Exploring the Influence of Grief on Color Preference: An Empirical Test on Color-in-Context Theory's Fifth Premise

Daisy Bui

Psychology Department, Middlebury College

PSYC 0202 - Research Methods

Professor Matthew Kimble

November 2, 2024

Introduction

Grief has long been recognized as a profound and burdensome aspect of human experience, with wide-ranging health and social implications. Much of the existing research has centered on developing interventions to mitigate these adverse effects; however, relatively little attention has been given to the broader, more subtle impact that grief may exert (i.e., sensory perception).

Research on preferences for sad music found it more frequently chosen over happy music to regulate negative emotions and provide comfort (Taruffi & Koelsch, 2014). Results from their survey suggested that the "reward of empathy"—the pleasurable experience associated with shared feelings in music as an expression of others' emotions—emerged as a unique feature of music-evoked sadness. Building on these findings, a qualitative study on preferred elements of music during times of bereavement, researchers identified slow tempo and relaxing melodic structure as crucial components in facilitating grief processing (McCurry et al., 2019). These auditory elements were found to help young adults express their emotions, recall memories of their lost loved ones, and achieve a sense of belonging, all of which are essential to their emotional healing process.

Further, Viper and colleagues (2020) observed that self-selected music at funeral ceremonies plays a significant role in supporting grief expression. In particular, the study revealed that planning funeral music with loved ones before their death gave the bereaved hope and comfort across various stages of mourning. Their results indicated that for many bereaved individuals, listening to songs, especially those associated with the deceased, can elicit positive memories. Given the impact of grief on the choice of music as a therapeutic coping mechanism,

it could be the case that such psychological processing can also guide our choice of other sensory modalities, namely, visual preference.

Color-in-Context theory posits that the investigation of the relationship between color and psychological functioning includes six aspects, each aligned with a specific premise in the model (Elliot & Maier, 2012). Notably, the theory asserts that the associations between colors and psychological responses are influenced by both cultural learning and biological predispositions. Cultural experiences may shape the meanings associated with certain hues, while evolutionary causes may explain more universal color connections. Further, a color's meaning and impact are also heavily influenced by the context in which it is seen. The same color can trigger a variety of emotional and cognitive reactions depending on the external environment that one is in. Additionally, the theory's fifth premise explicitly states that there exists a reciprocal relationship between color perception and human affect, cognition, and behavior; that is, one's psychological state may also have a powerful pull on dictating one's color perception. For the purpose of this study, we will concentrate specifically on this premise. Our primary goal is to investigate the significant influence of emotional functioning on color perception and, subsequently, on individuals' preferences for colors.

A growing body of research has been linking mental health conditions to altered sensory experiences. Specifically, Bubl et al. (2010) found a significant correlation between the severity of depression in patients with Major Depressive Disorder (MDD) and reduced retinal contrast gain - a process by which the retina adjusts its sensitivity to enhance visual perception across different light intensity and color contrast in a scene. By utilizing the pattern electroretinogram (PERG)—a non-invasive method to assess retinal function in response to high-contrast stimuli—the researchers observed that both medicated and unmedicated patients exhibited substantially

lower contrast gain compared to healthy controls. Such altered contrast processing, as indicated by the authors, may have a more fundamental relation with the patient's depressive state than has been hypothesized before.

Expanding on the growing research on visual alteration in patients with MDD, another study looked at the association between depressive symptoms in patients with Parkinson's Disease (PD) and color vision (Li et al., 2018). Their results suggested that the deficiency of color perception is positively correlated with the severity of depressive symptoms in PD patients. In line with these findings, Paul J. Fitzgerald summed up a series of evidence that supported the hypothesis that visual perception is impaired in those experiencing depression (Fitzgerald, 2013). The study also raised the possibility that milder kinds of depression may cause subtle alterations in sensory perception.

Moreover, Maciejewski and colleagues (2007) identified five core indicators of bereavement: disbelief, yearning, anger, depression, and acceptance, each following its own timeline of intensity. To examine the role of depression within these stages, they assessed participants' moods using the Hamilton Rating Scale for Depression (HRSD), a standardized clinical tool that quantifies the severity of depressive symptoms. By tracking these scores over time, they demonstrated that depression reached its peak at 6 months post-loss. Therefore, given that grief processing involves certain levels of depressive symptoms, experiences of grief may temporarily alter color perception.

