

The Shades of Morality: The Effects of Light Temperatures on Moral Decision-Making

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Abstract

This study explores whether the colour temperature of lighting affects moral decision-making, using research on morals and the influence of light on the mind. Two types of lighting were used: yellow-white light and blue-white light. Yellow-white light was hypothesized to elicit emotional responses, while blue-white light was hypothesized to promote logical reasoning. Moral scenarios were presented to participants to measure their responses as they were exposed to the different light variables. In addition to the hypothesis, this study aimed to answer the question of whether or not the colour temperature of lighting influences one's moral outlook on a decision. While the results were not statistically significant, this experiment could easily lead to revised versions.

Keywords: morality, decision-making, emotional responses, logical responses, environmental influences, ethics

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The effect of lighting on moral decision-making is a narrow topic in the broad and universal nature of morality. Previous studies have focused on various factors that can influence morals, including correlations with colour and lighting. It has been found that the colour of lighting has a profound impact on human behaviour and cognition. However, there are still gaps in understanding the direct relationship between lighting temperature and moral judgments. This study aimed to explore this specific topic, going beyond the physiological and psychological responses associated with colour and lighting to delve into a deeper understanding of morality.

Understanding morals is crucial in society, as they provide frameworks for laws and policies. Studying the effect of lighting on moral decision-making can inform the creation of environments that nurture ethics and control. This study contributes to the literature by attempting to understand the various factors influencing moral choices in everyday life.

More specifically, this experiment separated moral decisions into emotion-based decisions and logic-based decisions, and research has gone into these types of decisions, identifying them with the moral concepts of deontology and utilitarianism respectively. With the aim to investigate whether the colour temperature of lighting influences moral decision-making, participants responded to scenarios in an environment of either blue-white or yellow-white light, mimicking midday and morning/evening lighting, respectively.

Literature Review

Research has indicated that an individual's ethical behaviour is influenced by their chronotype (Gunia et al., 2014). Chronotypes are determined by our sleeping and waking times, and researchers are determined that morning people exhibit more ethical behaviours because of their natural alertness (Gunia et al., 2014). Another study explained how negative emotions are expected to be more evenly regulated during the day for both morning and night types (Correa et al., 2020). The purpose of this experiment was to determine if the temperature of lighting influences situational moral outlooks.

Nichols and Mallon (2006) conducted a study measuring causes of emotional and moral responses. Their study showed that "actions that are 'personal' generate a greater emotional engagement than the 'impersonal' actions." If an act is personal and thus being in moral violation, it's built off the presence of the following: "(i) likely to cause serious bodily harm, (ii) to a

particular person, (iii) in such a way that the harm does not result from the deflection of an existing threat onto a different party” (Nicholas & Mallon, 2006). Therefore, in the absence of this criteria, the action is considered impersonal, thus resulting in not an emotional response. Being an emotional or logical decision-maker is far more complex than being white and black. Research performed by Gray and Schein (2012) found that the psychological concepts of deontology and utilitarianism could be summarized by the idea of whether an individual thinks about their actions or whether they think about the consequences of their actions. To utilitarian thinkers, also known as logical thinkers, the outcome of their action or decision is more important than the decision itself, whereas deontological thinkers, or emotional thinkers, put their personal ethics and dutiful obligations above whatever the outcome may be (Chukwunke & Ezenwugo, 2022). Chukwunke and Ezenwugo (2022) suggest that deontology is centered on a personal, individual level, where emotions have high importance; utilitarianism is on a societal level, where logistics and simple facts play a central role. These concepts intertwine regularly, with emotional (deontological) thinkers occasionally considering their actions to be logical or utilitarian thinkers perceiving their logical actions to be important for both their own and others' emotional states.

Further research has shed light on how different stimuli affected these thinking processes. One study investigated how the impact of light influences psychological perception (Chen et al., 2022). In this study, participants were tested in differently coloured illuminations; the results indicated that these illuminations could influence an individual's feelings of comfort and relaxation. Song and Yamanda (2019) also found that expressive lights affect human perception. Meanwhile, another study explored whether colours (not including black or white) have an impact on moral decision-making (Ryan et al., 2019). The study discussed how colours can provide insight into people's emotional and social intelligence, as well as the impact of colours on cognitive processes. Importantly, this study focused on “the effect of [coloured words] related to morality”, and it was found that there were “different effects of colours on morality” (Ryan et al., 2019). For example, the use of red in a video game may cause a player to act rashly and disregard ethical control to some extent. Combining these two streams of research lead us to the concept of coloured light.

