Generally, the deep purple color palette was deemed neutral and evil to the extent, that even if the knight would be good the viewers thought it to be plausible as well.

7.2.5 Knight #5

This knight was rated to be between good and neutral with 22 answers (45,6%) rating the character good, 12(21,1%) voting for slightly good and the same amount voting for neutral. Interestingly, 3 answers (5,3%) and 4 answers (7%) considered the character either slightly evil or evil, respectively.

When asked what led them to the decision, majority of the responses were due to the character's color scheme being too bright or childish for a knight that could be taken seriously. However, some of the responses thought, that the character would be very threatening in a serious fantasy setting especially with a player-controlled antagonist, as the bright pink color palette would indicate the design would be intentional.

When asked how the responders would react if the character would be opposite of their rating, majority of responses were, that they could not take the character seriously or would be very suspicious. Several comments however, pointed out that the reaction would primarily be dependent of the context, as a knight which that color scheme would not be as intimidating in an environment with alike vibrant color palette as it would in more darker environment.

7.2.6 Knight #6

The last knight was primarily considered neutral or good. Majority voted for neutral with 23 votes (40,4%) due to the green being associated with nature and natural colors. Good and slightly good were voted equally with 14 votes (24,6%) and only six responses (10,6%) were for slightly evil or evil. Where most responses associated the color palette as natural or neutral, some had associated the color with the color of poison.

When asked how the responders would react if the knight was told to be opposite, some would not have been surprised but some stated that it would be logical as green being natural and neutral color, it can also be used to symbolize poison or corruption of sorts, which aggressively takes over things.

7.2.7 Good, neutral, or evil?

In the final part of this chapter, all six knights were presented to the viewer side by side in a random sequence.

For this part, the respondents were given a text field to answer, in case that the respondent could not find a one specific knight to deem least threatening, neutral of most threatening.

When asked which one of the six was the least threatening, the respondents primarily voted knights 1 and 5. This is most likely due to the first knight having very neutral color palette while the fifth knight had very high contrast and even childish color palette.

LEAST THREATENING

KNIGHT 1: 17
KNIGHT 2: 1
KNIGHT 3: 8
KNIGHT 4: 3
KNIGHT 5: 16
KNIGHT 6: 10
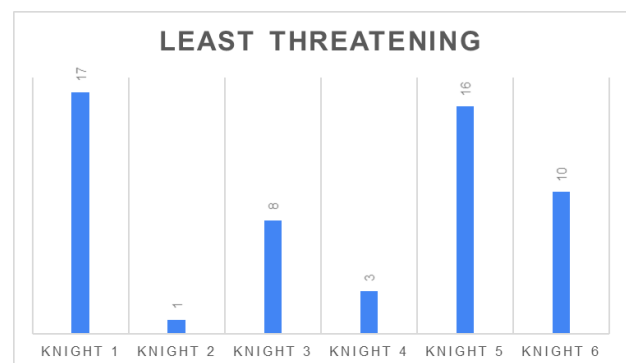
With the most neutral character, Knights 1 and 6 were rated the most neutral. With the first knight the reason is most likely the one mentioned above, where on the sixth knight the natural green color palette was a influencer on the neutral image.

MOST NEUTRAL

KNIGHT 1: 24
KNIGHT 2: 0
KNIGHT 3: 6
KNIGHT 4: 5
KNIGHT 5: 6
KNIGHT 6: 19
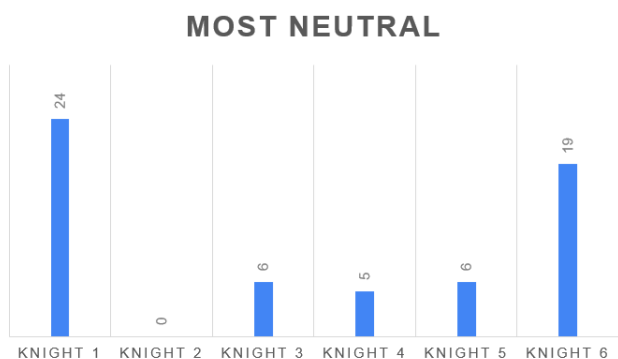
With the most threatening, the majority voted for the second knight. This came as no surprise, as symbolically and culturally black and red color combination is more often than not associated with evil.