The purpose of this study was to investigate how the emotional context of autobiographical memories influences color preferences for bereaved individuals. We examined whether recalling memories with neutral, negative, or positive emotional valence would have an influence on individuals' rating for three components of color - hue, saturation, and lightness. We

analyzed two independent variables—preference before versus after recall (within-subject) and type of autobiographical recall (between-subject)—and explored their interaction's effect on color perception. While limited research has directly examined the impact of grief on color preference, there has been an increasing interest in how unpleasant psychological experiences like depression may influence visual perception. Building on this framework, we hypothesized that bereaved individuals prompted by negative stimuli would opt to alter images to a considerably greater saturation and lightness than those evoked by neutral and positive stimuli.

Although our findings may not directly open new avenues for developing therapeutic intervention, our goal is to empirically test the Color-in-Context theory by evaluating its fifth premise. By exploring how grief-related emotional states influence perceptual and behavioral reactions to color, we hoped to provide empirical data that either supports or refines the theory's broader applicability to emotional and perceptual processes.

Methods

Participants

Participants were 60 adults (M age = 25.21 years, SD = 14.50; 60% women) who had experienced the loss of a loved one between 1 and 6 months prior to the study. Eligibility criteria required normal or corrected-to-normal vision and no color vision deficiencies, which we verified using a color plate test. To ensure participants did not meet the criteria for prolonged grief disorder (i.e., complicated grief), licensed mental health professionals conducted assessments based on the DSM-5-TR guidelines. We sent out invitations to participate via email and obtained written informed consent from each participant.

Materials

We prompted ChatGPT to generate eight ambiguous images - four with abstract background themes and four with abstract geometrical themes (see Appendix A). The reason behind this was that we wanted to avoid having any identifiable features in the images (e.g., faces, nature, famous art styles) that may have had an influence on the participants' color ratings. The parameters of hue, saturation, and lightness were adjusted in Adobe Photoshop 2023. The score range of each element was: 0 to 360 degrees for hues, 0% (gray) to 100% (fully saturated) for saturation, and -100 (% of black) to 100 (% of white) for lightness. All images were displayed on a Dell 24(inc) Monitor - S2425HS (1920x1080 resolution).

We provided participants with a pencil and paper to draft their responses during the autobiographical recall task.

Procedures

The order of tasks was as follows: CPT1 - autobiographical recall - CPT2. We made known to the participants that the two tasks were for separate purposes - one used to study personal color preference, and the other was to understand the relationship between grief and memory recall.

In the Color Preference Task (CPT), participants were instructed to adjust the hue, lightness, and saturation of a series of images, one displayed on the screen at a time, according to their preferences. They could use a mouse cursor to select or manually input the values for each color element in Photoshop. To mitigate potential demand characteristics, we incorporated a minor deception: before the first color preference task (CPT1), participants were informed that only half of the image set was available due to loading issues. Thus, we asked them to complete

the available ones first and move on to the autobiographical recall task. After completing the recall task, participants were notified that the remaining images were now ready, and participants proceeded to the second color preference task (CPT2). Each CPT task involved similar categories of images - two backgrounds and two geometries, with counterbalancing applied to control for potential order effects across participants. By the end of the experiment, each participant had adjusted a total of eight unique images.

In autobiographical recall, the proctor told the participants that we wanted to analyze how much they could remember about a particular personally relevant event. We randomly assigned participants to one of the three conditions: negative, neutral, or positive. The prompts provided for each group were as follows:

Negative Recall Condition

“Please take a moment to reflect on a difficult time in your past (i.e., those that made you feel negative, sad, or disappointed). Using a scale from 1 to 10, where 1 indicates ‘least distress’ and 10 indicates ‘extreme distress,’ please aim for a 7 in your reflection.”

Neutral Recall Condition

“Please take a moment to reflect on a recent, ordinary event in your life, such as a habit or daily activity.”

Positive Recall Condition

“Please take a moment to reflect on a past event that brought you a sense of happiness or positivity. Using a scale from 1 to 10, where 1 indicates ‘least positive feelings’ and 10 indicates ‘extremely positive,’ please aim for a 7 in your reflection.”

