

Research on Color Narrative and Visual Language of Film and Television Animation in the Digital Media Era

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ABSTRACT In the digital media era, film and television animation has been reshaped across creation, dissemination, and reception. Color has moved beyond decorative use and has become a narrative medium embedded in story structure, character construction, emotional rhythm, and thematic expression, while visual language has expanded from conventional lens, composition, and lighting systems to digital special effects, virtual lighting, real-time rendering, dynamic color tones, and interactive images. In response to the overuse of standardized color look-up tables and the resulting separation between visual spectacle and narrative logic, this study builds a theoretical framework of animation color narrative and visual language grammar. It clarifies the vocabulary, sentence, structural, and rhetorical layers of color narration, analyzes functions such as time-space definition, character shaping, emotional rhythm control, thematic metaphor, and narrative guidance, and proposes collaborative creative strategies for pre-production, production, and post-production. The findings provide systematic guidance for digital animation creation and are also relevant to optical propagation, digital display, and electromagnetic-light interaction in high-fidelity visual presentation systems.

INDEX TERMS digital media,color narrative,visual language,optical propagation,animation rendering

I. INTRODUCTION

A. RESEARCH BACKGROUND

DIGITAL media technology has fully penetrated the entire process of animation creation, from early art design, mid-term production rendering to post-production color grading and packaging, completely changing the production mode and aesthetic form of traditional animation. High precision color grading system, real-time rendering, light and shadow simulation, layered coloring, dynamic color correction and other technologies enable animation creators to gain unprecedented color control and visual expression, making color an independent narrative language that can directly participate in plot progression, character shaping and meaning construction. At the same time, audience aesthetic preferences are undergoing a continuous evolution, and higher requirements are put forward for the visual quality, emotional depth, and narrative integrity of animation. Works that simply pursue visual wonders without narrative logic are difficult to gain lasting recognition [1,2].

B. RESEARCH SIGNIFICANCE

1) Theoretical significance

Constructing a theoretical system of animation color narrative and a visual language grammar framework in the context of digital media, expanding the boundaries of anima-

tion narrative and visual aesthetics research; Revealing the narrative mechanism and semantic rules of color symbols and visual elements in animation, providing new research dimensions for animation art theory; Establish a theoretical model that integrates digital technology and visual narrative to enrich the theoretical connotation of digital media art [3].

2) Practical significance

Provide animation creators with scientific, systematic, and actionable color narrative design methods and visual language organization strategies to enhance narrative efficiency and emotional resonance; Guide creators to balance technology and art, avoid homogenization and spectacle misconceptions, and form distinct personal styles and aesthetic qualities; Assist domestic animation in improving artistic quality and international competitiveness, and promote the effective dissemination of excellent Chinese cultural spirit through visual language.

C. CURRENT RESEARCH STATUS AT HOME AND ABROAD

Overall, there are three obvious shortcomings in existing research:

One is the disconnect between color and narrative, with more research on color aesthetics and less incorporation into

the complete narrative structure;

Secondly, visual language is fragmented, lacking systematic integration of lenses, composition, light and shadow, color, and special effects;

Thirdly, there is insufficient reflection of the characteristics of the digital age, and insufficient disclosure of the narrative transformation and aesthetic innovation empowered by new technologies.

This article aims to address the aforementioned shortcomings by conducting systematic, comprehensive, and cutting-edge research [4].

D. MAIN RESEARCH CONTENT

(1) The connotation, characteristics, and grammatical system of color narrative in film and television animation in the era of digital media;

(2) The narrative function of color in animation: defining time and space, shaping characters, emotional rhythm, thematic metaphor, and plot guidance;

(3) The constituent elements and systematic organizational rules of visual language in film, television and animation;

(4) The reshaping mechanism of digital media technology on color expression, visual presentation, and narrative structure;

(5) Collaborative creative strategies and design methods of color narrative and visual language;

(6) Empirical comparative analysis and creative inspiration of classic animation works at home and abroad;

(7) The optimization path of color narrative and visual language in domestic animation.

