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*Article*

# The Utilization of Somber Colors in the Depiction of Characters, Employing Painting Techniques, Serves to Elicit a Melancholic Sentiment in the 3D Animated Film Entitled "2%"

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**Abstract:** The selection of somber colors and painting techniques for animated characters is often based on subjective considerations; therefore, empirical data is needed to support more measurable for design decisions. The objective of this study is to ascertain the combinations of somber colors and painting techniques that are most preferred by animation practitioners and enthusiasts through a quantitative approach. A visual-based online survey was disseminated to respondents consisting of animation practitioners and animation enthusiasts, employing purposive sampling and snowball sampling techniques. The research is instrument employed was a questionnaire that presented several character variations, featuring somber color combinations and oil texture layering, matte brush, watercolor layering, and texture noise technique are. The collected data were then subjected to analysis using descriptive statistics to ascertain the level of preference. The results of the analysis indicated that the majority of respondents expressed a predilection for variations that incorporated somber blue-gray colors in conjunction with the oil texture layering technique. A comparison of the two groups revealed no significant disparities in their preferences. Consequently, this amalgamation is proffered as a point of reference for the enhancement of visual appeal and emotional resonance in the domains of animation production, digital games, and other creative content.

**Keywords:** animated character design; painting techniques; quantitative survey; somber colors; visual preferences.

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## 1. Introduction

3D animation is an effective medium for conveying stories and emotions, especially deep sadness [1], [2], [3]. Dull colors with low saturation and dark shades effectively create a sad atmosphere [4], [5]. Scenes and emotions in animation are intertwined, where good scenes combined with the right colors can strengthen emotions and resonate with the audience [6], [7]. The focus of this research is the application of gloomy colors through painting techniques on 3D animated characters to create a strong impression of sadness.

The texturing stage plays a very important role in applying colors effectively to characters. Painting techniques excel in expressiveness and flexibility, allowing for the exploration of color gradations, textures, and details to add emotional nuances [8]. The texture painting method, supported by the use of UV Mapping, provides expressive colors and details to 3D models [9], thereby reinforcing the sad impression of the characters.

The main issue is how to combine somber color selection with the right painting techniques so that the sad impression is built naturally and convincingly. This requires an understanding of painting techniques and color palettes, as well as the psychology of color perception in influencing the audience's emotions. Painting techniques provide artistic freedom to interpret emotions personally, creating textured and complex visuals that convey intuitive emotions without complicated additional elements [10], [11]. Somber colors effectively build a melancholic atmosphere and make the animation more vivid and relatable [12], [13].

This study will analyze the design and design process of the characters of the father and Mira in the 3D animated film titled "2%". The film tells the story of a father's struggle to save his daughter, Mira, who is running out of oxygen (only 2% remaining). It depicts a citypunk world filled with smog due to air pollution, where people wear special masks to obtain oxygen and survive. For the father and Mira, who are lower-class citizens, these masks are valuable and difficult to obtain. To reinforce the father's struggle and Mira's condition, a sad impression is created through the choice of colors and textures displayed on both characters.

## 2. Materials and Methods

Character design in this study employs a Design-Based Research (DBR) approach to examine the application of somber colors using painting techniques on 3D animated characters to convey sad emotions. This approach involves collaboration with respondents to produce valid design solutions [14]. Initially, the design and development were guided by theory, then implemented and evaluated with the involvement of respondents. The evaluation resulted in design revisions in the form of redesigns for improvement. This continuous innovation process occurred in several iterative cycles.

### 2.1 First Phase, Design

The development of character designs based on theory, in accordance with the requirements, is the first phase of this three-phase study. Various journals supporting this phase were reviewed using the reflection-in-action and reflection-on-action frameworks [15], [16]. For example, a somber color palette was selected based on the principles of high desaturation and dark values, with hex codes dominant according to character (Figure 1).



(a) (b)

**Figure 1. Color palette (a) Father (b) Mira**

### 2.2 Second Phase, Implementation

From the requirements and theory produced in the first phase, the characters of the father and Mira were designed and developed (Figure 2).



(a) (b)

**Figure 2. Front view design (a) Father (b) Mira**

### 2.3 Third Phase, Analysis

Using purposive sampling techniques involving 100 anonymous respondents, the two character designs were tested. The respondents consisted of animated film viewers and animated work creators aged 17-50 years. Each questionnaire answer was made using a Likert scale (five values) to measure how effectively gloomy colors evoked sadness. Quantitative data analysis was carried out, accompanied by data triangulation, to align the design findings and respondent perceptions.

