

Colour Theory in Marketing and UX/UI Design

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Colour is everywhere. It is outside in nature, in manufactured spaces, and on every object that is seen. Sometimes colours are subtle and go unnoticed in the objects that are seen everyday, like a pale blue sky or the logo of a favourite brand. Other times colours can be loud, calling to its viewers from advertisements or magazines, and forcing its viewer to notice it. Depending on one's culture, colours can indicate holidays, such as red and green for Christmas or orange and black for Halloween. Throughout history, artists have been using colour to show meaning. For example, blue was used to show value in the Medieval era or how yellow was used to create vivid, joyful images in the nineteenth century (Gottesman, 2016). Colours can even signify emotions, such as how blue is commonly associated with calmness, or red with anger. Colour archaeologist Montaha Hedef describes the use of colour in society by stating,

We are naturally born into colour, we eat colour, we drink colour, we sleep with colour, we wake up with colour, we swim in colour, we love colour, we are surrounded by colour, yet few of us are mindful about the volume of colour we are flooded with. (Hidafi, 2017, p. 297)

Colour is so significant in our lives, yet most people do not notice it or give it any consideration. Artists and scientists alike have been studying colour for centuries, and have explored how it can be used to influence their audience into deriving aesthetic pleasure or to have specific emotional reactions to it.

Given that colours are so prominent and can carry significant meaning, it is important for both consumers and marketing officers to understand how colours can be used to influence decisions. This is especially valuable in places like marketing and electronic retail websites, as colours have the ability to persuade the shopping habits of

the website's users. In order to understand the effects that a website's colours have on its viewers and marketing effectiveness, this thesis will examine several different aspects of colour theory including colour perception, psychology, marketing affordances, and accessibility. It will then take these concepts and apply them to the Amazon, Rakuten, and Craigslist websites to analyze how their use of colour may be affecting their website's marketing effectiveness in both positive and negative ways. As I demonstrate, colour is most effective when it adopts the biological, psychological, cultural, and social affordances of its viewers. Using the examined theories and examples, it will then provide suggestions on how to use colour in UX/UI design in the most efficient ways possible.

Methodology

To analyze the use of colour theory in today's UX/UI and marketing techniques, this study will use qualitative methodology, specifically the grounded theory method where existing literature and theories will be cross-examined to determine emerging patterns. Through literature review and the use of deductive reasoning, I will examine existing concepts about colour theory and various thematic patterns throughout the topic will be discussed. The previous knowledge and research on this topic will be analyzed until overlying trends emerge and critical theories are presented through the data. During this study, both qualitative and quantitative research papers will be considered so the theories are as accurate and comprehensive as possible. The research will be structured so the existing colour theory can be organized into the pillars of colour perception, psychology, marketing, and accessibility.

In the second section, I will examine the colours and colour combinations on the Amazon, Rakuten, and Craigslist websites and critique them based on the theories that were previously discussed in the paper. Each website will be compared and contrasted against each other and against the pillars of this research. Amazon's consistent blue and orange colours help uphold the brand's values of trust and passion, while maintaining reliable and recognizable branding. The Rakuten website uses a variety of colours for their sites in different countries and for their individual services. Although it is less cohesive than Amazon's branding, Rakuten's colour choice allows the website to cater to the cultures and values of their customers. The Craigslist website takes a minimalist approach that may not cause misinterpretive issues, but could still benefit from the addition of more colour.

While considering these concepts and examples, it is clear that the success of a colour palette relies heavily on various factors of the viewer such as their culture and social backgrounds. Taking these conclusions into account, suggestions on how a website can improve their use of colour to become more efficient and powerful will be provided.

Literature Review

The different usages and effects of colour have been studied for centuries by scientists and artists alike (Stokley, 2018), and the relevance of colour in UX and UI design is no exception. Modern colour science and theory is most often credited to Sir Isaac Newton's work with glass prisms and his findings in his book *Opticks* from 1704. Through experimentation with sunlight and glass prisms, he proved that white light is composed of seven different colours - red, orange, yellow, green, blue, indigo, and

violet. This fact had been theorized before, but Newton was able to prove the existence of the visible spectrum in physics and mathematics (Luo, 2005). Newton's work famously both contrasts and compliments poet Johann Wolfgang von Goethe's theories on colour, and his book *Theories of Colour* published in 1810. As Newton based his ideas in physics, Goethe studied psychology and perception, and he took a philosophical approach to colour theory. Using theories about the nature of light and existence of darkness, he demonstrated that colours are not subjective but rather have a direct impact on people's moods and emotions. Goethe suggests that this psychological effect is unknowingly used and taught in society (Jasper, 2015; Popova, 2012). Despite their differing scientific views, both Newton and Goethe created the foundations for today's understanding of colour theory.

With these foundational theories about colour, many scholars have begun to look specifically at UX/UI design and marketing. Barševska and Rakele (2019) conducted theoretical research to determine how colour can be used in UX/UI design and used their data to make general suggestions towards designers on how to use colour effectively. Their research was directed towards the designs of book covers, and the authors found that while various demographics of people have different tastes, colour is crucial to the success of a design and a product's sales. Similarly, Singh (2006) analyzed different colour theories in aspects including health, culture, emotions, and gender to determine how colour can affect consumers in everyday marketing scenarios like in restaurants, brands, trends, and waiting time. This research found that colours are controversial and have important nuances based on the physical region, culture, gender, and age of the viewer. In a more general sense, Don Norman has made very

influential contributions to the discussion of UX/UI design, such as his theories in his book *The Design of Everyday Things* (2014) and *Emotional Design* (2003). He explains that in order to have a successful design, the user must be put first. It is essential to understand the needs, cultural affordances, and psychology of users in order to design effectively. Although he does not often examine colour specifically, his work user-centred design theories are crucial to understanding the elements of website design and how they affect a user.

In addition, there have been many attempts to quantify this research and physically measure the effects of colour on its viewers. Kauppinen-Räsänen and Luomala (2010) attempted to research how package colour affects consumer's product experiences, and used a preference-consumption interviewing technique to ask participants about their opinions on several different product groups. Through this research, they suggested that there are three purposes to colour in marketing: attention, aesthetic experience, and communication, which together have a decisive effect on consumers' purchasing habits. In a similar manner, Xu (2020) measured how participants reacted to Chinese traditional decorative pattern's colour schemes and discussed how these findings can be used to create specific reactions to ads or products. They stated that the cultural traditions of consumers have an extremely large effect on the way that they interpret and react to colours in marketing. This research gives a strong theoretical base to understand that colour theory can affect consumers in a variety of situations, and their previous experiences and cultural views on colour can influence their purchasing habits.

Defining Colour

Before the functionalities and applications of colour can be appreciated, it is important to first understand what colour is. Based on centuries of research across many different disciplines of art, philosophy, and science, colour is known today as a property of an object that can be defined by its hue, saturation, and lightness (Barševska & Rakele, 2019).

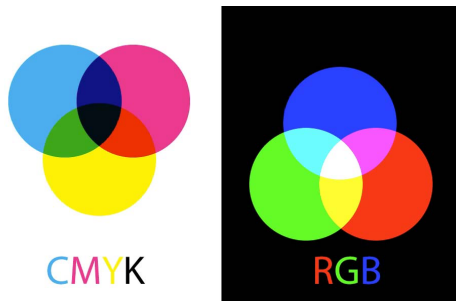
The visible spectrum of colours was discovered by Newton by shining pure white light through a crystal pyramid and observing the seven different colours that it formed - red, orange, yellow, green, blue, and violet. Each of these colours have a unique wavelength that is either absorbed by the surface, or reflected and seen as a hue (Feisner, 2006).

Colour Modes

Colour can be displayed and perceived in different ways depending on the surface and context of the object. For example, the colour of an object in the natural world begins with pure white light. In this sense, black is the absence of light or colour, and adding all colours together creates white. This colour mode is known as RGB, representing red, green, and blue as the three colours that are the most sensitive to the human eye. RGB is the colour mode that is typically used in digital formats. Alternatively, CMYK is a colour mode representing cyan, magenta, yellow, and key or black. Here, adding colours creates black, and white is the absence of colour. CMYK is most often used in print to ensure accurate colours as the ink mixes.

Figure 1

RGB and CMYK colour modes.



Note: From Caplin, S. (2017). *Creative Pro*.

<https://creativepro.com/understanding-difference-between-rgb-cmyk/>.

In quantitative research, a third colour mode called HSL is typically utilized. This describes colours in terms of its hue, saturation, and luminance, and measures the wavelength of the hue, the amount of gray in the colour, and the amount of white or black in the colour. This colour method is most used in quantitative research because it can be easily measured against human participants (Raybould, n.d.).

Hue, Saturation & Value

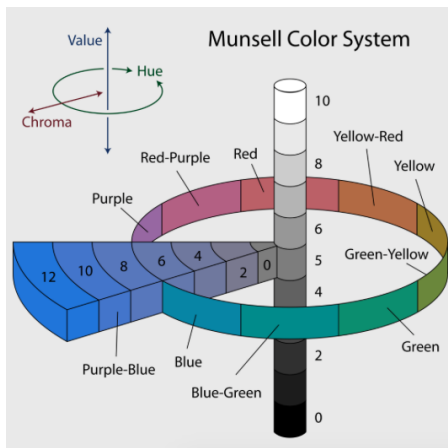
A hue is the most basic form of a colour within the abilities of human vision, or the colour as it can be scientifically proven by its wavelength. When someone says 'red' or 'blue,' they are referring to the hue of the object. A tint, shade, or tone can be created by adding white, black or grey, respectively, to a hue.