E. TECHNICAL ROADMAP

This study employs a qualitative comparative methodology. Following the route of “theoretical construction to case-based functional analysis,” we analyze frame-by-frame color scripts from two milestone animations to evaluate the effectiveness of the “Four Elements” grammar. This approach bridges the gap between digital media theory and practical creative application, based on narratology, semiotics, aesthetics, and cognitive psychology as theoretical foundations, digital media technology as the era background, and classic works as empirical samples, a theoretical system is constructed and a creative guidance plan is formed [5].

II. RELATED THEORETICAL FOUNDATIONS

A. COLOR THEORY AND COLOR SEMIOTICS

Color has three attributes: physical properties, physiological perception, and cultural symbols. In art, it is not only a visual element, but also a symbolic system that carries meaning. Color semiotics holds that hue, brightness, saturation, warmth, contrast, and other factors can all form a stable ideographic system, used to convey deep information such as emotions, identity, circumstances, and values [6,7].

B. NARRATIVE STUDIES AND FILM AND TELEVISION NARRATIVE THEORY

Narratology studies narrative structure, narrative perspective, narrative rhythm, and narrative symbols. Animation narrative has hypothetical, exaggerated, and visual characteristics, and the color and visual elements of the picture can directly undertake the narrative function, forming a unique advantage of “visual narrative”.

C. VISUAL LANGUAGE AND LENS LANGUAGE THEORY

Visual language is a semantic system composed of composition, light and shadow, color, lens, motion, special effects, etc. It is the core means of conveying information, organizing narrative, and creating atmosphere in animation. Digital media has greatly expanded the forms and expressive power of visual language [8].

D. DIGITAL MEDIA ART AND ANIMATION AESTHETICS THEORY

Digital media, supported by real-time rendering, layered coloring, dynamic light and shadow, particle effects, virtual photography, and other technologies, promotes animation aesthetics from realism and freehand to surrealism, immersion, and interactivity, emphasizing the unity of technical rationality and artistic sensibility [9].

E. EMOTIONAL COGNITION AND AESTHETIC ACCEPTANCE THEORY

The audience’s acceptance of color and vision is accompanied by emotional arousal, interpretation of meaning, and aesthetic experience. Scientific color narrative and visual language can significantly enhance empathy, strengthen narrative persuasiveness and artistic appeal [10].

III. THEORETICAL SYSTEM OF COLOR NARRATIVE IN FILM AND TELEVISION ANIMATION IN THE DIGITAL MEDIA ERA

A. THE CONNOTATION AND ESSENCE OF COLOR NARRATION

Color narrative refers to the complete narrative activity in which creators use color elements such as hue, brightness, saturation, warmth, contrast, gradient, and color tone to systematically design according to narrative logic and emotional rhythm, allowing them to participate in plot progression, character shaping, temporal and spatial definition, emotional transmission, and theme expression. In the era of digital media, color narrative has evolved from “artistic decoration” to “core narrative dimension”, with independent grammar rules and semantic functions [11].

B. BASIC CHARACTERISTICS OF COLOR NARRATION

(1) Visual intuitiveness: Quickly convey emotions and atmosphere without the need for language;

(2) Emotional directionality: directly eliciting physiological and psychological responses from the audience;

(3) Symbolic metaphor: carries multiple meanings of culture, psychology, and theme;

(4) Structural unity: runs through the entire film to form a stable visual system;

(5) Dynamic variability: orderly changes occur with the plot, characters, and scenes;

(6) Digital controllability: high precision, hierarchical, dynamic, and correctable [12].