MOST THREATENING

1	33	4	8	5	2
KNIGHT 1	KNIGHT 2	KNIGHT 3	KNIGHT 4	KNIGHT 5	KNIGHT 6
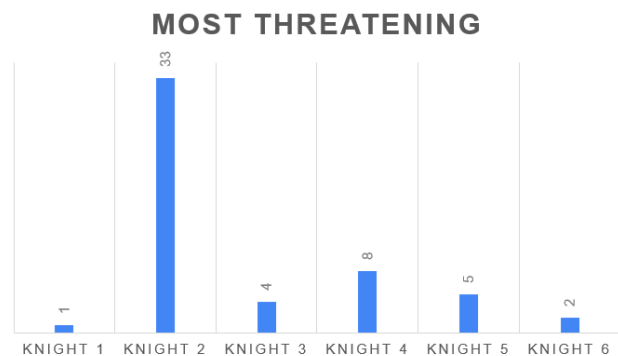
7.3   Simple shapes with two colors.

The last part of the poll was similarly about color combinations, in this turn I used just simple shapes with a different color in the middle. The goal of this poll was to find out what emotion, feeling or thing does a simple color combination arouse in the viewer when the visual information is limited, unlike in the previous part where even though the colored knight had the same pose throughout all the presented images, the general appearance gave some influence towards the given characters alignment.

The first color combination was a high contrast black and red. According to the given answers majority of the responses thought the color combination to be about evil, darkness and power. Some of the answers also brought up aggression and power as in power brought by anger. When the results (of which the majority were from European regions) are compared into the color symbolism of European scope told in chapter 3.1, the results follow the symbolical meanings accordingly. As red is often associated with power, emotion and flame it gives out the sinister emotion when black color is brought to accompany red color. Forming sinister, even hateful theme.

The second color combination was white and light blue color. While some of the answers associated the color combination with cold and justice, most of the answers associated the given color combination to openness, safety, serenity, and peace. This also follows the color symbolism guidelines. White and light blue tone has been used in situations where it is intended to convey serenity, peacefulness, or cleanliness. For

this reason, as mentioned in chapter 3.1 light blue and white is used for example in medical environments.

The third color was gray and green, Unlike in the first knight seen in figure 17, where the colors were primarily considered neutral. When the humanoid form was removed, the same color combination was considered primarily as earthly but at times even poisonous. Out of the answers, most associated the color combination as natural or earthly. However, out of the responses some answers stated the color scheme to remind them of poisonous, dull and at times even slightly ominous. With this color combination, the gray itself stand rather neutral, which as a majority color is most likely the reason for the neutral feeling of the color combination. In the color combination the color green however, is interesting due to the dual association with it. Green often symbolises nature and natural objects, but for this color combination the color is darker than the natural green, which causes the color be associated with the color "poison-green" in europe.

Fourth color was a vibrant red and yellow. This unsuprisingly was mostly associated with fire, caution and power. Often specified to remind about warning symbols in street signs. Additionally, some answers included things like Military, anger, glory and attention seeking. Symbolically this does not come as a surprise, as the color scheme is prevalently seen in warning signs throughout europe.

The fifth color was most peculiar as most of the responses had associated the blue and yellow colorscheme with Sweden. Even though there were answers like royalty, energetic, life and so on the majority of written answers were to sweden, swedish flag or something else related to sweden.

This could be due to the majority of answerers coming from europe (According to their answers shown in chapter 6.1) where the swedish influence especially in central- to northern europe has been known throughout the european history, possibly causing the swedish flag being associated greatly when it comes the color combination of blue and yellow.

The last image was purple and yellow, when it came to the answers the results were varying. Results showed that the there were no direct patterns of what the color combination brings to the viewer. Some answered the color to seem childish, some associated the color with happiness, joy and sillyness where some on the other hand voiced associations with regality, unpleasantness and uneasyness. Through the answers some answers had issued the colorscheme to even be disgusting or otherwise unpleasant to look at.