The saturation of a colour is the purity of its hue. At 0% saturation, the hue will appear grey, while it will appear its natural colour at 100%. In a real-life scenario, the saturation can change based on the amount of light hitting the surface of an object, which is why a wall can look different during the day compared to the night. Adjusting the saturation of a hue creates various tones, as it affects the amount of grey in the hue.

The value of a colour is also often referred to as its chroma, vibrancy, or intensity. This aspect depends on how much white or black is in the colour, making it appear brighter or darker. Adjusting the value creates different tints or shades of the hue, such as creating pink or maroon from red.

Figure 2

HSV or 'Munsell' colour system.



Note: From Raybould, J. (n.d.). *Virtual Art Academy*.

<https://www.virtualartacademy.com/three-components-of-color/>.

Primary Colours and the Colour Wheel

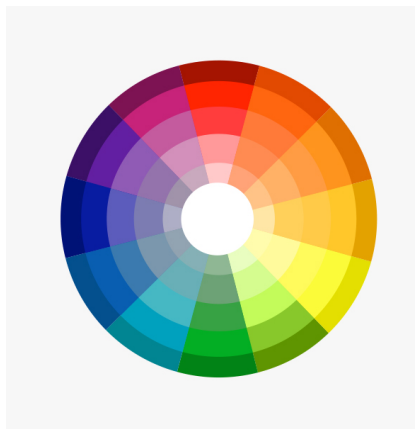
In a subtractive colour scheme like RGB, the primary colours are red, blue, and yellow, and in an additive colour scheme like CMYK, the primary colours are magenta, cyan, and yellow. In each situation, primary colours are hues that cannot be created by mixing any of the other hues. They also provide the greatest gamut of hues that can be created when they are combined with each other (Westland et. al, 2007).

Secondary colours are created by mixing two of the primary colours. For example, mixing yellow and blue creates green. Likewise, tertiary colours are created by mixing a primary colour and a secondary, such as making teal by mixing green and

blue. By continuing this process of mixing a hue with the one next to it, the colour wheel is formed. Additional layers to the colour wheel can be created by adding white to each hue to form various tints or adding black to create various shades.

Figure 3

The colour wheel, showing hues, shades, and tints.



Note: From Dulux (n.d.). *Dulux*.

<https://www.dulux.com.au/how-to/how-to-use-colour/how-to-use-a-colour-wheel>.

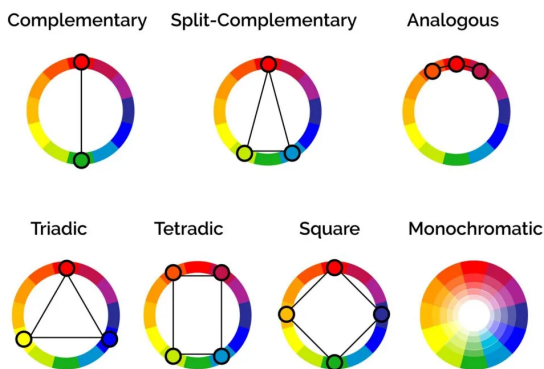
Colour Harmonies

While using the colour wheel, certain colour combinations and harmonies emerge that are often used in design. For example, a monochromatic colour scheme uses one hue and various tints and shades of that hue, and an analogous colour scheme uses several hues that are directly beside each other on the colour wheel. Similarly, complementary colours are two hues that are directly across from each other on the colour wheel, and split-complementary colours use a hue and the two hues on either side of its complementary colour on the colour wheel. There are many other colour harmonies that can be created using the colour wheel including triad, tetradic, and square colour schemes (Albers, 2009). There are also many other versions of the

colour wheel where the hues are organized in different patterns and shapes to characterize them in an alternative perspective. Despite the varying ways to harmonize colour, colour theory can “help control the craft of colour and its application” (Sinha, 2018, p. 7). These concepts allow designers to understand, measure, and standardize colour theory to facilitate the use of colours for both designers and product developers.

Figure 4

Various colour harmonies.



Note: From Colours Explained (n.d.). *Colours Explained*.

<https://www.colorexplained.com/color-harmony/>.

Colour Theory in UX/UI design

Westland et. al. (2007) state that “it is impossible to separate colour from design” (p. 1). In this way, colour is a crucial element to UX/UI and website design. It is essential to understand colour theory so that it can be used efficiently and advantageously on a website, while also avoiding colour mistakes that can harm its effectiveness. In its most basic definition, colour theory is understanding how colours interact with each other to affect the people experiencing a design. Colour interpretation can occur in several different ways including biologically, psychologically, and socio-culturally. More

specifically in terms of UX/UI design, the efficacy of colour theory is affected by the ways that colour can be perceived, psychological influences, marketing connotations, and accessibility affordances of each individual colour or colour combination. The next section will examine each of these four pillars of colour theory of UX/UI design in more detail.

Part 2: Colour Theory

Colour Perception

Human biology and psychology make it impossible for two people to experience a colour in the exact same way. Artist Josef Albers begins his book *Interaction of Colour* by explaining that if 50 people were told to think of the colour 'red,' it is expected that every person will think of a slightly different shade. Even if the prompt is more specific, like 'Coca-Cola red,' no one will think of the exact same shade in their minds as one's perception of colour is dependent on several factors including biology, cultural differences, and colour awareness and recognition (Albers, 2009).

Biology

Biologically, people see slightly different shades of colour based on the structure and shape of the lens in their eyes, and their unique cone cells that alter how light is reflected in their eyes (Brogaard, 2020). The human eye receives light in its innermost part, the retina, and uses millions of rods and cone cells as receptors to send signals to the brain to understand its colour. Although the majority of people have three types of cone cells that differentiate the wavelengths of colours, the ratio of each type of cone cell varies slightly between individuals. These deviations cause colours to be observed

or seen in slightly different ways, while still being perceived or understood as the same colour among everyone (Goudarzi, 2005).

Colour blindness also has an impact on about 1 in 12 men and 1 in 200 women, which occurs when the retina only has two types of cone cells and lacks the ability to see either red, green, or blue light (ColourBlindnessAwareness.org, n.d.). In a few extreme cases, an individual may only have one type of cone cell and would see the world in shades of grey rather than in colour (ClevelandClinic.org, n.d.). Since colour blind individuals are unable to make certain distinctions between colours, their experience seeing a design or colour combination will be different than to someone with normal vision (ColourBlindnessAwareness.org, n.d.). On the other hand, very few people have an extra type of cone cell in their retinas, allowing them to see an extra range of colours that most people cannot (Jewell, 2022). Although this does not limit their colour perception, it continues to demonstrate that different people will see colour in different ways. Age is yet another factor that can change the way that people are physically able to see colour. As people grow older, the lenses of their eyes begin to turn yellow, resulting in a slightly yellow filter over their entire eyesight. One study found that about 45% of seniors over the age of 70 had problems with their blue-yellow colour vision, with the proportion rising to about 70% of seniors over the age of 90 (Dotinga, 2014). As colour can be seen in different ways, it is essential for a designer to take these physical differences into account so the colours and visibility of a site is accessible to everyone.

The physical or biological effects of colour are out of scope for this thesis as it will focus primarily on the psychological connotations and sociocultural significance of

colour; however, it is critical to understand that people see colour in slightly different ways. The influence of colour on one person can be different to another because of biological differences that cause the viewer to interpret the colour in a unique way.

Cultural Differences

Varying cultural backgrounds and personal experiences can also have a major effect on the way that one appreciates colour and colour combinations. Westland et. al. (2007) give the example of ancient statues and monuments from various civilizations including the Egyptians, Greeks, Babylonians/Assyrians, Mayans, and other Mesoamerican cultures. Although many of these artifacts have now faded and appear white, they were once vividly coloured in a “distinct code of colouration that was presumably considered pleasing or harmonious at the time” (Westland et. al., 2007, p. 2). It is unknown whether the colours were used for aesthetic or symbolic purposes, but various colours and colour harmonies were appreciated for their aesthetics throughout history depending on the culture and society at the time (Westland et. al., 2007).

Even today, traditional colours have a heavy influence on a nation’s cultural psychology. In a study examining colour theory in product design and marketing, Xu (2020) considered the colours in Chinese traditional decorative patterns. Not only do customers recognize the traditional colour schemes in comparison to modern colours, but they can also intensify the aesthetic perception of the product and can give it significant cultural meanings (Xu, 2020). In UI design, the same cultural affordances exist and the effectiveness of a website can change based on the user’s cultural interpretation of the colours.

Colour Awareness and Recognition

The context in which a colour is shown can also change the way that the viewer perceives it. In other words, the way that someone interprets or understands a colour changes based on what other objects, shapes, and colours they see around it, as well as the lighting and vantage point of the scene (Jonauskaite et. al., 2018; Shevell & Kingdom, 2008). To test this phenomenon, Jonauskaite et. al. (2018) performed a series of experiments to determine why people see different colours in the viral image from 2015 known as 'The Dress' (Figure 5). Different pieces of the picture were taken with varying amounts of context, and the subjects were asked to identify and describe the colours in each part of the image. The study concluded that "contextualization is key" for the illusion to occur, as contrast and texture information changed the way that the subjects understood the colours (Jonauskaite et. al., 2018, p. 864).