Moral reasoning, dynamic in its nature, is challenging to measure (Shallow & Medin, 2023). Although moral decision-making is considered subjective, it is valuable to abolish the false correlation between moral judgement and moral responsibility, although moral judgement does

predict moral intent (Small & Lew, 2021). Moral reasoning can be measured in a multitude of ways. One study discussed the three phases that should be measured: pretest (measure morality before the experiment), response (measure morality during the experiment) and post-test (measure morality after the experiment), which is similar to an interrupted time-series design (Ryan et al., 2019). However, the most influential past study towards this experiment was when moral judgement was investigated by having participants rate on the fairness, justice, contract, duty, consequences, and greatest good of a series of hypothetical scenarios on a seven-point scale (Cohen et al., 1993).

Based on the previous experiments and studies that have been conducted, we hypothesized that the presence of warm light will cause a more emotional moral response, whereas the presence of cool light will cause a more logical moral response to scenarios.

Method

This experiment was a between-groups design, conducted between two groups: Group 1 assessed morally-charged scenarios in an environment with yellow-white light, and Group 2 assessed the same scenarios in an environment with blue-white light. The yellow-white light was meant to mimic the light of a morning or evening (the rising and setting sun is frequently perceived as a yellowish light), while blue-white light mimicked that of midday (the sun is brightest then, emitting blue-white light). Simply put, one light is warm (yellow-white), and the other is cool (blue-white). The independent variable for this study was the colour of the light exposed, and the dependent variable was the rating of each moral scenario.

Participants

Participants were recruited through convenience sampling from the researcher's peers, friends, and family. The age of the participants ranged from 17 to 74, which was documented as well as their gender, to see if those are potential factors of their moral decision-making. A total of 67 participants were recruited ($n = 36$ in the yellow-white light group, $n = 31$ in the blue-white light group). Forty-four percent of the yellow-white light group were male ($n = 16$), and fifty-six percent identified as female ($n = 20$). The yellow-white light group's average age was 28. As for the blue-white light group, 36% identified as male ($n = 11$), and 64% identified as female ($n = 18$). Two participants didn't wish to share their age in this group. The average age for the blue-white light group was 27. Participants' data was removed ($n = 5$ in the yellow-white light group, $n = 6$

in the blue-white light group) if they failed to correctly answer the attention check question or if they didn't sign their consent or debriefing forms.

Procedures

Participants were placed in a dark room with one researcher, a lamp with the two colour settings, and a questionnaire of morally based scenarios. The room was meant to be as dark as possible so that the light would be more prominent in the experiment, and as empty as possible to reduce any extraneous noise. The experimenter gave the participants their consent form, which did not include the hypothesis in order to erase any possible demand characteristics during the experiment. They answered the questions utilizing the Likert scale that was attached to record their answer, options ranging from “strongly agree”, “agree”, and “undecided” to “disagree” and “strongly disagree”. To close, in an introspective self-report, they would then answer if they believe they are a more logical or more emotional person. The Likert scale was used because it was found to be not only popular among studies focusing on morality, but also act as a way of judging whether the participant thinks logically or emotionally in the situation provided. This ensures that a reasonable answer is given by the participant because the nature of the study deals with moral dilemmas, which seem quite subjective. A scoring system was formed separately for researchers to give a numerical score for every question. Additionally, the questionnaire began with an attention-check question, which did not have an attached numerical score.

Results

An independent-samples *t*-test was conducted to investigate the differences in moral decision-making between two lighting conditions (blue-white versus yellow-white). Levene's test for equality of variance was not significant, indicating the assumption of homogeneity was *not* violated. The results of the analysis indicated that the blue-white lighting condition ($M = 18.2$, $SD = 2.98$) and the yellow-white light condition ($M = 17.9$, $SD = 2.99$) did not significantly differ in their moral decision-making, $t(62) = 0.35$, $p = .35$. These findings are inconsistent with the study's hypothesis.