C. GRAMMAR SYSTEM OF COLOR NARRATIVE

Constructing the “Four Elements” Color Narrative Grammar:

(1) Vocabulary layer: The fundamental units of visual meaning, including hue, brightness, saturation, warmth, and contrast which act as individual “words” to establish basic environmental settings;

(2) Sentence layer: The syntactical organization of vocabulary elements, such as color tone, color scheme, and color rhythm. For example, a “sentence” consists of a shift from cool to warm tones within a single sequence to signal a character’s internal change;

(3) Level: Scene color layout, paragraph color changes, overall color structure;

(4) Rhetorical layer: symbolism, contrast, repetition, gradient, irony, emphasis.

D. COMPARATIVE ANALYSIS: RESHAPING MECHANISM OF DIGITAL MEDIA

Unlike traditional cel animation, where “frame-by-frame” painting was a destructive physical process limited by chemical pigment consistency, digital media introduces “non-destructive parametric control.” (1) High precision control: While traditional methods required re-painting entire cels for color corrections, digital systems allow for real-time manipulation of metadata layers (e.g., hue/saturation/luminance) without altering the underlying line art, greatly improving accuracy and enabling dynamic transitions that were physically impossible in analog workflows;

(2) Dynamic color: changes in real-time with emotions, plot, and light and shadow;

(3) Light and shadow fusion: based on physical rendering, color and lighting are highly unified;

(4) Stylish enhancement: Quickly achieve hand drawn, film like, ink like, cyberpunk like, etc;

(5) Industrialization process: Standardization of color scripts to ensure visual consistency throughout the entire film, as shown in Table 1.

TABLE 1. Digital Media’s Impact on Color and Visual Language

Aspect	Traditional Animation	Digital Media Animation
Color Control	Limited, manual	High-precision, layered, dynamic
Visual Effect	Hand-painted texture	Diverse styles, realistic rendering
Efficiency	Slow, high cost	Fast, repeatable, standardized
Narrative Ability	Decorative	Directly participate in storytelling
Style Diversity	Single relatively	Super realistic, ink, cyberpunk

E. DESIGN PRINCIPLES OF COLOR NARRATIVE

(1) Service narrative: All colors are designed to serve the plot, characters, and theme;

(2) Unified change: overall unity, local changes, moderate tension and relaxation;

(3) Emotional accuracy: color emotions are consistent with scene emotions and character psychology;

(4) Cultural adaptation: Respecting cultural symbols of color and audience cognitive habits;

(5) Moderate technology: Technology serves the art, without showing off or piling up [13].

IV. THE CORE FUNCTION AND IMPLEMENTATION PATH OF ANIMATION COLOR NARRATIVE

A. TIME SPACE DEFINITION FUNCTION:

DISTINGUISHING TIME AND SPACE WITH COLORS

Quickly establish temporal and spatial attributes such as era, region, scene, dream/reality, and reality/fantasy through stable color tones, reducing the cost of narrative narration.

(1) Historical time and space: low saturation, retro, yellowing, brown tones;

(2) Real time and space: neutral, natural, and balanced color tones;

(3) Fantasy/Dream: High saturation, bright, soft, and flowing color tones;

(4) Different regions: establish recognition using regional representative colors;

(5) Parallel in different time and space: Distinguish between dual narrative lines with strong color contrast.

B. CHARACTER SHAPING FUNCTION: PRESENTING CHARACTER ARC LIGHT WITH COLORS

Color becomes the visual externalization of character identity, personality, emotions, destiny, and growth.

(1) Character setting colors: The main color reflects personality, and the auxiliary color enriches the hierarchy;

(2) Emotional color: color changes with psychological state, including temperature, brightness, and saturation;

(3) The arc of growth: from oppression, darkness, and monotony to brightness, richness, and harmony;

(4) Opposing roles: Using complementary colors to create visual conflict and narrative tension [14].

C. EMOTIONAL RHYTHM FUNCTION: USE COLOR TO CONTROL EMOTIONAL FLUCTUATIONS

Color directly determines the mood and narrative rhythm of the scene, forming a visual rhythm.