Figure 5

The viral image from 2015 known as 'The Dress.'



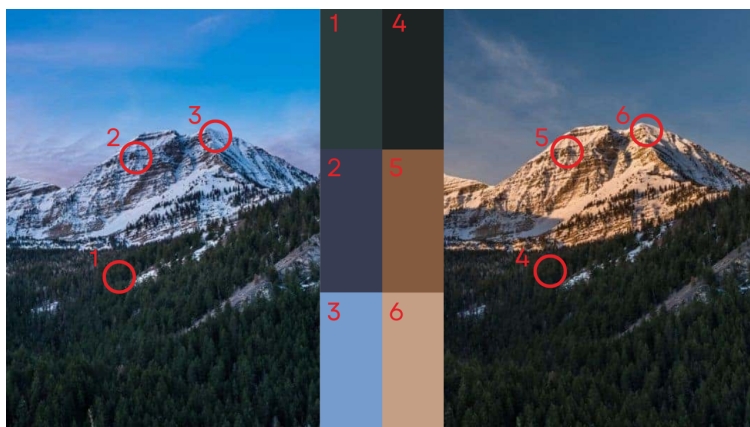
Note: From Wikipedia (2022). *Wikipedia*. https://en.wikipedia.org/wiki/The_dress.

Another example occurs when the lighting of the sky changes throughout the day, as it can cast different shades on the world like a filter. Some of these times of day

are commonly known as ‘golden hour,’ the time before sunset, or ‘blue hour,’ the time just after sunset. Although everything appears more orange or blue during these times, the human eye understands the context of the lighting and can still recognize the true colour of the object, despite its hue at the given time. In Figure 6, a mountain is shown at blue hour and at golden hour, and it is clear that the exact hues of the snow, rock, and trees are quite different in each photo. At blue hour (left), the snow appears blue and the rock appears purple, while the same objects appear beige or brown at golden hour (right). Nonetheless, the viewer still knows that the snow is white, the rock is grey, and the trees are green at all times because the eye understands the lighting of the scene and can interpret the true colour of the object despite the way it appears to change hues. In this way, it is clear that the human eye does not always interpret the hue of an object as exactly what is shown, but rather perceives the colour based on its context.

Figure 6

Comparing the hues of a mountain during blue hour and golden hour.



Note: Image of mountains (without diagrams) from “Mountains” (n.d.). *Photo Jeepers*.

<https://photojeepers.com/blue-hour-golden-hour-photography/>. Each hue in the middle

is picked from inside its corresponding circle, showing the different hues of an object depending on the lighting of the scene.

When studying colour, both its scientific properties based on its physical wavelength, as well as the psychological aspects dependent on the viewer and the context in which they see the colour must be considered. People physically see colour in different ways, can perceive the same hue differently based on its context, and that a colour will have different meanings to different people based on their culture.

Psychology of Colours

Traditional Colour Theories

The idea that certain colours could influence human behaviour and emotions is usually credited to Kurt Goldstein and his studies from 1939 and 1942 (Be a People Expert, 2016; O'Connor, 2011). In Goldstein's words, "it is probably not a false statement if we say that a specific color stimulation is accompanied by a specific response pattern of the entire (human) organism" (as cited in O'Connor, 2011, p. 232). He, along with several other theorists from that time including Faber Birren, Robert Gerard, and Max Luscher, argued that colour can create a specific physical and psychological reaction from its viewer. Although specific concepts of their theories have since been superseded, it has still set the groundwork for today's psychological colour theory (O'Connor, 2011).

In recent years, there have been countless studies that have researched this phenomenon from biological, psychological, and cultural perspectives. For example, Hurlbert and Ling (2017) contend that colour preference and other reactions to colour are an effect of human evolution. As people discovered what was safe and what was

dangerous, the colours of those things became rooted in human nature, such as green denoting healthiness because of the association with plants. Elliot and Maier (2012) take another perspective and argue that in addition to biology and human nature, people also learn specific colour meanings as they grow up in society. Through language and phraseology, literature, ritual, the arts, and popular usage, “the mere perception of a color can activate its paired associate and influence affect, cognition, and behavior accordingly” (Elliot & Maier, 2012, p. 8).

Even though the specific ways in which colour connotations become embedded in human psychology are unknown, it has been repeatedly proven that people are stimulated and affected in specific ways by different colours. Elliot (2016) wrote a historically based review on colour theory to provide insight to where colour theory began, where it is now, and where future research is needed. In his extensive analysis, he states that there is “substantial support” to prove these effects and lists over 50 studies that have found links between colour and human emotion.

In traditional, Western colour psychology, colours are typically categorized into warm, cool, and neutral colours. Warm colours include red, orange, and yellow, and have the connotations of being energizing, passionate, and positive. Cool colours are typically considered to be calm, professional, and subdued. Neutral colours are black, white, and grey, including very light tints and very dark shades of any hue. Each colour is considered to have its own meanings, with the secondary colours each taking some of its meaning from the primary colours from which it was created. Figure 7 shows a list of colours and their meanings from a traditional, Western perspective.

Figure 7*Colours and their meanings in Western psychology*

Red	Violence, Love, Passion, Danger, Importance, Fire
Orange	Energy, Earth, Change, Movement, Creativity, Health
Yellow	Energy, Happiness, Deceit, Cowardice, Hope, Gender-Neutral
Green	Growth, Renewal, Abundance, Envy, Jealousy, Stability
Blue	Sadness, Calmness, Responsibility, Reliability, Peace
Violet / Purple	Royalty, Wealth, Creativity, Imagination, Romance
White	Purity, Cleanliness, Virtue, Goodness
Black	Power, Elegance, Formality, Evil, Death, Mystery
Brown	Nature, Dependability, Steadfastness, Dullness, Wholesomeness
Grey	Moody, Depressing, Formal, Modern

Note: Interpreted from Chapman (2021) and Elliot (2019).

Cultural Colour Theories

Additionally, colours have different meanings across the world in various societies. The colour blue is a great example. In America, it is a corporate colour, while it represents death in Iran, but purity in India. Blue is a cold colour in East Asia and Sweden, but warm in the Netherlands. Similarly, it is a feminine colour in the Netherlands but a masculine colour in Sweden and in America (Aslam, 2006). There have been countless studies that quantify the average preferences for individual colours in different countries. While blue is the most popular colour in America, the United Kingdom, and several other industrialized countries, it is only moderately appreciated in

Lebanon and Iran, and it is the most disliked colour for participants from Kuwait (Yokosawa et. al., 2015).

The meanings of certain colours also differed between various cultures throughout periods of history. For example, the colour crimson was only worn by senators during Ancient Roman times, but it was later seen as a colour that represented charity during medieval times. In the Renaissance, crimson was socially accepted as a colour to wear during mourning (Aslam, 2006).

In a study of the cultural differences between colour perception, Aslam (2006) created a table (Figure 8) to show the traditional meanings of seven colours across nine cultures. It is clear to see that not only do colours have unique meanings in varied cultures, but many of the connotations are also extremely contrasting, if not complete opposites.

Figure 8

An examination of the meanings of colours in various cultures across the world.

Colour	Country–Culture cluster								
	Anglo-Saxon	Germanic	Latin	Nordic	Slavic	Chinese	Japanese	Korean	ASEAN
White	Purity	–	–	–	–	Death	Death	Death	Death
	Happiness	–	–	–	–	Mourning	Mourning	Mourning	Mourning
Blue	High quality	Warm	–	Cold	–	High quality	High quality	High quality	Cold
	Corporate	Feminine	–	Masculine	–	Trustworthy	Trustworthy	Trustworthy	Evil
	Masculine	–	–	–	–	–	–	–	(Malaysia)
Green	Envy	–	Envy	–	–	Pure	Love	Pure	Danger
	Good taste	–	–	–	–	Reliable	Happy	Adventure	Disease
	–	–	–	–	–	–	–	–	(Malaysia)
Yellow	Happy	Envy	Envy	–	Envy	Pure	Envy	Happiness	–
	Jealousy	Jealousy	Infidelity	–	–	Good taste	Good taste	Good taste	–
	–	–	–	–	–	Royal	–	–	–
	–	–	–	–	–	Authority	–	–	–
Red	Masculine	Fear	Masculine	Positive	Fear	Love	Love	Love	–
	Love	Anger	–	–	Anger	Happiness	Anger	Adventure	–
	Lust	Jealousy	–	–	Jealousy	Lucky	Jealousy	Good taste	–
	Fear	–	–	–	–	–	–	–	–
	Anger	–	–	–	–	–	–	–	–
Purple	Authority	–	–	–	Anger	Expensive	Expensive	Expensive	–
	Power	–	–	–	Envy	Love	Sin	Love	–
	–	–	–	–	Jealousy	–	Fear	–	–
Black	Expensive	Fear	Fear	–	Fear	Expensive	Expensive	Expensive	–
	Fear	Anger	Anger	–	Anger	Powerful	Powerful	Powerful	–
	Grief	Grief	Grief	–	–	–	–	–	–

Multiple sources: Oyama et al. (1963, cited in Hupka et al., 1997), Kreitler and Kreitler (1972, cited in Grossman and Wisenblit, 1999), Ricks (1983), Jacobs et al. (1991), Schmitt (1995), Hupka et al. (1997), Schiffman et al. (2001) and Neal et al. (2002). The country clusters are adapted from Ronen and Shenkar (1985). The absence of any concrete reported research findings for particular cultural clusters are denoted by dashes.