An additional independent-samples *t*-test was conducted to analyze whether the two lighting conditions differed in their perceived moral decision-making. Levene's test for equality of variance was not significant, indicating that the assumption of homogeneity was not violated. Results indicated that the blue-white lighting condition ($M = 2.5$, $SD = 1.08$) and the yellow-white

light condition ($M = 2.92$, $SD = 1.25$) did not significantly differ in the self-report of their moral decision-making, $t(64) = 1.46$, $p = .32$.

As seen in Table 1, there were no statistically significant differences between the two label conditions, and therefore, we cannot reject the null hypothesis that yellow-white light and blue-white light do not impact an individual's moral decision-making.

Discussion

Our study assessed whether the presence of yellow-white light or blue-white light influenced an individual's moral decision-making. We hypothesized that the presence of yellow-white light would elicit more emotion-based responses connected to deontology, and blue-white light stimuli would lead to logical responses along the concept of utilitarianism. While the results were not statistically significant and did not support the hypothesis, this experiment could easily branch off into more intricate, controlled, and potentially illuminating replications.

An attention check question was used, which ensured the construct validity of the dependent variable. We also used a manipulation check question, which involved asking the participants about the colour of the lighting (the manipulated variable). Participants in the condition with the yellow-white light condition marked the yellow-white light on the form, and vice versa for the blue-white light condition. This ensured the construct validity of the independent variable.

Our data and findings may not be generalizable to other situations where there are different shades of lighting, considering our experiment only used two. It is worth noting that the blue-white and yellow-white lights are, however, representative of common lighting environments in everyday life. This experiment was conducted in different rooms (for the convenience of the researchers), some without windows and completely dark, others in rooms partially lit by the sun peaking through the curtained windows. Therefore, it can be considered a design confound as other lights were also typically present with the independent variable, and inconsistency in environments, which can also influence participants' moral decision-making. An independent group-design was used, with participants with similar demographics randomly assigned to the two groups to avoid the selection effect. As per the findings of the experiment, the standardized effect size is small ($d = 0.36$), so the experiment does not show any statistical validity.

As expected there were limitations within our study. Our first limitation was that our participants may have felt pressured or rushed to answer the scenarios as an experimenter was in

the same room as them, known as the Hawthorne Effect. The experimenter was in the room to clarify any scenarios; however, this may have restricted the genuity of each response. A second limitation of this study was the sample size ($n = 67$). If the study was conducted with a larger sample size, it perhaps may have shown statistical significance. It is worth noting that there was an inconsistency in where the research took place. Questionnaires were answered in a variety of empty rooms, some of which contained distractions or other minor sources of lighting (ex., daylight). Gaining a consistent research space would eliminate this design confound. Our last, and perhaps the largest limitation of the study, was the selection bias. This presented a lack of external validity, as participants were not selected on a random basis but conveniently sampled from friends and family in the local area. While we attempted to increase the variety, it was challenging to recruit others to conduct our research in a short period of time.

Further implications of our study can be used to explore how participants from different ethnicities and cultures respond to the moral scenarios. It would be valuable to learn whether specific cultures influence decision-making. As there was an insignificant difference between the two light groups (blue-white light and yellow-white light); instead of exposing participants to light that mimics certain times in the circadian rhythms, participants could be tested outside using natural morning, midday and evening light. Morality is a broad concept and can be experimented on in a variety of ways. Light is a common stimulus in everyday life, therefore future research would benefit from exploring which lighting, or any other potential factors, significantly impact moral-decision making.

Tables

Table 1

Means, Standard Deviations, and T-Test Results for the four Dependent Variables

Variable	<u>BL</u>		<u>YL</u>		<i>df</i>	<i>t</i>	<i>p</i>	<i>r</i> ²
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>				
Self-Report -								
Morality Score:	2.50	1.08	2.92	1.25	64	1.46	.32	.02
Age:	26.9	13.9	28.2	11.6	–	1.69	.10	.12
Gender:	0.38	0.49	0.44	0.50	–	-.72	.47	.12
Total -								
Morality Score:	18.20	2.98	17.92	2.99	62	-.35	.35	.12

Note: BL = Blue-White Light. YL = Yellow-White Light

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Appendix A

Measures

A Likert scale makes the assumption that reactions can be assessed, and the strength or intensity of a reaction is linear on a scale that ranges from strongly disagree to strongly agree (Likert, 1932). This will be our unit of measurement for the questionnaire.