(1) Peaceful and warm: warm yellow, warm orange, low contrast;

(2) Nervous and oppressive: cool blue, dark blue, high contrast, low brightness;

(3) Joyful and enthusiastic: high saturation, warm color scheme, rich color matching;

(4) Sadness and loneliness: cold gray, light blue, low saturation, single tone;

(5) Conflict and confrontation: strong complementary colors, high contrast, and drastic changes [15].

D. THEME METAPHOR FUNCTION: USING COLOR TO CONVEY DEEP THEMES

Color becomes the visual embodiment of abstract themes, achieving the goal of ‘conveying ideas through color’.

- (1) Life hope: Green, warm yellow, bright gradient;
- (2) Freedom dream: light blue, light purple, light and transparent;
- (3) Justice and Light: White, Gold, Warm Light;
- (4) Desire danger: red, purple, dark gold;
- (5) Reconciliation and Growth: Moving from Conflict Colors to Harmonious and Unified Tone, as shown in Table 2.

TABLE 2. Digital Media’s Impact on Color and Visual Language

Narrative Function	Color Strategy	Typical Performance
Time-Space Definition	Fixed tone, color contrast	Era, region, dream/reality
Character Building	Role color, emotional change	Personality, growth, psychology
Emotional Rhythm	Warm/cold, light/dark, saturation	Calm, tense, happy, sad
Theme Metaphor	Symbolic color system	Hope, freedom, justice, growth
Narrative Guidance	Key color, gradient transition	Focus, transition, rhythm

E. NARRATIVE GUIDANCE FUNCTION: FOCUS AND TRANSITION WITH COLOR

- (1) Visual Focus: Highlight key characters, props, and actions with accent colors;
- (2) Transition Connection: Smooth transitions are achieved through color gradients and echoes;
- (3) Rhythm control: color change frequency matches narrative speed;
- (4) Suspense creation: local highlighting, extensive suppression, and key color hints.

F. IMPLEMENTATION PATH OF COLOR NARRATIVE

- (1) Early stage: Develop a full-color script for the entire film (ColorScript);
- (2) Mid term: Layered coloring, unified light source, ensuring color consistency;
- (3) Post production: overall color grading, emotional enhancement, emphasis on key points, and rhythm optimization;
- (4) Full process: color and plot, characters, music, and editing are highly coordinated [16,17].

V. VISUAL LANGUAGE COMPOSITION AND NARRATIVE LOGIC IN FILM AND TELEVISION ANIMATION

A. DIGITAL TRANSFORMATION OF VISUAL LANGUAGE COMPONENTS

Visual language in the digital era is characterized by “Computational Aesthetics.” Beyond traditional composition and lighting, digital media transforms these elements into “Dynamic Variables.” For instance, “Lens Language” now includes “Virtual Cinematography,” where algorithms simulate physical lens artifacts (e.g., chromatic aberration, realistic

bokeh), and “Material-Texture” has evolved from simple shading to physically based rendering (PBR), allowing the narrative to be told through the microscopic interaction of light and digital surfaces [18-20].

B. CORE COMPONENTS OF VISUAL LANGUAGE

- (1) Composition language: balance, symmetry, asymmetry, center, corners, blank space, hierarchy;
- (2) Light and shadow language: light source direction, intensity, virtual and real, warmth and coldness, atmosphere shaping;
- (3) Lens language: scenery, angle, motion, focal length, perspective;
- (4) Color language: the complete system mentioned above;
- (5) Material and texture: realistic, cartoon, hand drawn, ink wash, metal, fabric, etc;
- (6) Dynamics and special effects: motion rhythm, particles, lighting effects, fluids, fragmentation, clones, etc;
- (7) Style language: artistic style, modeling language, overall aesthetic temperament, as shown in Table 3.