Note: Taken from Aslam, M. M. (2006). Are you selling the right colour? A cross-cultural review of colour as a marketing cue. *Journal of Marketing Communications*, 12(1), 15–30. <https://doi.org/10.1080/13527260500247827>.

Since much of the literature on colour theory has had an American background, there has been a tendency to apply a narrow, Western perspective to the use of colours in marketing. However, this is extremely ineffective and may lead to strategic failure (Aslam, 2006). For example, a designer may choose to use the colour green for a brand focusing on nutrition as it represents ‘good taste’ in American culture. However, this would be a poor design choice in Malaysia where green represents danger and disease. In this sense, it is clear that although colours incite a specific reaction in people, the effects are not universal and can change from person to person.

Colour in Context

More recent studies on colour have begun to examine another theory called ‘colour in context.’ While context has been “largely ignored in theoretical and empirical work on color psychology,” the colour in context theory understands and accepts the fact that the meanings and perception of colour are completely dependent on the physical surroundings of the colour, the personal experiences and culture of the viewer, and the biological reactions that humans have to certain wavelengths of light (Elliot & Maier, 2012, p. 70).

For example, it theorizes that while red may indicate love in some situations like on Valentine's Day, it does not have the same affordances in another situation like in school, where it may have the connotations of failure instead (Be a People Expert, 2016). Another example is the colour yellow. In some situations, such as transportation

in Western society, yellow indicates caution. Yellow stop lights, caution signs, and school buses are all yellow objects that indicate to the viewer that they need to slow down or be careful (Be a People Expert, 2016). On the other hand, yellow has also been shown to be an energetic colour that promotes happiness, confidence, and sunshine when it is used in product design or marketing. Despite these implications, calling someone 'yellow' is known to be calling them a coward or deceitful (Chapman, 2021).

Although these meanings seem to be contrasting, they are all equally true in their own context and equally inaccurate out of context. Yellow does not indicate happiness on a caution sign, nor does it indicate cowardice on a children's toy, but it still carries both of those meanings when used in the correct situation. Additionally, traditional colour psychology has focused on solely the hue of the colour, but Elliot and Maier (2012) argue that the variances in saturation and value can also influence on the meaning of the colour in the same context-bound manner. In this way, it is clear that colours provoke certain reactions and emotions in its viewer, and the connotation of a colour can be altered depending on the context in which it is seen.

Despite the varying ways that colours can be used and perceived, it does not mean that the use of colours is meaningless. Colours can have a large impact on a viewer's perception and reaction to a design, so it is crucial for designers to understand these intricacies and caveats in order to use them effectively.

Colours in Marketing

Since colours can evoke emotional and psychological reactions from its viewer, marketers can influence what a consumer thinks of a product or experience by using

specific colours. To explain colour connotations in marketing, Westland (2017) gives the example of yellow and green dish soap. Before even opening the bottles, many customers would assume they smell like lemons and apples respectively because of its colour and natural colour associations.

When first interacting with a product, people tend to make up their minds in the first 90 seconds, with about 62-90% of the assessment based on colour alone (Singh, 2006). Other studies conducted by Colour Marketing Group found the following:

Colour increases brand recognition by up to 80%, colour ads are read up to 42% more than similar ads in black and white, and it can be up to 85% of the reason people decided to buy a particular product. (As cited in Kaushik, 2011, p. 129)

Since colour can have such a significant influence on a customer's purchasing decisions, it is a very important aspect of marketing. Even though its effects are often unnoticed or underestimated, it can entice and persuade consumers to feel a certain way about a product, and to recognize brands and promote brand values (Singh, 2006; Aslam, 2006).

Emotions and Perceived Values

In his book, *Emotional Design*, Don Norman (2003) explains that in marketing, "the design becomes the product" (p. 65), explaining that people are much more likely to purchase a product if they like its design. He uses the coloured iMac computers as examples, pictured in Figure 9. Although they had the exact same hardware and software as other Apple computers that were not selling well, sales significantly increased once the computer became available in multiple colours because people enjoyed its aesthetics (Norman, 2003). Another example is the Heinz 'EZ Squirt Blastin'

Green Ketchup' that debuted in 2000, also pictured in Figure 9. Despite the fact that the condiment did not have a different taste or consistency, it resulted in \$23 million in sales and the highest sales increase in the brand's history because it was green rather than the traditional red (Morton, 2019). When marketers use different or unconventional colours like in these examples, the colour itself influences a consumer's purchasing decisions simply because of its aesthetics and the customer's personal colour preferences, and because it differentiates itself from other products.

Figure 9

Coloured iMacs and Heinz 'EZ Squirt Blastin' Coloured Ketchup.



Note: From Gallagher (2020). How Apple went from bust to five million colorful iMacs sold. *AppleInsider*. <https://appleinsider.com/articles/20/04/19/how-apple-went-from-bust-to-five-million-colorful-imacs-sold>, and Glass (2011). What were they thinking? the day ketchup crossed the line from perfect to purple. *FastCompany*. <https://www.fastcompany.com/1779591/what-were-they-thinking-day-ketchup-crossed-line-perfect-purple>.

The same types of implications can be found in packaging design or a company's branding. For example, while the main branding colours of Crest are blue and red, the company only uses blue and white on their 3D Whitestrips to reinforce the ideas of

purity and cleanliness for white teeth, and to emphasize these implications specifically for this product line (Kumar, 2017). In the same way, colour has a large influence over a product or brand's perceived price and value. Certain colours are seen as more expensive or of higher quality than others, and using those colours can change the way that a consumer regards the brand. For example, dark colours can create an indication of richness or high value, which is why many expensive technological products use dark grey or black packaging (Aslam, 2006; Kumar, 2017). Other colour/value connotations in the UK and USA include pink and red as average priced, or light neutral colours as dull but expensive (Aslam, 2006). Although product quality is ultimately the deciding factor in customer satisfaction, colour provokes an emotional response about the product and company, and heavily influences the purchasing habits of consumers (Aslam, 2006).

Colours reflect the company and can communicate its vision and values in the same way that colour psychology evokes emotions in its viewer. For example, Nature Valley uses green to promote its healthy ingredients, and yellow as an accent colour to boost the feelings of sunshine and positivity (Kumar, 2017). Companies like Toys 'R' Us and McDonalds use simple colours because they are vibrant and intense to ensure they are seen in a busy environment (Aslam, 2006). Kumar (2017) lists many more ways that colour can influence a customer's emotions, which are organized into Figure 10. It is important to note that context is crucial as previously explained, and the same colours can have varying meanings between different companies.

Figure 10*Colours and their influence on consumer's emotions*

Colour	Emotion	Example
Red	Vividness, Youth, Energy	Coca-cola
Orange	Courage, Ego, Uniqueness	Hermes
Green	Quiet, Leisure, Comfort	Starbucks
Green	Healthiness, Nature	Whole Foods
Blue	Reliable, Professional, Staid	IBM
Red and Yellow	Urgency, Energy, Speed	McDonalds, Burger King
Brown	Reliable, Consistency	UPS
Black	Power, Luxury, Exclusivity	Apple

Note: Interpreted from Kumar (2017).

In a more subtle sense, brands can influence their customers' purchasing habits by establishing specific moods and enticing them to have certain feelings through the use of colours during their experience with the company. Singh (2006) gives several examples of how this can occur with colours in interior design. Using red or yellow, restaurants can increase the appetites of their customers, while all-you-can-eat restaurants can use blue to suppress their appetites. Similarly, casinos often use the colour red as it makes time feel like it is passing slowly, so their clients do not feel like they are wasting a lot of their time inside.

Brand differentiation

Brands also use colours to create a strong association with itself and a given colour (Kaushik, 2017; Aslam, 2006). In the words of Singh (2006), "colours evoke

brands” (p. 786). When confronted with a large selection of similar products, consumers will look for the brands they can recognize, so it is important for companies to use colour in an effective way to stand out from their competitors and be noticed by their customers (Kumar, 2017; Norman, 2003). In one study, 62% of participants created an association with a brand based solely on the colours they saw in a 3 second advertisement (Kumar, 2017).

For example, Heineken’s green, Coca-cola’s red, Shell’s yellow, Barbie’s pink, and Cadbury’s purple are all extremely recognized to their brand. Although these colours can evoke various emotions in different people, the brands are able to be identified and trigger a reaction by their colour quicker than written word or images (Singh, 2006; Aslam, 2006). In a similar sense, Pepsi uses the colour blue and H&R Block uses the colour green to differentiate themselves from their competition which typically use red or blue respectively in their own industries (Aslam, 2006; Labrecque & Milne, 2011).

The usages and influences of colour are often unnoticed by consumers, which make their effects even more potent (Aslam, 2006). The correct use of colours ensures that a brand can portray itself in an effective way with colour connotations, in an appropriate way in its context, and in a way that differentiates itself from its competitors, making it an crucial aspect of marketing.

