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RESEARCH JOURNAL

HOW THE HUMAN EYE & EAR PERCEIVE

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# 

# Introduction

This research paper we will answer our main question and our hypothesis. We will analyze with our give resources and from there we will deduct the best solution for Cannon OCÉ and their clients.

* Different colors of light, different emotions.
* How the human ear perceives the different sounds and their sound amplitudes.
* How do we get influence by sounds and lights?

# Research Goal

The research goal is to determine if our project is going to encounter any unwanted side effects. Such as the eye and ear having trouble receiving our messages for warning. There could be even the risk, that the currently to be developed system from us, to be a potential health hazard. The research goal is to determine the optimal settings and their coherence.

## 

## Eye

Expert interview:

We made an interview with different workers at TUe printer shop. We ask them some question about what is the thing they track the most and the answer was paper and ink, this being the only common errors they face during their working hours .

### **Research question**

*Can light influence people's behaviour?*

### **Hypothesis 1:**

*Emotion can be influenced by the use of different colors of light.*

An emotion a character is experiencing can be identified by what colour the character, or whatever they have is or turns in to. When they are angered or embarrassed, a character can turn red, or they can turn yellow if they are happy or blue if they are sad. The background might even change to the same colour the person is. A character, sometimes, in order to reflect what they are feeling in that particular day can change clothes and wear a specific colour.

Here's a list of colours commonly used to identify several emotions:

* Red: Anger, embarrassment, passionate, and lustful.
* Blue: Shyness, calmness or sadness.
* Yellow: Happiness, caution or cowardice.
* Green: Health, reliability, safety.
* Black: Mournful or cold.
* Pink: Love, embarrassed, cherry.
* White: Shocked, scared, sick, mournful.
* Grey: Emotionless or depression.

**Colour psychology**

Is the study of hues as a determinant of human behaviour. Colour influences perceptions that are not that obvious (ex: food taste). Colours can also enhance the effectiveness of placebos (ex: orange/ red pills are used as stimulants). A person can indeed be influenced by a colour, however, these effects differ between people. An individual’s perception of a colour can be influenced by some factors such as gender, culture, sex, etc.

Colour psychology is also widely used in marketing and branding. Many marketers see colour as an important part of marketing because color can be used to influence consumers emotions and perceptions of goods and services. Companies also use color when deciding on brand logos. These logos seem to attract more customers when the color of the brand logo matches the personality of the goods or services, such as the color pink being heavily used on Victoria's Secret branding. Colours are also important for window displays in stores. Research shows that warm colours tended to attract spontaneous purchasers, despite cooler colours being more favorable.

Perceptions not obviously related to color, such as the palatability of food, may in fact be partially determined by color. Not only the color of the food itself but also that of everything in the eater's field of vision can affect this. For example, in food stores, bread is normally sold in packaging decorated or tinted with golden or brown tones to promote the idea of home baked and oven freshness.

### **Hypothesis 2:**

*Light color can be an alert for the brain.*

For ages people react to colours depending on their feelings about the colour they see, but recently with studies is found that all people emotions or actions is made by brain.

Colour of light can be translated to different meaning for the brain which will let human make reactions depending on the light color. The process starts on the eye where we find a light sensitive cells in the back of the eye which are known as Cone receptors, and this cells will send signals to the center of the brain which will decide what is the reaction the brain will do with the specific color of light. There is a part in the brain called Hypothalamus, it is a very complex part of the brain which gives different signals such as hunger, stress, sleep, mood, body temperature, etc. For instance, the Hypothalamus with blue or green light colors is produce hormone which let us wake up, and that’s why when the sun goes down we feel sleepy due to the fact that the blue light in the sun disappears. Moreover, there is a studies show that red color give signs to the brain to increase neurobiological and level of wakefulness.

### **Hypothesis 3:**

*Light colors have different meanings in various cultures.*

Colors are a fact in our life, colors can remind you of a nice memory, a special day or a specific situation you go through. On the other hand, colors in some cultures can have different meanings that you have never thought about. For instance, in India the color red can mean power, wealth, married woman, beauty and love. For South Africa the color red in their flag means the struggle they had in order to get their independence. In Thai culture color yellow for Monday is the color of luck because their king is born on Monday, in many African countries yellow color means gold, money and power. In USA most of the banks use a blue logo which in their culture means safe and security. This is not only for American culture but also for other western countries. For western nations blue is the color that means freshness and money. In eastern and Asian cultures the color green is the meaning of new life or health , but in China if a man wears a green hat means that his wife cheated on him.

In conclusion, some colors in some cultures are the opposite meaning then other cultures, as mentioned before about color red which shows happiness in India, but in South Africa it means struggle to get freedom. Before choosing any color for a product or a gift to someone from other cultures than yours, make sure to check the meaning of the colors because they might bad/sad in their country.