Question 1 acts as an attention check, and those who failed this check were cleared from the data.

The primary stimuli will be the illumination of the environment, by the use of a ring light that will either glow with yellow-white (warm) light or blue-white (cold) light.

The following is the given questionnaire:

Question 1: The scale below shows a range from ‘strongly disagree’ to ‘strongly agree’. Please choose ‘agree’ below so that we can ensure we have your attention.

- Strongly disagree
- Disagree
- Undecided
- Agree
- Strongly agree

Question 2: What colour is the lighting (circle the answer)?

- a) Yellow-white light
- b) Blue-white light

Scenario 1- Your friend tells you that they accidentally killed somebody in self-defense. They were attacked after their shift at the hospital and shoved the attacker, who hit their head. Your friend normally wouldn’t hurt a fly. Later, you see that an innocent stranger was arrested for your friend’s crime. You make the decision to say nothing to the police for the sake of the friend. Do you agree with the choice?

- Strongly disagree

- Disagree
- Undecided
- Agree
- Strongly agree

Scenario 2- You take your best friend and their sibling for swimming. You and your best friend are really close, while you've only just met their sibling. You hear a scream and realise the two of them are caught in a strong current that will carry them out to sea. You are an excellent swimmer, so you save the life of your best friend's sibling, who is not as good of a swimmer and has a lower chance of surviving. Do you agree with this choice?

- Strongly disagree
- Disagree
- Undecided
- Agree
- Strongly agree

Scenario 3- You desperately need money as you are going through a financial crisis and won't be able to pay next month's rent. Your landlord has already given a warning that if you won't be able to pay the rent by the first of next month, you have to leave the house. You found a wallet on a bus which has enough cash that you don't need to worry about your finances for one month and you will be able to pay rent on time. There are IDs in the wallet and the contact information of the wallet owner. You return the wallet and risk losing a place to live. Do you agree that the right choice was made?

- Strongly disagree
- Disagree
- Undecided
- Agree
- Strongly agree

Scenario 4- A food delivery guy left someone else's order in front of your door by mistake. You can see the order has been sitting in front of the door for almost half an hour and nobody reached out to claim it. You finally decide to eat the food because you are hungry and don't have the energy to cook. You think it is okay to do so because nobody came to claim the food and if you don't eat it, the food will be spoiled later, and you will end up throwing it out anyways. However, after another 30 minutes, the delivery guy came back to your door asking about the mis-delivery of food. You say that you do not know about the food delivery. Later he tells you that he has not been doing well on his job and this was his last shot. He further tells you that he thinks that he will be fired this time. You are embarrassed about lying but also do not want to deal with the confrontation. You decide to say nothing, and don't ever see the delivery guy again. Did you make an agreeable choice?

- Strongly disagree
- Disagree
- Undecided
- Agree
- Strongly agree

Scenario 5- You were not able to prepare for your psychology exam because of a family situation and really need to pass the exam to pass the course. On exam day you're sitting at one of the front desks and can see the answer key on the teacher's table. You have a choice to copy the answer sheet to pass the class. You do. Do you agree with the choice?

- Strongly disagree
- Disagree
- Undecided
- Agree
- Strongly agree

Scenario 6- At your workplace, one of your colleagues is getting harassed by the manager. The colleague wants to complain about the manager to the upper-level management and needs your

support as she confides in you. Your manager is really close to the upper-level management, and you know if you won't be able to prove the claims, the upper management will fire both your colleagues and yourself for supporting false claims. You are about to get a promotion next month for which you've worked hard for. You decide to support their colleague at risk of your jobs and futures. Do you think you could agree with this choice?

- Strongly disagree
- Disagree
- Undecided
- Agree
- Strongly agree

Question 3: Are you more of an emotional or logical person?

- Very logical
- Logical
- Unsure
- Emotional
- Very emotional

The following are simple demographic questions. They're of no importance to the data.

What's today's date? (required) _____

How old are you? (required) _____

What is your gender?

- Male
- Female
- Other
- Prefer not to disclose

Thank you for your participation. Please hand in your work.