Colour Trends

Despite the associations that are currently connected to certain colours, it is important to realize that colour preferences, like many other aspects of marketing, are not permanent and go through trends (Kumar, 2017; Singh, 2006). For example, the

most popular colour for a vehicle in 2017 was white, representing 35% of vehicles sold around the world, while silver dominated the market from 2000-2010 (Hidefi, 2017). Changes in trends can also be slower to be noticed. Since the mid 1990s, the colour pink has slowly started to appear in fashion, interior design, and many other markets in support of the pink ribbon for breast cancer awareness. Prior to this campaign, it was unusual to see the colour pink appear in many industries, such as men's clothing, but its use has since increased enormously (Hidefi, 2017). More recently, global warming awareness has begun to influence "every single facet of design and colour" (Hidefi, 2017, p. 287), allowing green and other natural colours to become part of the current colour trends.

Trends, like all other meanings of colour, are still context-bound and can change based on culture, location, and personal experiences. Hidefi (2017) gives the example of the Bedouin people in the Empty Quarter bordering Saudi Arabia, the United Arab Emirates and Oman. Since they are constantly surrounded by only natural, earthy colours, a vibrant colour palette likely would not become a trend in their culture because the colours are out of context to their way of life, and unable to be connected to a relatable, authentic part of their lives.

Colour trends are essential to marketing managers as they can use colour forecasting to predict which colours may become popular. With this knowledge, brands can prepare for the trend by making relevant design choices, differing themselves from their competitors, and keeping the brand from becoming outdated (Singh, 2006; Hidefi, 2017). If companies are able to use colour correctly, they have a much better chance of their company's success.

Colour Accessibility

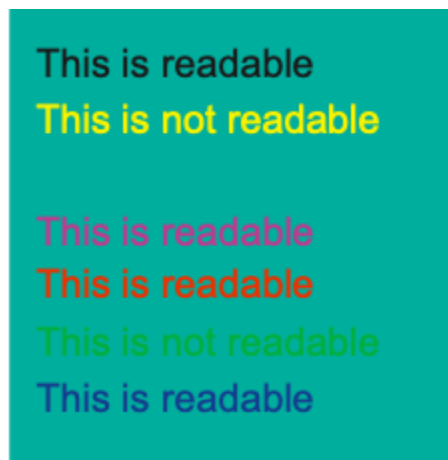
Colour combinations and meanings are only effective if they are able to be understood and used by their viewer. One of the most important theories in design is known as human-centered design - the concept that a successful design begins with its usability (Norman, 2014). In reference to colour theory, human-centered design signifies that a colour combination is rendered ineffective if it is difficult to see or if it is inaccessible by its viewers. About 15% of the world has trouble seeing certain colours for various reasons, and even people with normal colour vision have difficulties seeing certain colour harmonies (Lanyi, 2017). In this way, it is essential to understand colour accessibility so that everyone is able to see a design with ease. Some examples of good and poor colour harmonies are displayed in Figure 11.

Since accessibility is such an important element to consider in order to reach the largest audience possible, there are a multitude of resources to help designers make practical choices. The Web Content Accessibility Guidelines provide insight on specific ratios of colours and contrast that can make it easier to distinguish colours for any viewer (Lanyi, 2017). Schwarz (2021) also provides several guides to maintaining an accessible design including refraining from using neon colours, red and green directly beside each other, light colors on white or detailed background, and “bright colors with more bright colours.” To use colour in a powerful way, the design must first start with accessibility or else the other theories of colour cannot be applied in the intended manner.

Figure 11

Examples of good and poor colour harmonies for readability

This is readable
 This is not readable
 This is not readable
 This is readable
 This is readable
 This is readable
 This is readable
 This is readable



Note: From Lanyi (2017).

Part 3: Case Studies

Colour is a key part of design but it can be difficult to utilize colour and consider all its affordances when designing a website. Colours can be very subjective, evoke different emotions, change meanings in various contexts, and can create accessibility issues when colour harmonies are not used correctly. It is essential to follow a company's established branding while still staying up to date with the current trends and maintaining the mood that the website is meant to convey. Still, colours can create extraordinarily effective results when they are used correctly. To better understand how these critical colour theories apply to marketing and UX/UI design, the websites of Amazon, Rakuten, and Craigslist will be analyzed as examples.

Amazon

After being founded in 1994 by Jeff Bezos as an online bookstore, Amazon quickly became the world's largest online retailer and the sixth biggest corporation in the

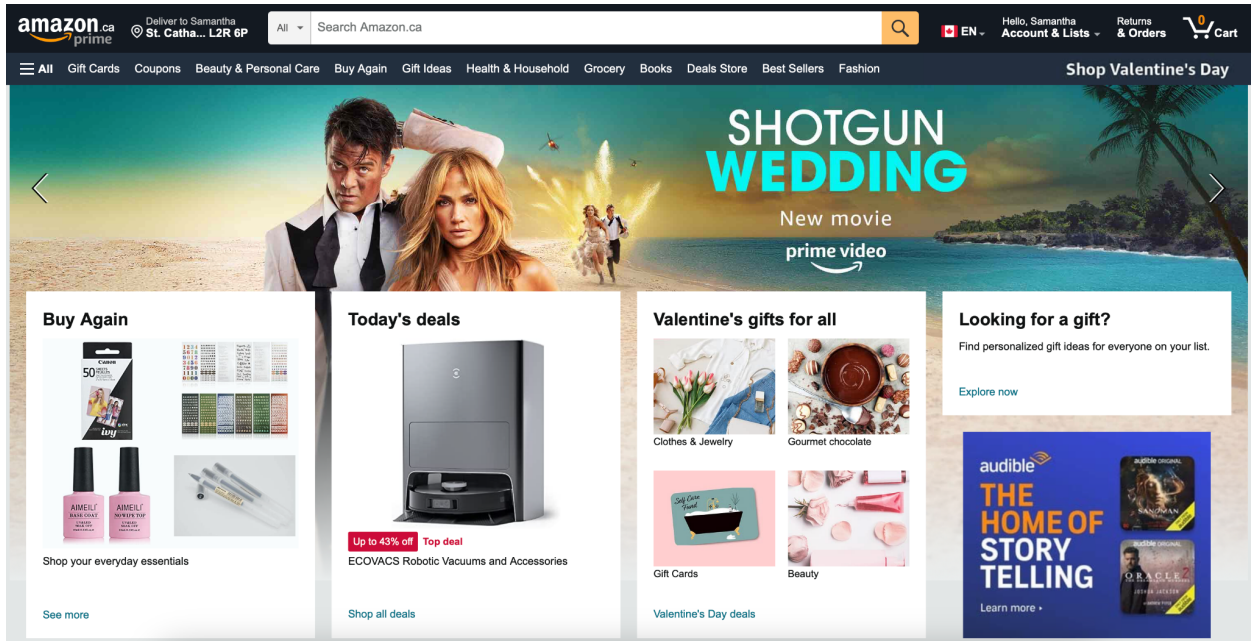
world (Hall, 2023; Debter, 2022). Now, Amazon also owns many sub-brands in various technological sectors including AWS Cloud Computing Services, Kindle, Amazon Echo, Alexa, Prime, and many more (US About Amazon, 2020). Their core brand principles include “customer obsession rather than competitor focus, passion for invention, commitment to operational excellence, and long-term thinking” (US About Amazon, 2020).

Amazon uses a navy and orange colour scheme across the majority of their branding, websites, and social media. Specifically on their website, they use a navy header and footer, a grey background, and white squares to separate blocks of content. Their logo is shown in white with their trademark orange arrow. The rest of the website uses very little colour except what is shown in product images, and blue text as buttons (Figures 12 and 13).

Like many other large businesses, Amazon uses blue as part of their brand's colour schemes because it is the most universal corporate colour. Globally, blue is associated with calmness, reliability, integrity, and high quality, and it creates trust between its consumers and the company (Aslam, 2006; Chapman, 2021; Elliot, 2019). More specifically, navy blues are considered steadfast, confident, and authoritative (Bear, 2018). The navy is also similar enough to black that it can adopt some of the colour connotations associated with black including power, elegance, and formality (Chapman, 2021). This use of blue and its corresponding psychological associations help to demonstrate Amazon's core values of customer dedication and commitment.

Figure 12

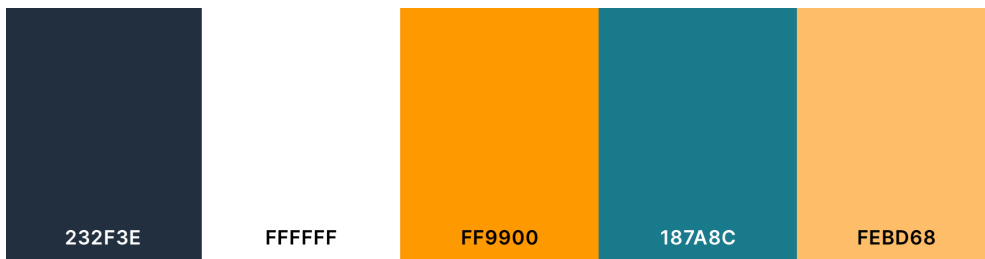
Amazon.com home page



Note: Screenshot of Amazon.com from February 5, 2023.