TABLE 3. Visual Language Elements of Animation

Visual Element	Core Function	Narrative Role
Composition	Visual order	Focus, balance, hierarchy
Light & Shadow	Atmosphere & emotion	Mood, space, realism
Color	Narrative & symbol	Story, emotion, theme
Camera	Perspective & rhythm	Viewpoint, pace, tension
Special Effects	Visual expression	Fantasy, exaggeration, climax

C. NARRATIVE LOGIC OF VISUAL LANGUAGE

- (1) Unified logic: The visual style of the entire film is stable, forming a recognition system;
- (2) Narrative logic: Visual service narrative, clear and efficient information transmission;
- (3) Emotional logic: Visual emotions and narrative emotions are on the same frequency;
- (4) Rhythmic logic: visual speed, elasticity, and complexity matching narrative rhythm;
- (5) Symbolic logic: Visual elements repeat, echo, and contrast to form a semantic structure.

D. THE RESHAPING OF VISUAL LANGUAGE BY DIGITAL MEDIA

- (1) Breakthrough in expressive power: Low cost implementation of surreal vision, complex light and shadow, and grand scenes;
- (2) Production efficiency improvement: real-time preview, quick modification, batch rendering, standardized output;
- (3) Diversified forms: 2D/3D fusion, ink painting, cyber, Chinese style, pixel and other diverse styles;
- (4) Narrative style innovation: Immersive, interactive, multi perspective, and dynamic storytelling have become possible;

(5) Aesthetic paradigm shift: from hand drawn texture to digital aesthetics, emphasizing delicacy, fluency, and shock.

E. PRINCIPLES OF VISUAL LANGUAGE DESIGN

- (1) Clarity: The narrative information is accurate, not obscure, and not chaotic;
- (2) Unity: highly unified in style, light and shadow, color, and texture;
- (3) Emotionality: Visual perception has warmth, emotion, and empathy;
- (4) Moderation: Reasonable special effects, no stacking, and no overshadowing;
- (5) Innovation: Creating a unique visual identity based on standardization.

VI. COLLABORATIVE CREATIVE STRATEGY OF COLOR NARRATIVE AND VISUAL LANGUAGE

A. CORE CONCEPT OF COLLABORATIVE CREATION

Color narrative and visual language are highly unified, mutually supportive, and synergistically narrated, forming an integrated expression of “visual emotional narrative”, achieving the creative goal of “being understood, moved, remembered, and transmitted”.

B. UNIFIED PLANNING STRATEGY IN THE EARLY STAGE

- (1) Unified visual worldview: setting overall color tones, light and shadow rules, and artistic style;
- (2) Develop a color script: complete the color planning of the entire film according to the plot paragraphs;
- (3) Establish visual standards: unified standards for characters, scenes, props, lighting, and special effects;
- (4) Clear narrative focus: Determine the visual scheme of key scenes, climax, and turning points.

C. MID TERM PRODUCTION COLLABORATION STRATEGY

- (1) Layered management: color, light and shadow, line draft, and special effects layered production;
- (2) Unified light source: The global illumination is consistent, ensuring natural and reliable colors;
- (3) Dynamic matching: character color, light and shadow change with movement and environment in real time;
- (4) Quality control: Check according to visual specifications to ensure that the style is not distorted, as shown in Table 4 below.

TABLE 4. Collaborative Creation Strategies of Color and Visual Language

Stage	Strategy	Core Objective
Pre-Production	Color script + visual system	Unity and planning
Production	Layered rendering + light consistency	Quality and stability
Post-Production	Overall + rhythm optimization	Emotion and impact
Balancing	Technology serves art	Aesthetics and narrative

D. POST OPTIMIZATION AND STRENGTHENING STRATEGIES

- (1) Overall color grading: unify color tones, enhance emotions, and highlight key points;
- (2) Visual rhythm optimization: matching speed, elasticity, complexity with editing, and music;
- (3) Key emphasis: Key plot points, characters, and props are highlighted with colors and light and shadow;
- (4) Unified style: eliminate lens differences and form a perfect whole.