The last color combination, like the purple knight in the previous section, could be considered as a wild card of sorts. The color combination is unusual and very rarely seen in any situation due to the correlation of both colors. As told in chapter 3.1 both, purple and yellow colors have their own symbolical meanings and uses, but in this scenario presented the yellow color which usually is used as a higlight was combined with another rather bright color. This causes the color feel mismatched and out of place. Even though the color combination is relatively close to the classical regal colors, both colors should be darker for the colors to fit properly, in current state it is just too bright.

7.4 Conclusion

Throughout the results of the survey, it has become clear that the aspects of color symbolism stated in chapter 3.1 hold certain weight when it comes to color combinations. Even though the survey was conducted on a small scope, the responses were on par with the symbolical color combinations described in chapter 3.1 and the results formed a clear pattern of which one can create the conclusion, that the theories of color symbolism are still relatively valid, even though the theories themselves have been created years ago.

However, the survey results primarily show the results of cultural and emotional level when the archaic levels of colors are considered (Huttunen 2005, 41-43). This kept in mind, one could produce a wider survey, which takes all archaic levels into account in a way. Throughout the results, there were couple answers which were notable however, when the results are examined from the character design point of view. Couple answers in the whole survey deemed all colors neutral, when it came to the colored knights, some recipients responded that the color combinations do not

bring any positive or negative emotions to them stating that the character's "alignment" is purely contextual. This as an answer shows that some users can not be so easily affected with color palette alone, but all other aspects of game design, namely environment design and sound design have to be kept in mind to deliver the desired effect when it comes to the character's portrayal.

Even though the number of answers were too few for global generalizations, it would seem according to the responses brought by this survey, that the principles of color symbolism and basic principles of color theory can still be considered to be valid and appropriate to be used in situations where colors are intended to hold value, especially in game development and media creation.

8 Survey results compared to example games.

When games are examined with the results of the surveys in mind, one can notice that these colors are used in similar fashion to convey emotions which the results provided information about.

First game which is examined is Dark Souls 3, created by From Software in 2016. During the gameplay one can notice the color induced associations from character's color. For example, as the game's multiplayer system, the PC can see phantoms during gameplay which are either NPC phantoms or PC phantoms. These phantoms have their own alignments, factions and behavior inside the game and usually their faction and behavior is indicated by the colored aura surrounding the character model. Players who are mainly assisting other players are often shown to be surrounded by white aura, where players who have been taking part to the pvp-combat and have been invading other players are surrounded by red aura. In dark souls 3, the player can acquire a purple aura, golden aura and other different auras depending of the player's choices through the game and the player's actions for in game factions. When comparing the survey results to the colors of the phantoms in dark souls 3, the results compliment the color design. Red and black combination shown in Fig. 18, was primarily associated with evil, where white, gold and a combination of white and blue were associated with positive images. It is worth mentioning however, that enemies in "positive colors" for example golden armors are presented throughout Dark Souls series. This in turn creates the element of surprise, as the golden primary color was associated with good.

Figure 18: Example of the character colors with the hostile player surrounded by red aura, a friendly assisting player with white and blue aura and player character in the background without any aura. (Dark Souls 3, From Software, 2016)

Another example game where the character is grouped with color is in Bayonetta series (Platinum Games, 2009) and Bayonetta 2 (2014), where the enemies' alignments to the heavenly and hellish are primarily shown through color palette. Where heavenly characters are in major parts colored with white and gold, the hellish creatures are primarily mixture of deep purple and black.

As mentioned previously, during the survey it formed a noticeable pattern, that gold and white paired together formed a positive association, mainly towards good and holy symbolism. In Bayonetta-series this is used to convey the character's heavenly alignment. This however creates the mixed result of a player seeing a character which is colored like a

Figure 19: Affinity, enemies of bayonetta series. (Bayonetta 1&2, Platinum games)

good character and even told specifically to be of angelic origin, followed by an order to fight that presented creature as seen in Figure 19.