Figure 13

Colour scheme of Amazon's websites



As a secondary, accent colour, Amazon chooses orange because it compliments the blue and continues to represent Amazon's values. Blue and orange are opposite to each other on the colour wheel, and this particular shade of orange is very bright compared to the dark blue. This large contrast allows the colour combination to have a very visually appealing aesthetic. Additionally, orange is a traditionally energetic,

creative, and passionate colour that represents movement and change (Chapman, 2021; Elliot 2019). These connotations continue to uphold Amazon's brand values, especially their 'passion for invention.'

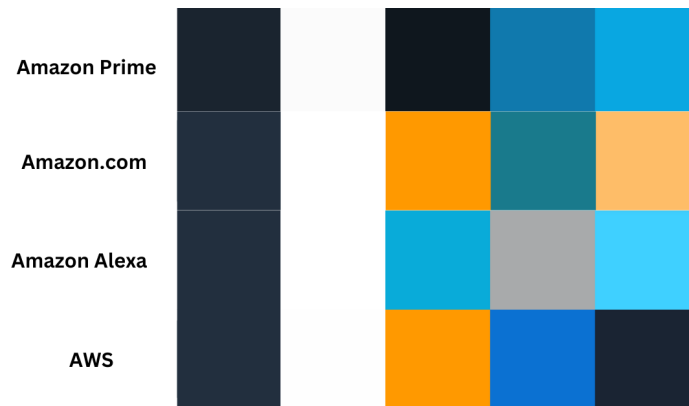
Furthermore, consistently using the same orange for their logo, branding, and website has helped Amazon create a recognizable and prominent visual identity. In the same way that Coca Cola is associated with red, Cadbury is associated with purple, and Heineken is associated with green (Singh, 2006), Amazon's constant use of orange creates a strong correlation between the colour and the brand. For example, one of Amazon's marketing techniques involved removing all the words from their delivery packages and leaving just the orange arrows. Of course, the shape of the logo is also very significant, but this design helped to create a strong mental connection between the colour and the brand so it is more easily recognized by its target audience (Jansen, 2022). In the UX/UI design of Amazon's website, the minimal use of orange allows the design to have the corporate values of blue while still keeping the brand identity that is associated with Amazon's orange.

That being said, Amazon's sub-brands do have small variances in colour that do not include as much orange. Amazon Prime Video, Alexa, and AWS Cloud Computing Services all keep the same hues of blue, navy, and white in their branding. Prime Video uses the darkest shades of blue and introduces a new shade of medium blue as an accent colour. Alexa's branding is switched, using mostly the medium blue with navy as its accent. The website for AWS is almost identical to Amazon's main page, except it also includes an additional shade of a medium, corporate blue. These colour schemes are presented in Figure 14. Although there are subtle differences between each site, all

of Amazon's sub-brands still all use very similar colours which further enforces the mental connection between these shades of blue and each of Amazon's services, while allowing each to have their own brand identity.

Figure 14

Differences between Amazon Prime, Alexa, AWS, and Amazon.com's main pages



Rakuten

In comparison, Rakuten is a Japanese-based online shopping platform operating in 29 different countries and regions. It was founded in 1997 by Hiroshi Mikitani, and has evolved to become Japan's largest e-commerce corporation, and the third largest e-commerce business worldwide. Rakuten also has over 70 of sub-brands within their company including e-commerce, banks, travel, marketing, and many more. In 2022, their market share was valued at \$6.81 billion (Shastri, 2022). Rakuten states that its vision is: "Creating value through innovation and entrepreneurship. By providing high-quality services that help our users and partners grow, we aim to advance and enrich society" (Rakuten, n.d.). Their name itself, Rakuten, means 'optimism,' which further denotes their brand values of empowerment and professional success (Rakuten, n.d.).

Rakuten has a large colour palette and uses a variety of different colours in various settings across their businesses and websites. However, their main brand colours are specific shades of red and purple. For their websites, they use grey writing and white backgrounds with additional shades of purple and red to provide a variety of accent colours and variety in design. These colours can be seen in Figure 15.

Figure 15

Rakuten brand colours that appear across their marketing and websites.



In order to distinguish and identify each of their services and sub-brands, Rakuten uses many different colours and has individual branding guides for each one. Some examples of their varying colour palettes can be seen in Figures 16a and 16b. In a press release about a recent rebranding initiative, the company expressed that they use a variety of colours for each service “to express the distinct characteristics of each service and highlight the diversity of the Group as a whole, as well as conveying happiness and our optimism for the future” (Rakuten Inc., 2018). The use of different colours for their various sub-brands allows the company to convey individual brand values and provoke different psychological reactions.

Figure 16a

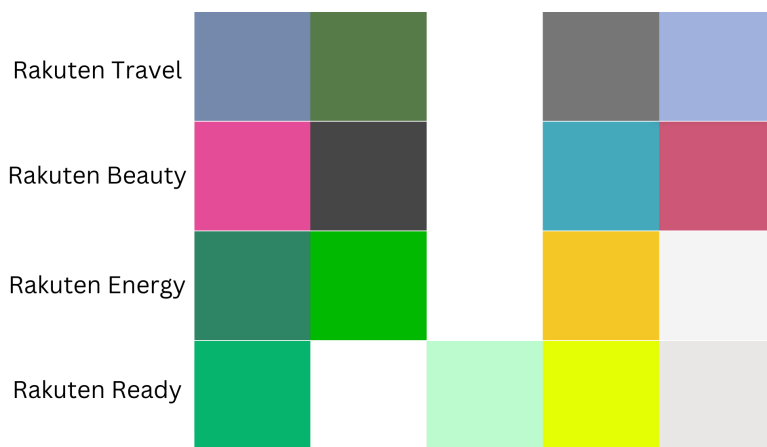
Various Rakuten services and their corresponding logos showing a multitude of colours.

Service Name	Current Logo	New Logo
Rakuten Ichiba		
Rakuten Travel		
Rakuten Card		
Rakuten Bank		
Rakuten Life Insurance		
Rakuten Recipe		
Rakuten Drone		
Rakuten Beauty		
Rakuten Ticket		
Rakuten Energy		
Rakuten AirMap		
Rakuten Marketing		
Rakuten Viber		

Note: From Rakuten Inc., 2018.

Figure 16b

The colours of various Rakuten websites.



Since each service has its own unique goals and marketing strategies, each website has a different colour palette to accurately represent the brand so their viewers will react to it in the intended manner. For example, Rakuten Ready is a technology that aims to facilitate mobile ordering for businesses. Their manifesto emphasizes the importance of speed and convenience, and they list “optimistic, straightforward, smart, friendly, and simple” as brand values (Rakuten Ready, n.d.). Although Rakuten red usually represents happiness and celebration, the context of this service has the ability to change the viewer’s initial reactions. In the context of delivery and travel, red is associated with stop signs, red lights, and warnings, where green is associated with green lights and proceeding. This website chooses to use bright shades of greens and yellow instead of the brand’s usual red (Figure 17) so that the colours' connotations align more closely with their context. In this way, Rakuten’s use of colour is very effective as it is free to change based on the context so that the site’s user is more easily influenced to react in the way they are meant to. Although this is a much different marketing strategy than Amazon’s cohesive approach, it still uses colour very effectively and it leaves room to use other design elements to create brand recognition.

Figure 17

The brand colours of Rakuten Ready.

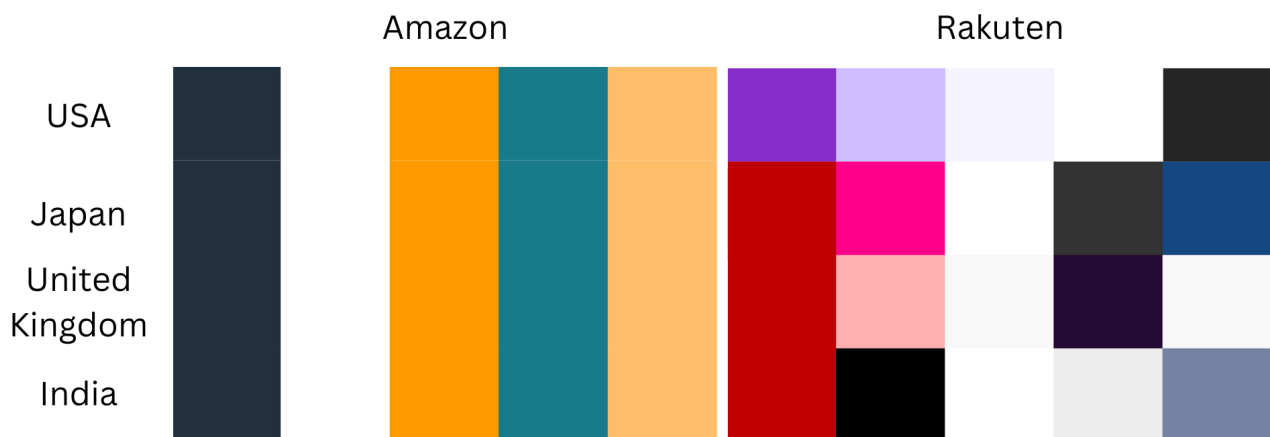


Note: Interpreted from Rakuten Ready, (n.d.).