E. STRATEGY FOR BALANCING TECHNOLOGY AND ART

- (1) Technical service narrative: No meaningless special effects, no blind pursuit of high saturation;
- (2) Art driven aesthetics: maintaining the warmth, emotional concentration, and artistic character of hand drawn art;
- (3) Digital simulation texture: simulating traditional aesthetics such as film, ink painting, and oil painting;
- (4) Moderate innovation: making local breakthroughs within a stable system.

F. CASE STUDIES AND EMPIRICAL ANALYSIS: SPIDER-MAN: ACROSS THE SPIDER-VERSE AND DEEP SEA

To validate the proposed framework, we conducted a comparative analysis of Spider-Man: Across the Spider-Verse (International) and Deep Sea (Domestic). In Across the Spider-Verse, the “Vocabulary Layer” is defined by distinct color gamuts for different universes (e.g., the watercolor pastels of Earth-65 versus the highcontrast neon of Mumbattan), effectively automating time-space definition via digital shaders. In the domestic film Deep Sea, the use of “particle ink” technology allows for a fluid color narrative where high-saturation “particle” bursts correlate with the protagonist’s emotional peaks, providing a measurable link between digital rendering density and narrative intensity.

G. OPTIMIZATION PATH FOR DOMESTIC ANIMATION

- (1) Strengthen early visual planning, establish color scripts and visual standards;
- (2) Enhance the narrative ability of color, allowing color to truly participate in storytelling;
- (3) Build a systematic visual language to avoid fragmentation and homogenization;
- (4) Balancing technology and art, pursuing emotional, cultural, and aesthetic visual expression;
- (5) Based on the cultural core, form a visual aesthetic system with Chinese characteristics.

VII. CONCLUSION AND PROSPECT

A. RESEARCH CONCLUSION

- (1) In the era of digital media, color in film and animation has become a core narrative element, with five core functions: defining time and space, shaping characters, emotional

rhythm, thematic metaphor, and narrative guidance, forming a complete color narrative theory system and grammar rules.

(2) The visual language of animation has greatly expanded under the empowerment of digital technology, consisting of a systematic semantic system composed of composition, light and shadow, lens, color, material, special effects, etc. It follows the five major logics of unity, narrative, emotion, rhythm, and symbol, and is the core carrier of animation narrative.

(3) Color narrative and visual language must be designed collaboratively, planned uniformly, and fully coupled to achieve efficient narrative, strong empathy, and advanced aesthetics. This is the common creative law of excellent animation.

(4) Digital technology provides powerful tools for color and visual expression, but it must be guided by artistic aesthetics and narrative logic to avoid creative misconceptions such as flashy techniques, stacking, and homogenization.

(5) Constructing a scientific color narrative and visual language system plays a crucial role in improving the quality of animation art, enhancing emotional resonance, shaping cultural character, and promoting international dissemination.

B. MAIN INNOVATION POINTS

(1) Construct a systematic theoretical system for color narrative in film and television animation in the era of digital media, clarify its functions, grammar, design principles, and implementation paths.

(2) Establish a complete framework of visual language composition and narrative logic, and reveal the reshaping mechanism of digital technology on visual language.

(3) Propose a collaborative creative strategy of color narrative and visual language, forming a methodology that can directly guide creation.

(4) Based on the reality of domestic animation, propose targeted optimization paths that combine theoretical and practical value.

C. RESEARCH PROSPECTS

Further research can be conducted in the future:

(1) Research on AI assisted color design and intelligent generation of visual language;

(2) Color narrative and visual language innovation in immersive and interactive animation;

(3) Research on the adaptation of color symbols and visual language from the perspective of cross-cultural communication;

(4) Research on the Modern Expression of Chinese Aesthetic Spirit in Animation Color and Visual Language;

(5) Research on Color Script and Visual Standardization for Industrial Processes.

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CONFLICTS OF INTEREST

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