Participants had thirty minutes to reflect on their experiences and could format their responses as essays, paragraphs, or poems. They could submit their answers at any time before the time limit and then proceed to the CPT2 task.

Data Analysis

Our study's goal was to explore how the emotional context of autobiographical memories shaped color preferences among bereaved individuals. Specifically, we examined how negative autobiographical recall—compared to neutral and positive conditions—affected color perception in terms of hue, saturation, and lightness. The independent variables (IVs) included the recall condition (negative, neutral, and positive) as a between-subjects factor, and the time of task (CPT1 vs. CPT2) as a within-subjects factor. The dependent variables (DVs) were hue, saturation, and lightness, measured as the difference in adjustments made by participants between the first (CPT1) and second (CPT2) color preference tasks. To evaluate the data, we conducted repeated measures ANOVAs for each DV to assess the main effects of recall condition and time of task, as well as their interaction.

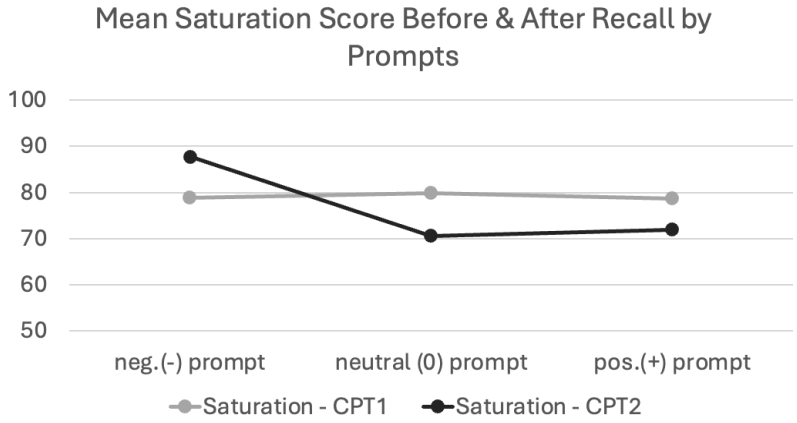
We hypothesize that participants in the Negative Recall Condition will prefer brighter, more vibrant colors (higher saturation and lightness) compared to their baseline preferences. In contrast, participants in the Neutral and Positive Recall Conditions would show no significant changes in color preferences.

Results

We conducted repeated measures ANOVA tests to examine the effects of time of task (CPT1 vs. CPT2) and different recall prompts on saturation ratings. The analysis revealed no

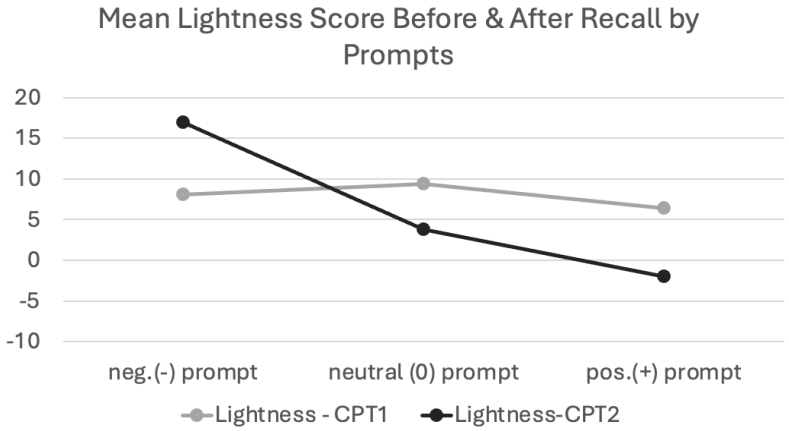
significant main effect of time of task on participant's preference, F(1,27) = 0.683, p> .05. Meanwhile, there was a significant main effect of recall type on saturation preference, F(2,27) = 3.39, p< .05, which indicated that negative memory recall was associated with increase in color saturation rating. Importantly, we also found a significant interaction effect between time of task and type of prompts on participant's score, F(2,27) = 3.626, p< .05 (See Figure 1).