In contrast to Amazon, Rakuten also takes their use of colours in context one step further. As previously discussed, colours have different connotations across the world so using the same colour for two different communities can result in inefficient or strategically unsuccessful designs (Aslam, 2006). To prevent these unfavourable affordances, Rakuten uses different colours on their sites for different physical locations.

Figure 18

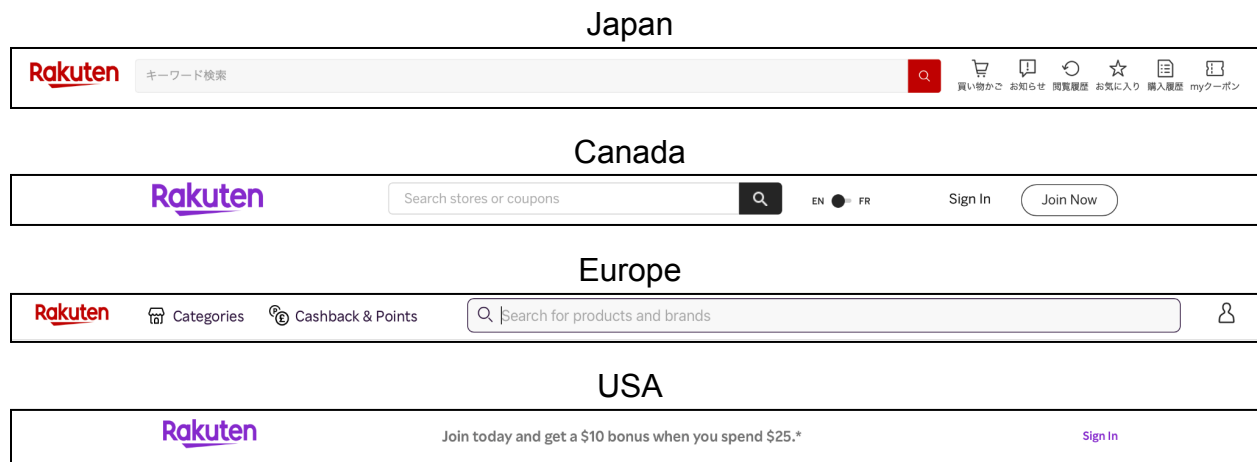
Comparison of the colours on the Rakuten and Amazon websites for the USA, Japan, the United Kingdom, and India.



The most obvious distinction is on the Rakuten logo itself in the top left corner of the navigation bar, shown in Figure 19. In Japan and Europe, it is displayed in the main Rakuten red, whereas in Canada and the USA, the logo is shown in purple. These differentiations become even clearer in the logo shown in the tabs of the browser. As seen in Figure 20, the Japanese site has a red and white logo, the Canadian site is purple and white, the European site has the default browser logo, and the American site has a solely white logo.

Figure 19

Navigation bars of Rakuten in various regions.



Note: Screenshot of <https://rakuten.co.jp/>; <https://rakuten.ca/>, <https://rakuten.co.uk/>, and <https://rakuten.com/> respectively.

Figure 20

Logos of Rakuten Japan, Canada, Europe, and USA in the tabs of Safari



Note: Screenshot of <https://rakuten.co.jp/>; <https://rakuten.ca/>, <https://rakuten.co.uk/>, and <https://rakuten.com/> respectively.

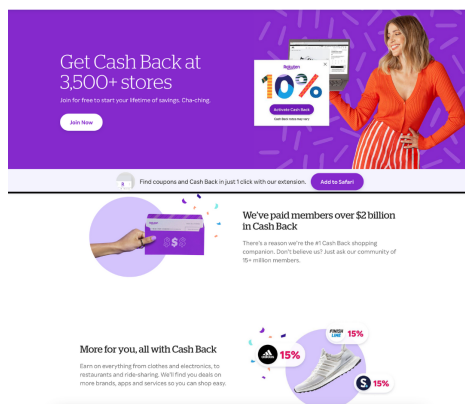
Since colours carry multiple meanings and can incite different reactions to people in different cultures, Rakuten changes their colours to best suit the audience that is being targeted. While using the colour red to indicate positivity and optimism makes sense in a Japanese setting, it does not have such a strong connotation to happiness in North America. Rakuten instead changes the colour of their logo on the Canadian and American sites to purple so that it remains on brand, but has a better chance of being interpreted in the intended manner. From another standpoint, the colour purple is rare to

see on the European website because it can have a negative connotation to its viewers. Disney discovered some of these negative effects of purple as they opened DisneyWorld Paris and had visitors claiming their purple branding, although incredibly successful in the USA, seemed dark and morbid to their European perspectives (Designing Disney, n.d.). Although purple is one of Rakuten's main colours, it is purposefully left out of the European interface to prevent some of the colour's negative connotations from being perceived.

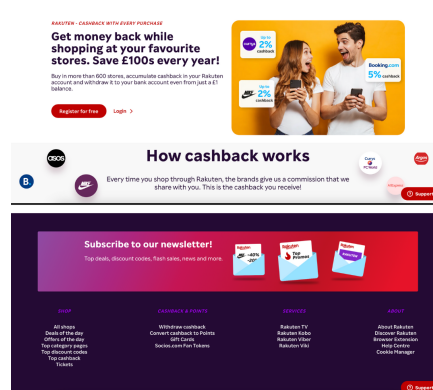
On the homepages of each site, the background is always pure white, but the accent colours differ (Figure 21). Although all of Rakuten's primary brand colours appear in each site, the frequency and patterns of these colours change. In Canada, the first highlight colour is light purple, but there is also red, purple, and red and purple gradients across the rest of the page. On the European site, there are very few blocks of colour on the homepage, but the footer is vibrant purple, and the American site only uses abstract blobs of light purple to accentuate their page. In contrast, the Japanese site uses a large variety of hues to capture their viewer's attention immediately.

Figure 21

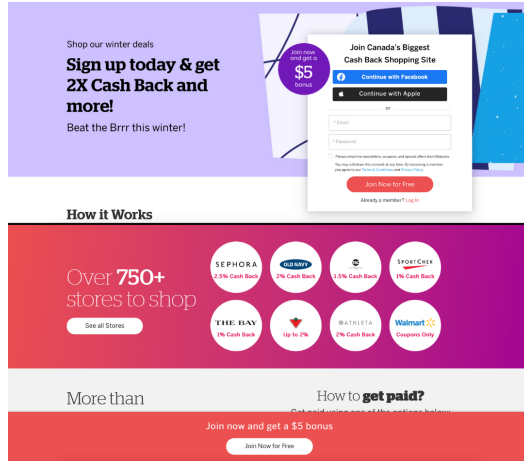
Homepages of Rakuten Canada, USA, Europe, and Japan.



Rakuten USA



Rakuten Europe



Rakuten Canada



Rakuten Japan

Note: Screenshots of <https://rakuten.co.jp/>; <https://rakuten.ca/>, <https://rakuten.co.uk/>, and <https://rakuten.com/>.

In a cross-cultural analysis of the user interface of Rakuten Travel, the Krows Team (2020) notes that most websites across the world typically have a minimalist interface with large images and slick designs. However, the Japanese audience prefers to see as much information as possible rather than the simple designs seen in other cultures. In their words, “it doesn’t make much sense for Rakuten to have a minimal design with the minimum amount of information while targeting the Japanese audience” (Krows Team, 2020). The same rationale can be applied to the colours of the page. The Rakuten Japan website uses many different colours in order to organize and quickly present lots of information to its users, whereas the European and North American sites use simple and minimal colours so that it appeals to the aesthetics of the audience in those cultures.

Craigslist

While Amazon and Rakuten are great examples of different ways to use colour effectively, it is also important to understand instances where the use of colour could be

improved. Craigslist uses a very simple design with a plain white background, blue writing, and grey accents over some blocks of text (Figures 22-23). There are no other colours on the page except a very faint yellow highlight over today's date on the calendar and the words "create a posting." The website is exactly the same in every region, and the design of the individual pages for each category are almost identical.