When it comes to hellish creatures, the character as often colored with red, deep purple and black. Furthermore, to convey the evilness towards the player the characters are often see decorated with skulls, spikes and alike objects which often are used to symbolize something evil or menacing. Examining the creatures by color alone, the three mentioned colors all hold symbolism often associated with evil and alike, which when combined are rather reliable ways to prove that the creature is hostile. The result was briefly observed in the survey results where deep purple and black characters were often thought to be either slightly evil or very evil without further explanation. When the details of skulls, spikes and other objects are added the intended evil symbolism is emphasized even further.

9   Discussion

This research was done with the intention of creating a collection of information when it comes to color design. Even though color is a subject that affects every individual daily and it can be used for any visual subject in this research the information was presented from the scope of game development. In addition to the basic principles of color design, psychological and symbolical associations of colors the research focused partially into game design, character development and character design. As mentioned in previous chapters, some of the sources in the previous chapters could be considered as old in the current date, however the basic principles of color theory, color blending and character design have remained mainly unchanged throughout the years and therefore they can still be deemed valid even in the present day.

In overall, the scope of the research could've been slightly smaller, as several of the aspects in this research could have been their own individual matter to research about due to the vast amount of information covered by each section. However, as the goal was to create a introduction or guide for character development and it's internal color design principles, the surface introduction into the matter is sufficient. This way a person who is interested of color design or character design and its variety can examine this research for pointers of things to keep in mind when it comes to the subject.

In the survey which is presented in chapter 6, results were sufficient for a small scope as the goal of the survey was to utilize the principles of color design and color combination to see if the color combinations often told to be perceived in some specific way correspond when presented with a random group of people. As such, the survey results were successful, albeit relatively few in numbers. The survey results showed clear patterns in relation to each presented image and the free form text answers presented similar responses with slight variation. In retrospect if something could have been improved throughout the survey, it would be that the survey should have been delivered for public sooner than it did, with either a dedicated survey for each part of the world instead of a overall survey distributed for

everyone. As most of the people in my personal network were from Europe, the answers of the survey also reflected symbolical ideas according to European meanings, this could have been avoided by creating a separate survey for other parts of the world.

Additionally, for the survey, the survey could have been wider in range as few of the comments pointed out the fact, that the character's alignment in the survey is also contextual. When this is kept in mind, each individual image could have been set in front of a backdrop that would have set the environment for the viewer. Even though the forementioned situation could have been a possible improvement for the survey, I had purposefully left it out as the survey concentrated into the character's color palette and the symbolical association of it without any apparent context. When it comes to possible refinement of the survey, the survey could have also been created with minimal free forming text answers, as these proved to be varying in terms of response clarity and appropriateness as some of the responses could be regarded as inappropriate by terminology.

When the survey is examined in an overall manner however, it was sufficient into current research but there are plenty of things to keep in mind if such survey were to be created in the future.

As mentioned throughout the chapters, colors are a global thing that affects individual people on varying levels. It is important to keep in mind however, that even though numerous psychological studies have been conducted throughout the years focusing into the effect of colors into human psyche, the effects are widely individual and as such, there is no definite way to create a single said color palette that works the same way for everyone. Even though this research focused into creating a surface level guide on how colors can be used, it is worth to keep in mind when developing a character that every single person is an individual in their own right and as such, they have noticeable variation depending on cultural, historical, psychological and preferential background which can bring their own meaning to any given color.

10 Sources

Bister, Timo 2019. Viittoja Ja Karttoja Tutkimisen Ja Kehittämisen Teille, Tietojenkäsittelyn Opinnäytetyö: Jyväskylä, Jyväskylän korkeakoulu.

Hansen,Paul,Color Symbolism Represented in Buddhist Traditions http://www.people.vcu.edu/~djbromle/color-theory/color03/paul-h/colorsymbolisminbuddhismPaul.htm (referenced 04.11.2020)

Elliot, Andrew J. and Maier, Markus A 2013. Color Psychology: Effects of Perceiving Color on Psychological Functioning in Humans https://web.archive.org/web/20200508045513/https://www.annualreviews.org/doi/pdf/10.1146/annurev-psych-010213-115035 (referenced 04.11.2020)

Gage, John. Colour and Meaning: Art, Science and Symbolism, 1999. London: Thames and Hudson,.

