A Study on the Influence Mechanism of AIGC Tools on the Creative Thinking of Watercolor Painters from the Perspective of Embodied Cognition

Peng Mei

Wuhan Institute of Design and Sciences, Wuhan, China

1035365275@qq.com

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Abstract: This study focuses on the mechanism of AIGC tools' influence on the creative thinking of watercolor painters from the perspective of embodied cognition. Through literature research, case analysis, and empirical research, this paper deeply analyzes the influence of AIGC tools on perception, the interaction between body movements and creative processes, and the interaction between emotion and cognition. The study found that AIGC tools expanded the perceptual experience of watercolor painters, changed the interaction mode between body movements and creative process, and had a complex impact on emotion and cognition. The constructed influence mechanism model covers the embodied interaction, cognitive, and creative thinking transformation layers. The results of this study have important guiding value for the creation of watercolor painters. With the continuous development of AIGC technology, the frequency of watercolor painters using AIGC tools in their creation has gradually increased. Understanding the impact of these tools on creative thinking will help painters better use AIGC tools and improve their creative efficiency and work quality. This study provides a theoretical basis for understanding the role of AIGC tools in watercolor creation, provides a reference for watercolor painters' creative practice and art education, points out the research deficiencies, and looks forward to future research directions.

1. Introduction

1.1 Research Background

In the wave of digitalization, artificial intelligence-generated content (AIGC) technology has developed rapidly and has widely infiltrated the field of artistic creation. From the initial simple image generation to the current ability to create diverse, complex, and exquisite works of art, AIGC technology continues to expand the boundaries of artistic creation. In watercolor painting, the traditional creation process is complicated and requires the high skills and experience of painters. The emergence of AIGC tools has provided watercolor painters with a new way of creation, which can assist in generating sketches, provide creative inspiration, and perform style conversion and color adjustment on works. For example, by entering a specific description, the AIGC tool can generate a watercolor sketch of the corresponding style to help the painter start his creative thinking. Studying the influence mechanism of AIGC tools on the creative thinking of watercolor painters will help enrich the theoretical system of artistic creation in theory and provide a new perspective for interdisciplinary research; in reality, it can help watercolor painters better adapt to technological changes, improve their creative level, and provide guidance for the cultivation of new talents in art education.

1.2 Research Purpose and Significance

This study aims to explore the internal mechanism of how AIGC tools affect the creative thinking of watercolor painters from the perspective of embodied cognition. Through a multi-dimensional research method, the complex relationship between tools and painters' creative thinking is revealed, including the impact on cognitive patterns, creative ideas, aesthetic judgments, etc., and a complete theoretical framework is constructed to explain how AIGC tools reshape the creative thinking system

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of watercolor painters. In theory, this study applies the theory of embodied cognition to the study of AIGC tools and watercolor creation, enriches the application of embodied cognition theory in the field of artistic creation, provides empirical evidence for interdisciplinary research, and improves the relationship between technology and creative thinking in artistic creation theory. In terms of practical significance, the research results will help watercolor painters better use AIGC tools, improve creative efficiency and work quality, and provide teaching references for art educators, guide students to correctly understand and use AIGC tools, and cultivate artistic creation capabilities in the digital age [1].

1.3 Research Methods and Innovations

This study uses a variety of research methods. The literature research method reviews domestic and foreign materials extensively, combs the development of AIGC technology, embodied cognition theory and watercolor creation theory, and lays a theoretical foundation for the study. The case analysis method selects cases of different types of watercolor painters, deeply analyzes the application of AIGC tools in their creations and their impact on creative thinking, and summarizes the laws and characteristics. The empirical research method collects data through questionnaires, interviews and experiments to quantitatively evaluate the impact of AIGC tools on creative thinking. The innovation of this study lies in its unique research perspective. It studies the relationship between AIGC tools and the creative thinking of watercolor painters from the perspective of embodied cognition, breaks through the limitations of traditional research, and deeply explores the interactive mechanism between technology and creators' thinking [2]. In terms of research content, it not only focuses on surface influences, but also deeply explores the internal influence mechanism, constructs a theoretical framework, fills the research gap, and enriches the theoretical system of artistic creation.