Figure 1



Another repeated measures ANOVA was performed to evaluate the effect of task timing and type of prompts on lightness score. The results suggested a significant main effect between-subject of recall type for lightness, F(2,27) = 3.48, p< .05; that is, being in negative prompt condition was correlated with higher lightness rating. The interaction effects between task timing and prompt types were also significant, F(2,27) = 4.36, p<.05. However, we found no significant main effect of time of task on changes in individuals' preferences for lightness, F(1,27) = 0.44, p>.05 (See Figure 2).

Figure 2



Hue ratings did not show any significant results.

Discussion

Findings

Our findings suggested that the presence of an emotional-related stimulus is a critical factor in driving temporary shifts in color preferences among individuals. Specifically, participants prompted with negative-valence questions, which were induced with some significant level of depressed mood, demonstrated an increase in saturation ratings. In contrast, those prompted with positive-valence questions preferred lower color saturation. Interestingly, participants in the neutral condition also displayed a tendency to adjust images to be less saturated as compared to their preference prior to the recall task. Different emotional valences also play a role in changing one's lightness preference, with results similar to those shown in saturation ratings for negative, neutral, and positive conditions.

One plausible explanation for effects occurring in the negative condition is that lower mood may be correlated with shifts in visual perception and thus influence personal choice.

Previous studies on patients with Parkinson's Disease revealed a noticeable pattern of depressive symptoms having a significant association with color perception deficiency (Li et al., 2018). Notably, Bubl et al. also identified diminished contrast processing in MDD patients, which may make it difficult for these individuals to detect details in low light and differentiate between shades of gray. Since grief processing also involves symptoms of depression, as shown in Maciejewski's work, we reasoned that during the first six months post loss, being prompted with negative stimuli (i.e., being in the negative recall condition) can intensify an individual's depressive mood and result in decreased visual functioning. Therefore, participants may have had to increase saturation and lightness at a significantly higher level to compensate for the loss in perceptual details.

Additionally, we propose that dopamine may play a role in mediating the observed effect in the positive mood condition. As demonstrated by Ashby and colleagues in their 1999 research article, elevated mood can signify increased dopamine release. Consequently, participants in the positive condition may have experienced enhanced dopaminergic activity in brain regions involved in visual perception. Supporting this idea, a study by Jackson et al. (2012) demonstrated that mice with retinal dopamine deficiency showed partial restoration of contrast sensitivity after supplementation with L-DOPA, a precursor to dopamine. Given that all participants were still processing grief, they already experienced a decrease in visual functioning prior to the autobiographical recall task - for the reason we provided previously. Hence, compared to their own baseline, individuals in the positive condition may have experienced a temporary increase in dopamine release and thereby an improvement in visual processing; as a result, ratings for saturation and lightness got lowered.

Unfortunately, we could not find supporting evidence for the results observed in the neutral condition.

Limitations

The external validity of this study is limited due to several factors. First, the sample was homogenous in terms of age, visual ability, and psychological states, consisting primarily of adults who had experienced the loss of a loved one within 1 to 6 months. All participants had normal color vision and were excluded if they had complicated grief disorder. Since grief is a highly individualized process that varies in intensity and duration, the results may not be applicable to individuals who face more atypical grief responses or visual impairments. Second, the study was conducted under controlled laboratory conditions involving structured tasks and artificial color manipulation. These conditions may not fully capture the spontaneous emotional and perceptual shifts that occur in real-world settings, where factors like natural lighting and environmental context can influence perceptual responses.

Regarding limitations to our internal validity, we did not record the amount of time participants spent during the autobiographical recall task. This could have acted as a moderator that provided us with essential information related to the subjective amount of distress experienced and subsequent color ratings. In particular, longer reflection times may indicate greater emotional engagement, resulting in more significant changes in preference for other components of color (i.e., hue).

In addition, variability in participants' subjective emotional engagement during the recall task presents another challenge. Individuals may experience differing levels of emotional involvement when recalling personal memories. Those more emotionally engaged may show

stronger changes in color perception, while those less affected might display minimal shifts. This variability thereby introduces additional challenges in interpreting the relationship between emotional state and color preferences.

Future Research

Building on our findings and research design limitations, future studies should incorporate a more diverse sample that includes individuals with varying grief responses and visual impairments to enhance the generalizability of findings. Additionally, examining grief-related color perception using longitudinal methods and including other environmental factors, such as natural lighting and the amount of time spent on recall tasks, would also provide a more comprehensive understanding of how the emotional states of bereaved individuals can influence their perceptual changes outside of the laboratory environment.