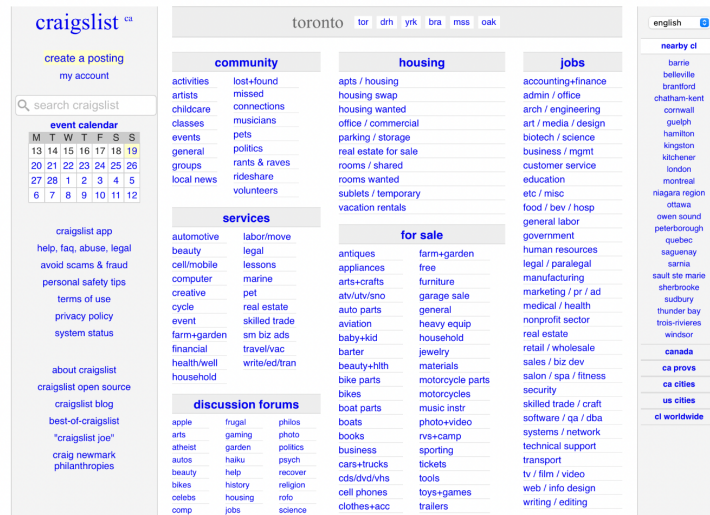
Figure 22

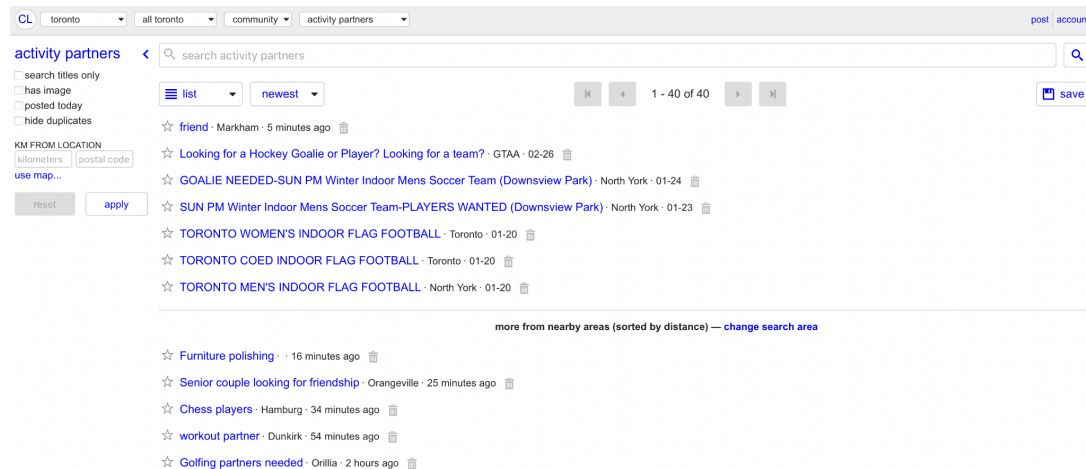
Colours of the Craigslist website.



Figure 23

Craigslist Toronto homepage and 'activities' search results





Note: Screenshots from <https://toronto.craigslist.org/>

In some ways, this website is quite effective. Its simple user interface allows it to be extremely usable by all users, even those who may struggle to understand complex technology. The lack of colours eliminates the problems that could be caused by regional or cultural differences, and it has very few accessibility concerns as the colours have enough contrast for every type of colour vision. Additionally, the design of the Craigslist website has had no significant changes since it was first launched in 1995 (Doubek & Kelly, 2020). While many designers critique this old design because it looks outdated, it has helped create a highly recognizable website that will remain effective as design trends come and go.

On the other hand, the minimalist design of Craigslist may work to some extent, but that does not mean that it is as efficient as possible. Feisner (2006) states that colour is the first element of any object that is noticed and it provides the ability to understand what is being seen. In this way, she argues that colour is the most important element of design and claims: “nothing has meaning without colour” (p. 2). In this way, Craigslist neglects the visual appeal of a viewer when they arrive on the website and

misses out on many benefits of an attractive design. The Craigslist website design is called successful because it maximizes the audience and requires little maintenance to remain effective (Sheppard, 2018). However, the use of colour could still be improved in several ways.

Firstly, some of the excessive white space could be removed. Although both Amazon and Rakuten also had white backgrounds, they also had many other colours to divide blocks of content so there was a clear visual hierarchy. Adding an additional colour to the palette - even if it is just another shade of grey - can help differentiate between the lists of products, places, and affiliate links. This will also help add to the aesthetic of the website by adding a little more contrast.

Additionally, the yellow blocks on the calendar and behind the text “create a posting” do not have enough contrast against the grey background to be useful. The contrast ratio between these two hues is 1.32, which is considered inaccessible according to the Web Content Accessibility Guidelines. If the yellow cannot be easily seen by its audience, it should not be used on the website. Instead, Craigslist should use a hue that creates more contrast between both the blue writing and the grey background, or change the way that attention is called to those buttons. Lastly, supplementary shades of the Craigslist blue could be added for aesthetic purposes. In the words of design company CydoMedia (2022):

The Craigslist website might get the job done, but its popularity doesn't justify the design they've chosen. Websites are supposed to be attractive enough to keep people on the site – and a first-time user would probably leave unless it comes highly recommended.

Although the current colour scheme of Craigslist is very simple and has its benefits, it is still possible to create a modern and aesthetically pleasing design while keeping the core elements that have led to the website's success.

Part 4: Suggestions

Colours affect the psychological reactions of its viewer and carry specific, instinctual connotations that are often overlooked and unnoticed. Even so, the meaning of a colour can change based on the individual observer, and their cultural background and demographics. Colours have the capability to influence their viewers in many different ways, which in turn can significantly improve or decrease the success of a website. When designing, it is essential to understand the affordances of colour and the ways that they affect their viewers in order to maximize the effectiveness of the website as a whole. Architect Jeanne Kopacz (2017) summarizes the importance of colour for designers by stating:

By identifying the individual responses that correlate to specific colour conditions, the designer may anticipate human response to the presence of visual (colour) stimuli. Put simply, if a particular colour condition elicits an identifiable reaction in the people who view that condition, we can create that condition for a similar response in other designed contexts. (Kopacz, 2017)

It is evident that colours can be used to create certain reactions in its observers, but it can be difficult to put these theories into practice. To summarize the significance of colour theory, three suggestions on how to use colour efficiently will be given.

1. *Conduct Research*

Since colours can carry multiple connotations and their meaning is dependent on many factors, it is crucial for designers to conduct research to ensure they are using colour in the best way possible. One study conducted by Gorn et al. (1997) found that 11 of 12 creative directors did not understand colour theory or conduct any sort of research into their meanings, but instead “simply trusted their preferences or gut feelings to make colour decisions” (as quoted in Labrecque & Milne, 2011, p. 712). Although it is still possible to use colours in an aesthetically pleasing way without research, understanding colour theory and its intricacies can elevate a design so it is as effective as possible. It will be much easier to create the intended emotional responses and accurately represent brand values if the colours are being portrayed in a precise manner. Proper research will also ensure that the design will target its audience in the best way depending on the culture of its viewers.

There are many scientific and peer-reviewed articles like the ones explored in this thesis that prove colour theories, but there are also countless online guides that can be used to quickly reference the meanings of colours in different contexts and cultures. For example, Cameron Chapman (2021), a professional graphic and web designer, wrote a series of blog posts where she explains the meanings behind each colour of the rainbow and gives examples of various sites that use the colour well. Similarly, data solution company Summa Linguae Technologies (2022) has a colour guide to explain some of the differences between colour significance in various cultures, and includes an infographic for a convenient way to quickly check the colour’s connotations. There are a

multitude of other resources to explain colour theory so it is imperative that designers make use of these guides and maximize the effectiveness of their site.

2. Know your audience

As previously discussed, the meanings of colours vary between people from different cultures, age groups, and other social demographics. Although there are many ways to define a target audience, it is essential for a designer to specifically discern who their target audience is so that they can apply the most beneficial colour theories. Amazon, Rakuten, and Craigslist all have very broad target audiences that aim to include virtually all age groups, cultures, and genders. Their websites use colours that are very universal to maximize the colours' effectiveness on the most amount of people possible. However, this logic still applies when a website is meant for a smaller target audience. For example, it was previously explained how people from various age groups physically see colours in different ways, but Dittmar (2001) explains that these biological changes also influence a significant variation in colour preference between age groups as well. In this case, a designer could choose to use a colour that best suits the age group it is targeting so it maximizes its success. If the target audience is specifically defined by a designer, it will be much easier to apply the most advantageous colours to the website.

3. Use colour trends

With all the intricacies of colour theory, colour trends can help to confirm the effectiveness of a specific hue for various demographics and can help predict which colours will remain effective for their audience in the future. For example, the Pantone Colour of the Year is an incredibly popular and influential tool that is used to predict

upcoming colour trends. Through design, entertainment, fashion, travel, technology, and art industries, Pantone forecasts yearly colours which in turn continue to “influence purchasing decisions in multiple industries” (Pantone, 2022). Kirchner (2022) took this data from Pantone’s past predictions and used it to demonstrate some of the ways colour can be used to target different age groups. Although this is just one example of how to apply colour trends, understanding which colours will remain effective for different demographics ensures that a design will keep a modern aesthetic while remaining suitable and profitable for as long as possible.

Future Research

With these concepts, it is clear that colour theory is an impactful and imperative aspect of website design. As the meanings of colours shift based on various biological, sociocultural, and psychological affordances, it is crucial for designers to carefully consider the colour’s impact on their target audience in addition to the colour’s aesthetics. Colour must be properly researched based on all these factors in order to create a successful design.

While this paper begins to introduce important colour theories related to UX/UI design, there is still much more research to be done. The analysis of various psychological and cultural effects of colours are quite surface level in this paper. I examined traditional colour psychology in Western society and demonstrated how those alter from other cultures around the world, but colours have further significance based on one’s gender, age, hobbies, and other factors. These elements need research to further quantify this research and prove the effects that the individual factors can have.

Since colour trends and their corresponding connotations are constantly changing, it is important to keep this research up to date so it can continue to be used effectively as time passes. As previously mentioned, companies like Pantone conduct yearly research to examine the effects that colours have been having on pop culture and to predict the next colour trends. It is vital that this topic continues to be studied in this way so designers have the information they need to be able to use colour efficiently. Once the effects of colour are fully understood and applied correctly, it will be able to create a truly powerful design.

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