2. Theoretical Basis

2.1 Overview of Embodied Cognition Theory

Embodied cognition is an important theory in cognitive science, which emphasizes the close connection between psychological activities such as cognition and thinking and the body and environment. Cognition is not independent of the body, but originates from the interaction between the body and the environment. The physical experience of the body affects mental activities. The development of this theory has gone through a long process. Early cognitive psychology was mainly based on the symbolic processing model and the connectionist model, both of which presuppose the disembodiment of cognition. With the development of multiple disciplines, embodied cognition has gradually emerged. Its advocates oppose traditional disembodied cognition and point out the decisive influence of body structure, neural structure and sensory motor system on the cognitive world and thinking style [3].

In psychology, body movements and postures affect emotional experience and cognitive judgment, such as smiling can make people feel happier. In education, it provides a basis for innovative teaching methods and advocates experiential learning, such as letting students operate physical models to understand abstract concepts in mathematics teaching. In the field of artificial intelligence and robotics, it inspires the development of more advanced cognitive models so that robots can adapt to the environment like humans.

2.2 AIGC Tool Related Theories and Technologies

AIGC, or Artificial Intelligence Generated Content, refers to a production method that uses artificial intelligence technology to automatically generate content, covering multiple forms such as text, images, audio, and video. Its core lies in the use of artificial intelligence technologies such as machine learning and deep learning, allowing computers to imitate human creative thinking and methods to generate content with certain creativity and value. AIGC is a way to automatically generate content using artificial intelligence technology, covering multiple forms. Its core technologies include machine learning and deep learning, which allow computers to imitate human

creative thinking to generate creative and valuable content. AIGC has a long history of development, originating in the 1950s. From the early simple music and novel generation to its widespread application in many fields today, the technology has continued to break through. The key technologies are generative adversarial networks (GAN), variational autoencoders (VAE), and Transformer models. GAN consists of a generator and a discriminator, and generates high-quality content through adversarial training; VAE combines deep learning and Bayesian reasoning to generate content in latent space operations; the Transformer model is based on the self-attention mechanism and performs well in natural language processing and multimodal content generation [4].

In terms of intelligent painting technology, the image generation algorithm based on the diffusion model and the style transfer algorithm based on GAN are key. The diffusion model achieves image generation by learning to recover data from noise, such as Stable Diffusion, which can generate images based on text descriptions. The style transfer algorithm of GAN can transfer the style of one image to another, achieving style conversion and fusion, such as converting a photo into a watercolor style.

2.3 Characteristics of Watercolor Painters' Creative Thinking

The creative thinking of watercolor painters is characterized by imagery and creativity, reflecting the rich thoughts of the painters. Imagery is reflected in the careful observation and perception of real objects, transforming them into visual images in the picture, and using elements such as lines and colors to construct a beautiful picture structure. Creativity requires painters to break through tradition and constantly explore and innovate in tools and materials, expression techniques, and subject matter. Emotionality makes watercolor works a carrier of emotional expression for painters. Emotion runs through the entire creative process, increasing the appeal and connotation of the works.

There are many factors that affect the creative thinking of watercolor painters. Life experience is one of the important factors that affect creative thinking. The life experiences of painters are rich and varied, including personal growth environment, travel experience, etc. These experiences provide painters with rich creative materials and sources of inspiration. For example, a painter who grew up by the sea may often have the sea, fishing boats, and beaches in his works. These elements are not only a depiction of his living environment but also a sustenance of his emotions and memories; artistic cultivation also profoundly impacts creative thinking. The artistic cultivation of painters includes studying and understanding art history, aesthetics, philosophy, etc., as well as studying and referencing various art forms and styles. Deep artistic cultivation enables painters to have keen artistic perception and aesthetic judgment so that they can constantly innovate and break through in their creations and form a unique artistic style.

3. Analysis of the Influence of AIGC Tools on the Creative Thinking of Watercolor Painters

3.1 Impact of Perception

The AIGC tool affects the perception of watercolor painters in many ways. In terms of visual perception, it broadens the boundaries of the painter's visual experience, can generate various fantasy and abstract images, provide novel visual references for creation, and can also perform style conversion, allowing painters to feel the differences in colors and lines under different styles. For example, when a painter wants to create a sci-fi style watercolor painting, the AIGC tool can generate relevant images to inspire inspiration [5].

In terms of tactile perception, the new tactile feedback generated by operating AIGC tools (such as digital drawing tablets) has changed the painter's understanding and expression of lines and textures. Painters can accurately control line changes with a stylus to create a variety of line textures. In terms of color perception, the AIGC tool provides convenient and diverse color selection and blending methods, built-in rich color libraries, and intelligent color recommendation functions. It can also simulate the effects of colors under different lighting and material surfaces, helping painters to deeply understand color relationships and improve their ability to use colors. Figure 1 illustrates the impact of AIGC on painters' creations.