Hintsanen, P. 2000. Coloria. Referenced:04.11.2020, http://www.coloria.net/index.htm.

Huttunen, M. 2005. Värit pintaa syvemmältä. Porvoo; Helsinki: WSOY.

Isbister, K. 2007. Better Game Characters by Design: A Psychological Approach. Hakupäivä 04.11.2020

Itten, Johannes, Lappi-Seppälä, Jyrki and Kare, Antero. 2004.Värit Taiteessa: Värien Subjektiivinen Kokeminen Ja Objektiivinen Tunnistaminen Johdatuksena Taiteeseen 4. muuttam. p, Helsingissä: Taide,

Kumar,Nitin 2002, Color Symbolism In Buddhist Art, Exoticindiaart.com, https://www.exoticindiaart.com/article/colors/aff10490/

Morton,Jill, 2001, Color Voodoo #1 : A Guide to Color Symbolism (Revised Edition) ,Colorcom, http://1.droppdf.com/files/1Z5pI/morton-colorcom-color-symbolism.pdf

Munsell, Albert 1907. A Color Notation, https://www.gutenberg.org/files/26054/26054-h/26054-h.htm (referenced 04.11.2020)

Palmer, Kim, A look at how color helps express the core beliefs of the world's major religions, Article, Stir/Sherwin-williams. https://www.sherwin-williams.com/architects-specifiers-designers/inspiration/styles-and-techniques/sw-art-stir-color-religion

Rihlama Seppo, ja Varsa, Kalervo. 1997, Värioppi. 6, uusittu painos. Helsinki: Rakennustieto Oy.

Rodrigues, António,2008,Islam and Symbolism, Military review, armyupress.army.mil, https://www.armyupress.army.mil/Portals/7/military-review/Archives/English/MilitaryReview_20080630_art017.pdf (Referenced 06.11.2020)

Ruth Brent Tofle, Ph.D., Benyamin Schwarz, Ph.D,So-Yeon Yoon, MA, Andrea Max-Royale, M.E.Des., Color In HealthCare Environments - A research Report, 2004, The Coalition for Health Environments Research (CHER) (https://www.healthdesign.org/sites/default/files/color_in_hc_environ.pdf)

Shutterstock, 2015, Symbolism Of Colors And Color Meanings Around The World, (https://www.shutterstock.com/blog/color-symbolism-and-meanings-around-the-world)

Six degrees, 2015, An international guide to the use of color in marketing and advertising, https://www.six-degrees.com/an-international-guide-on-the-use-of-color-in-marketing-advertising

Solarski, Chris, 2020, The Aesthetics of Game Art and Game Design, https://www.gamasutra.com/view/feature/185676/the_aesthetics_of_game_art_and_.php?print=1

Thompson, Jim. The Computer Game Design Course: Principles, Practices and Techniques for the Aspiring Game Designer, 2008, Thames & Hudson.

The State of Online Gaming,2019, Limelight. https://www.limelight.com/resources/white-paper/state-of-online-gaming-2019/#spend

Williams, Ray, What Are the Colors of Islam, 2018 Classroom, (https://classroom.synonym.com/what-are-the-colors-of-islam-12086654.html)

Willis, J.; Todorov, A. (2006). First impressions: Making up your mind after 100 ms exposure to a face, Psychological Science. 17 (7): 592–598. https://web.archive.org/web/20140715094146/http://psych.princeton.edu/psychology/research/todorov/pdf/Willis%26Todorov-PsychScience.pdf

Wou.Edu, Color Symbolism in Buddhism, 2015, https://wou.edu/wp/exhibits/files/2015/07/buddhism.pdf

Wou.Edu, Color Symbolism in Christianity, 2015, https://wou.edu/wp/exhibits/files/2015/07/christianity.pdf

Wou.Edu, Color Symbolism in Hinduism, 2015, https://wou.edu/wp/exhibits/files/2015/07/hinduism.pdf