Drawing from the work of Jackson et al. (2012) regarding dopamine and contrast sensitivity, future research could also explore the neural mechanisms underlying emotional changes in color perception. Neuroimaging techniques (such as fMRI or EEG) could help examine brain activity in response to emotional stimuli during color preference tasks. This would provide a deeper understanding of how mood-related neurotransmitters (e.g., dopamine) influence visual processing at the neural level.

Moreover, our findings provide evidence for the Color-In-Context Theory's fifth premise, which holds that emotional situations have a substantial impact on how people experience and interact with color. We found that grief, when combined with negative stimuli, can lead people to prefer a more vibrant color scheme. Given the influence of emotional states on color perception,

particularly in the context of bereavement, the way colors are used in environments like care homes, hospitals, and other institutions for the grieving could play a significant role in emotional regulation. Thus, the use of bright, saturated colors in living spaces could help mitigate some of the perceptual dullness that may accompany mourning. Further studies could inform design strategies in care settings, such as hospitals or bereavement centers, where color could be intentionally utilized to enhance emotional well-being in grieving individuals.

Works Cited

Ashby, F. G., Isen, A. M., & Turken, A. U. (1999). A neuropsychological theory of positive affect and its influence on cognition. *Psychological review*, *106*(3), 529–550. https://doi.org/10.1037/0033-295x.106.3.529

Bubl, E., Kern, E., Ebert, D., Bach, M., & Tebartz van Elst, L. (2010). Seeing gray when feeling blue? depression can be measured in the eye of the diseased. *Biological Psychiatry*, *68*(2), 205–208. https://doi.org/10.1016/j.biopsych.2010.02.009

Elliot, A. J., & Maier, M. A. (2012). Color-in-context theory. *Advances in Experimental Social Psychology*, 61–125. https://doi.org/10.1016/b978-0-12-394286-9.00002-0

Fitzgerald, P. J. (2013). Gray Colored Glasses: Is major depression partially a sensory perceptual disorder? *Journal of Affective Disorders*, *151*(2), 418–422. https://doi.org/10.1016/j.jad.2013.06.045

Jackson, C. R., Ruan, G. X., Aseem, F., Abey, J., Gamble, K., Stanwood, G., Palmiter, R. D., Iuvone, P. M., & McMahon, D. G. (2012). Retinal dopamine mediates multiple dimensions of light-adapted vision. *The Journal of neuroscience : the official journal of the Society for Neuroscience*, *32*(27), 9359–9368. https://doi.org/10.1523/JNEUROSCI.0711-12.2012

Li, D.-K., Liu, F.-T., Chen, K., Bu, L.-L., Yang, K., Chen, C., Liu, Z.-Y., Tang, Y.-L., Zhao, J., Sun, Y.-M., Wang, J., & Wu, J.-J. (2018). Depressive symptoms are associated with color vision but not olfactory function in patients with parkinson's disease. *The Journal of*

Neuropsychiatry and Clinical Neurosciences, *30*(2), 122–129. https://doi.org/10.1176/appi.neurospych.17030063

Maciejewski, P. K., Zhang, B., Block, S. D., & Prigerson, H. G. (2007). An empirical examination of the stage theory of grief. *JAMA*, *297*(7), 716. https://doi.org/10.1001/jama.297.7.716

McCurry, S. L., Dawson, R. M., & Heiney, S. P. (2019). Essential elements of song for Grieving young adults. *Creative Nursing*, *25*(4), 302–307. https://doi.org/10.1891/1078-4535.25.4.302

OpenAI. ChatGPT. (n.d.). https://openai.com/

Taruffi, L., & Koelsch, S. (2014). The paradox of music-evoked sadness: An online survey. *PLoS ONE*, *9*(10). https://doi.org/10.1371/journal.pone.0110490

Appendix A

The 8 Images shown in CPT1 and CPT2

Theme 1: Abstract Background	**Theme 2: Abstract Geometry**
Keywords used: ‘gray-scale’, ‘abstract,’ ‘gradient’, ‘no geometries’	Keywords used: ‘gray-scale’, ‘abstract,’ ‘geometries’