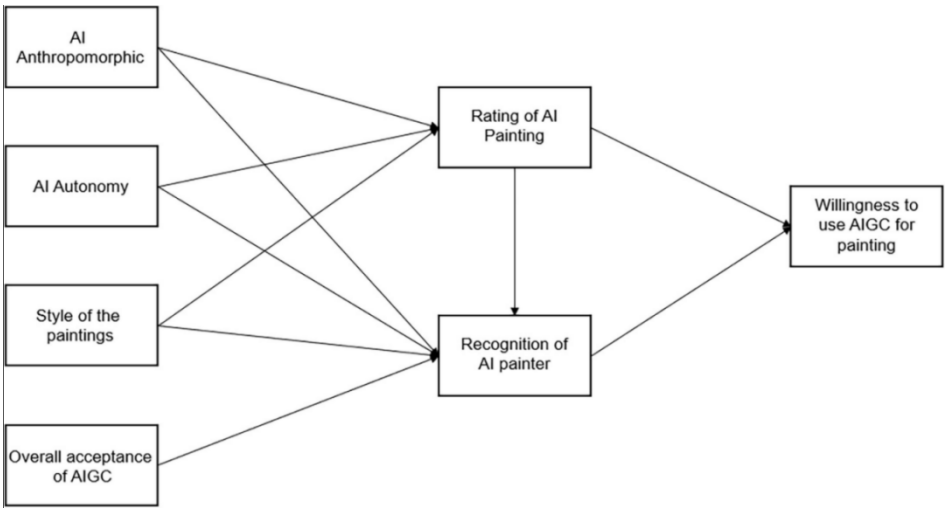

Fig 1. The influence of AIGC on painters' creation

3.2 Interaction between Body Movements and Creative Process

In traditional watercolor painting, the painter's body movements are closely linked to creative thinking. Different painting movements, such as outlining and expressing texture, contain the painter's intentions and emotions, and the rhythm and rhythm of body movements affect the style and emotional expression of the work. The intervention of AIGC tools has changed the interaction mode between body movements and the creative process. Painters interact with tools by operating computer equipment, such as clicking and dragging with digital drawing tablets, which is different from traditional painting movements. The functions and operating instructions of AIGC tools also simplify the creative process, such as color adjustment is no longer manually adjusted. This change in body movement has a multi-faceted impact on creative thinking. New movement experiences bring new creative ideas, and painters can more easily try different compositions and expressions. At the same time, it prompts painters to re-examine their creative thinking and methods, and combine traditional techniques with the advantages of AIGC tools.

3.3 Interaction between Emotion and Cognition

The AIGC tool has a complex impact on the emotional experience of watercolor painters. It can stimulate positive emotions such as surprise and excitement in painters, such as generating unique creative sketches, which can increase creative motivation. However, it can also trigger negative emotions such as anxiety and confusion, such as worrying that creative ability will be challenged or technical problems cannot be solved. The emotional experience of painters plays an important role in creative thinking and cognition. Positive emotions broaden the thinking horizon, promote association and imagination, and make the work more appealing. Emotions also affect the cognitive evaluation of the creative process and works. Positive emotions enhance creative confidence, while negative emotions may inhibit creative thinking [6].

AIGC tools have changed the environment and mode of interaction between emotion and cognition. In traditional creation, emotion mainly comes from reality and interaction with painting materials. After the intervention of AIGC tools, the information feedback and generated results of the tools become new influencing factors, requiring painters to screen and integrate information.

4. Case Study

In order to deeply explore the influence mechanism of AIGC tools on the creative thinking of watercolor painters, this study carefully selected a number of representative watercolor painters as research cases. These painters show rich diversity in age, creative experience, artistic style, and the degree of use of AIGC tools, so as to ensure that the research results are widely representative and comprehensive.

In terms of age, it covers young, middle-aged and elderly watercolor painters. Young painters have

active minds and are more receptive to new technologies. When using AIGC tools in their creations, they may be more inclined to explore new artistic styles and forms of expression, injecting new vitality into traditional watercolor creation; middle-aged painters usually have more mature creative styles and skills. When using AIGC tools, they may pay more attention to how to combine the tools with their own creative ideas to further improve the quality and connotation of their works; elderly painters have rich creative experience and profound artistic background. Their attitude and use of AIGC tools can reflect the integration of traditional artistic concepts and emerging technologies.