Zammitto, VeronicaCharacters, 2007, Lecture, sfu.ca. http://www.sfu.ca/iat842/Spring2007/lectures/iat842-Veronica-Zammitto-Characters.pdf

10.1 Image sources

Figure 1: NCS visualization, 2019, https://ncscolour.com/, https://ncscolour.com/wp-content/uploads/2019/12/Colour-Space_SMALL-1536x490.jpg

Figure 2: Briggs, David, 2007, http://www.huevaluechroma.com/pics/4.1.1.jpg

Figure 3: Examples of diffuse blending (http://k-rothery1316-dp.blogspot.com/2014/01/ougd405-photoshop-workshop-brief-1-week.html, Referenced 14.04.2020)

Figure 4: A Sunday Afternoon on the Island of La Grande Jatte, Georges Seurat, 1884

Figure 5: Examples of diffuse blending

Figure 6: Silhouette of Team Fortress 2 Characters, Valve.

Figure 7: Killing Floor 2 - Enemy type "Crawler"- concept art, Andrew Quintiliani, 2018, Tripwire Interactive (https://cdna.artstation.com/p/assets/images/images/012/687/716/large/andrew-quintiliani-x-nq21m3szh01sr2n5go1-1280.jpg?1536024111)

Figure 8: Color Wheel Visualization, Dota 2 Workshop - Character Art Guide, Valve https://support.steampowered.com/kb/9334-YDXV-8590/dota-2-workshop-character-art-guide?l=swedish#colorschemes (referenced 04.11.2020)

Figure 9: Example of complementary color scheme, Dota 2 Workshop - Character Art Guide, Valve

Figure 10: Example of split-complementary color scheme, Dota 2 Workshop - Character Art Guide, Valve

Figure 11: Example of analogous color scheme, Dota 2 Workshop - Character Art Guide, Valve

Figure 12: Example of triad color scheme, Dota 2 Workshop - Character Art Guide, Valve

Figure 13: Example of finished color scheme, Dota 2 Workshop - Character Art Guide, Valve

Figure 14: Finished model of a enemy type "crawler" Andrew Quintiliani, 2018, Tripwire Interactive.

Figures 15-17: Diagrams of the data gathered from the survey

Figure 18: Example of the character colors, Dark Souls 3, 2016, From Software

Figure 19: image of the enemy type Affinity in Bayonetta series, Bayonetta 1&2, Platinum Games 2009-2014

11 Appendices

11.1 Appendix 1: Survey structure

11.1.1 About you:

I am

- a man

- a woman

- not listed above

- I don't want to say

I am from

- Asia

- Africa

- Europe

- Latin America / the Caribbean

- North America

- Oceania

My age is

- 18 years

- 15-34

- 35-44

- 45-54

- >55+

My experience with games:

- I don't play games

- Low

- Moderate

- High

11.1.2 Part 2: Colored Knights:

Knight #1

What is your first reaction to this knight?

What lead you to this decision?

How would you think if the character was told to be opposite than how you rated it?

Knight #2

What is your first reaction to this knight?

What lead you to this decision?

How would you think if the character was told to be opposite than how you rated it?

Knight #3

What is your first reaction to this knight?

What lead you to this decision?

How would you think if the character was told to be opposite than how you rated it?

Knight #4

What is your first reaction to this knight?

What lead you to this decision?

How would you think if the character was told to be opposite than how you rated it?

Knight #5

What is your first reaction to this knight?

What lead you to this decision?

How would you think if the character was told to be opposite than how you rated it?

Knight #6

What is your first reaction to this knight?

What lead you to this decision?

How would you think if the character was told to be opposite than how you rated it?

Of the knights shown above, which one you would deem most good or least threatening. Why?

Of the knights shown above, which one you would deem most evil or most threatening. why?

Which one / Which ones you would deem most neutral. why?

11.1.3 Part 4: Color Combinations

What do you feel from this color combination?

What do you feel from this color combination?

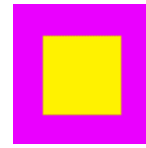What do you feel from this color combination?

What do you feel from this color combination?

What do you feel from this color combination?

What do you feel from this color combination?

11.1.4 Afterwords