# Research question:

*How do light colors get the users attention?*

### **Hypothesis 1:**

*Examples of used alert colors.*

Alert colors, sometimes, in different countries, are not the same and various companies use different alert colors to alert their clients of specific statuses. For instance, in Vanderbilt University Medical Center they sent 3 types of alert colors by email notification. Red is used to show there is a fire, yellow is used to prepare for an emergency protocol/plan that need to be followed , orange means to actually follow the protocol/plan made before. Examples of using yellow and orange colors in the medical center are: out of oxygen, electricity, water, steam, tornado.

In addition, the homeland security in the USA chose 5 colors for the society in order to alert the citizens about the emergency level of a terrorist attack. Each of the colors explain the chance of a terrorist attack. The meaning of each color is:

Green : low chance of terrorist attack,

Blue: general risk of terrorist attack,

Yellow: big chance of terrorist attack,

Orange: high risk of terrorist attack,

Red: severe risk of terrorist attack.

Also, for bad weather there are color codes which nations use to alert their citizens about the state of the weather and what they can do when they see that color code. There are 4 colors used for the weather state in general, each one describes a different situation. The colors are:

Green: weather is normal.

Yellow : take care because there is a chance of strong wind, snow or heavy rain,

Orange : it is for bad weather, for instance if it’s summer there might be a summer storm or strong heat.

Red : very bad weather, dangerous for citizens, which can damage their properties or might even kill, thus when the red code is up, citizens should make sure to be safe as much as possible.

### **Hypothesis 2:**

*Get user attention.*

Colors and lights are the strongest ways to get people's attention, based on research made by University of Barcelona about how to get user’s attention in a website. The research result was that the first thing the users notice in the website is it’s color. Thus, colors and lights can get user attention faster than anything else such as emotions or cultures.

Other research result made by Dr.Peter König from University of Osnabrück, Osnabrück, Germany found that the most attractive colors that get people’s attention are red and green and the colors which get less attention are blue and yellow.

Moreover, the study from University of British Columbia made by marketers and psychologists was about how the brain reacts to adverts if they contain the color blue or red. The result was both of the colors get the client’s attention but the difference between them was that clients who saw adverts with red color had more attention to the details, and blue colored adverts let the clients to think more in creative way.

### **Conclusion :**

In conclusion, the lights that will be used in our concept are based of the result we got from the research. For instance, based on the research that we made about light relations with cultures and people emotions, this research is helpful but if this colors are in a machine, users will think in different ways depending on their culture. If the machine displays the color red, then the user will know it is an alert due to the fact it is known globally that red is the alert/stop color such as in traffic lights or in weather alerting. Thus, the colors that will be used in our concept are the international colors for alerting which are yellow, orange, red and green.

Ear

Research on the human ear will be conducted, as well, to determine which types of sounds are better comprehended by the person and their optimal amplitude. So to not cause any form of distress in the user.

## **Research question**

*How the human ear perceives sound and what type of sound is suitable for the human. In addition to the main question it is important to understand the ear amplitudes and which is best suitable for this environment.*

### **Hypothesis 1:**

*The human ear perceives sounds differently. There two types of sounds speech and non-speech. Which is better and for what reason?*

Human sounds can be roughly divided into two categories: speech and non-speech. The first category is connected to the human possibility to exchange information, so if the project requires more in depth information on the error or warning this can prove to be very vaileble. Since a voice will deliver more information than a non-speech sound notification.

As for non-speech signals they will be suitable categorizing the status of is it in between a situation or it just started or even just end. Depending on the color depth of the light we can see if the process is about to finish or may finish in a some time.

### 

### **Hypothesis 2:**

*The human ear perceives the different sound amplitudes differently. Some amplitudes may be considered harmful or unpleasant, others informative.*

According to the clinical report the human hearing range depends on both the pitch of the sound – whether it is high or low – and the loudness of the sound. Pitch is measured in Hertz (Hz) and loudness is measured in decibels (dB).

For a person with normal hearing, when it comes to pitch the human hearing range starts low at about 20 Hz. That’s about the same as the lowest pedal on a pipe organ. On the other side of the human hearing range, the highest possible frequency heard without discomfort is 20,000Hz. While 20 to 20,000Hz forms the absolute borders of the human hearing range, our hearing is most sensitive in the 2000 - 5000 Hz frequency range.

As far as loudness is concerned, humans can typically hear starting at 0 dB. Sounds that are more than 85 dB can be dangerous for your hearing in the case of prolonged exposure.

Furthermore into to the investigation of Kim Krieger we can see that Kopiez says the research shows just how important context is. The ratings also changed depending on what the listeners thought the sounds were. If they thought a sound came from a musical composition, they rated it as less unpleasant than if they knew it actually was fingernails on a chalkboard. But their skin conductivity changed consistently even when they thought the chalkboard sound was from music and rated it as less unpleasant.

Overall, the human can distinguish sounds in reality, but they can be masked so they can appear more pleasant or at least easier to hear. This is according to the Kim Krieger’s post based on the research done in multiple Universities in Europe and North America. The volume of the sound also plays a roll making it easier to comprehend and most importantly, not to cause harm to the human ear.

## 

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