This study adopted a design that combines multiple research methods. First, we conducted in-depth interviews with each case painter to understand their motivations, processes, problems encountered, and changes in their creative thinking before and after using the AIGC tool. During the interviews, we asked the painters in detail how they used the AIGC tool to gain creative inspiration, whether the tool changed their composition method, color selection and other creative decisions, and their views on the role of the AIGC tool in artistic creation. Through the interviews, we collected the painters' subjective experiences and opinions, providing rich qualitative data for the study.

In addition, we analyzed the works created by painters using AIGC tools. Starting from the theme, composition, color, brushstrokes, and expression techniques of the works, we compared the changes in the works before and after using AIGC tools, and observed the impact of AIGC tools on the style and artistic expression of the works. We used image analysis software to quantitatively analyze the color composition and line characteristics of the works, and combined with the methods of art criticism to evaluate the artistic value and innovation of the works, so as to objectively present the impact of AIGC tools on creative thinking. The results show that AIGC tools affect the creative thinking of different watercolor painters in different ways during their creative process. It provides painters with new sources of creativity, expands the expression of composition and color, and prompts painters to break through traditional thinking and achieve innovation and change in creative thinking.

5. Comprehensive Analysis of Impact Mechanisms

Based on theoretical analysis and case studies, a theoretical model of the influence of AIGC tools on the creative thinking of watercolor painters is constructed, including the embodied interaction layer, cognitive transformation layer and creative thinking transformation layer. In the embodied interaction layer, the AIGC tool interacts with the painter's body movements and sensory system. The body movements of operating the tool change the tactile perception, and the visual information generated by the tool expands the visual experience. For example, the image generated by the input description gives the painter a new visual impact [7]. The cognitive transformation layer takes over the influence of embodied interaction and triggers changes in the painter's cognitive processes such as memory, attention and association. The information generated by the tool is incorporated into the memory, and the association is activated under the guidance of attention, prompting the painter to adjust the cognitive structure and rethink the creative method [8].

The creative thinking transformation layer is the result of the interaction between the first two layers, which is reflected in creative conception, composition and color application, aesthetic judgment and artistic expression. Painters use tools to break through the limitations of thinking, try new compositions and color combinations, reflect on and reconstruct aesthetic standards, and achieve freer artistic expression. From the cognitive dimension, AIGC tools break the traditional thinking patterns of painters, provide rich creativity, expand aesthetic horizons, and make artistic expression freer and more diverse. In the emotional dimension, it can stimulate positive emotions and enhance creative motivation, but it may also induce negative emotions and bring psychological pressure. In the social and cultural dimension, AIGC tools challenge the art market and evaluation system, promote the socialization and popularization of artistic creation, but also bring problems such as uneven quality of works.

6. Conclusion

Based on the perspective of embodied cognition, this study deeply explores the impact mechanism

of AIGC tools on the creative thinking of watercolor painters, and uses theoretical analysis, case study and model construction to fully reveal the interactive relationship between the two at multiple levels.

At the perceptual level, AIGC tools provide watercolor painters with rich visual references with powerful image generation capabilities, helping them break through the limitations of traditional materials, get in touch with fantasy and abstract images, broaden the boundaries of visual experience, and change tactile perception. In terms of body movements and creative processes, the use of AIGC tools has changed the traditional interaction mode. Painters operate computer devices to interact with them, and the new body movement experience brings new creative ideas. Taking digital drawing tablets as an example, stylus operations can achieve precise line control and diversified drawing, thereby changing the creative process and way of thinking.

The AIGC tool has a complex interactive effect on the painters' emotions and cognition. It can stimulate positive emotions and promote the expansion of creative thinking, but it can also induce negative emotions and inhibit the development of creative thinking. Through a case study of watercolor painters of different ages, creative experience and artistic styles, it was found that the impact of the AIGC tool on creative thinking was different. Young painters tend to use it to explore innovative styles, middle-aged painters selectively absorb creativity, and elderly painters use it as an aid to improve traditional creative thinking. Based on this, the constructed theoretical model of the influence mechanism includes the embodied interaction layer, the cognitive conversion layer and the creative thinking change layer. These three levels interact with each other, and ultimately manifest in the changes in the painter's creative conception, composition and color application, aesthetic judgment and artistic expression. This study shows that the AIGC tool profoundly affects the creative thinking of watercolor painters from multiple dimensions, and the embodied cognitive perspective provides a key theoretical framework and method for research.

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