The three phases above constitute a cycle of creation that gives rise to the next cycle, namely re-design. The DBR approach ensures that this research not only produces innovative visual artifacts, but also applied knowledge regarding the use of somber colors in 3D animation to convey sad emotions, contributing to the practice and theory of animated character design.

## 3. Results

As described in the methodology section above, this study followed the DBR cycle in developing the designs for the characters Mira and Father. Each cycle was supported by feedback from 100 respondents who filled out a questionnaire regarding the effectiveness of somber colors in evoking sad emotions. Three cycles were needed to arrive at the final designs for the characters Father and Mira.

### 3.1 First Cycle, Initial Design

The father character was rendered with a green and gray color palette using painting techniques. The Mira character was rendered with a predominantly brown and gray color palette using painting techniques. Feedback showed that 90% of respondents liked this combination as the most effective in creating a melancholic atmosphere. However, 10% felt that the colors still did not represent sadness, due to differences in experience and preferences regarding colors that evoke sadness.

### 3.2 Second Cycle, Re-Design

Based on feedback from the first cycle, the design was revised by adding several textures (Figure 3). Retesting showed an increase in satisfaction to 98% with better acceptance from the group that was previously dissatisfied.



(a) (b)

**Figure 3. Texture application (a) Father (b) Mira**

The test results revealed that respondents appreciated the balance between the emotional depth and visual clarity of the characters.

### 3.3 Third Cycle, Final Refinement

The final design studied the previous cycle, resulting in a color combination for the father character of green and gray, with a little brown to balance it out. Meanwhile, the character Mira got a color combination of brown and gray with details of red, yellow, and a little green. The final validation results showed that 98% of respondents agreed that this design was effective in conveying sadness while remaining aesthetically pleasing.



**Figure 4. Mira turn around design**

This final design provides the insight that the gloomy colors of the Mira character are dominated by low saturation colors (Figure 4). With a predominance of brown and gray colors and no bright colors, the colors used give a sad impression. The texture of the painting technique gives an organic and melancholic impression, with the uneven brush strokes giving a rough/soft impression that helps convey sadness. The character's skin color is slightly pale, which indicates sadness, while the slightly dark/black eyes add to the emotional impression. The simplicity of the form allows the analysis to focus on color and texture, rather than anatomical details.



**Figure 5. Father turn around design**

Meanwhile, the father's character can be seen to be dominated by green, brown, and gray colors, which can be categorized as colors with low brightness and saturation, typical of gloomy colors (Figure 5). The use of these dark colors gives a heavy, intense, and emotional impression, in line with the sad and melancholic impression. The surface of the shirt and pants show color gradations that give a worn and faded impression, supporting the sad impression. Dark colors on the skin, especially around the eyes and face, give an impression of fatigue and injury, relevant to the sad impression. Loose-fitting dark clothing provides a heavy silhouette, supporting the sad impression.

These findings provide guidelines for character modelers and designers: the use of somber colors with effective painting techniques is suitable for the drama genre, but requires visual calibration to maintain character clarity. Theoretically, this research reinforces the understanding that respondents' emotional perceptions are not static; continuous feedback allows for design refinements that are more responsive to audience needs.

## 4. Conclusion

This study demonstrates that the application of somber colors through painting techniques on 3D animated characters effectively creates a melancholic atmosphere and reinforces the sad impression of the character's visuals. The high respondent feedback (98%) in the third design cycle proves the effectiveness of combining low saturation colors with expressive painting textures in communicating sad emotions to the audience.

The iterative process based on Design-Based Research allows for the development of an increasingly optimal color palette and texture through repeated testing and respondent feedback. Design revisions based on audience input resulted in a significant improvement in visual acceptance, up to 98% in the final refinement, showing that collaboration between designers and respondents produces more responsive and effective design solutions.

These findings confirm that the selection of low-saturation colors and expressive painting techniques play a significant role in enhancing the emotional depth of 3D animated characters. Visual elements such as color gradation, rough or soft textures on surfaces, and color details in the eye and face areas collectively contribute to the audience's emotional perception. The results of this study provide practical guidance for character designers and animators in choosing color palettes and painting techniques that suit the narrative theme, especially for drama or dystopia genres that require a melancholic and sad atmosphere.

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