

Quantitative Analysis of Spatial Narrative Features in Oil Paintings from the Perspective of Digital Transcription: A Case Study of Xiaodong Liu's Works

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Abstract

Against the backdrop of generative AI's progressive integration into artistic creation, traditional art forms have embraced novel pathways for dissemination and innovative practice. Conventional generative models have been predominantly centered on replicating and learning the technical elements of artworks, such as brushwork and color application. This study aims to propose a novel approach by capturing spatial narrative characteristics, thereby providing quantifiable visual parameters to facilitate the contemporary dissemination of traditional easel oil paintings and AI-assisted creation, and further enabling style-transfer-based artistic production. Taking the oil paintings of artist Xiaodong Liu as the research object, this study adopts a qualitative-quantitative mixed research design to deconstruct and quantify his spatial narrative logic, while verifying the feasibility of the proposed analytical framework. Through quantitative analysis of dimensions including spatial depth, interpersonal interaction, and environmental dynamics, a descriptive lexicon adaptable to generative AI comprehension is derived. Following a comparative analysis with affective cognitive assessment, this study validates the feasibility of the quantification system. The translation of artistic experience into descriptive metrics establishes a data foundation and creative resource for subsequent digital transcription practices, such as AI-based style transfer and spatial narrative reconstruction.

Keywords: Oil Painting; Digital Translation; Spatial Narrative; Quantitative Analysis

1 Introduction

A. Chinese Narrative Expression of Easel Oil Painting

The localization of oil painting can be traced back to the period of Western learning spreading to the East in the early 20th century. Beihong Xu, Fengmian Lin and other pioneers studying in Europe, while introducing western oil painting techniques, actively explored the integration path with Chinese traditional aesthetic spirit, and laid a modern framework for Chinese oil painting education [1]. In the 1950s, driven by the Maximov oil painting training class, the realistic oil painting system of the Soviet Union was combined with the local cultural context of China, forming a way of oil painting creation with distinctive characteristics of the times [2-4].

The Chinese narrative expression of easel oil painting is a historical process of dynamic evolution, which not only reflects the adaptive transformation of art media, but also reflects the changing track of Chinese social and cultural context [5-6]. In the cultural construction of the new era, how to give oil painting new communication opportunities in the impact of modern diversified art forms is a problem worthy of in-depth study.

B. The Development of Artistic Creation in the Digital Wave

With the rapid development of digital technology, the communication ecology of traditional oil painting on shelves is undergoing profound structural changes. On the one hand, in the face of emerging media environments such as short video platforms, social media, immersive display and interactive communication, the traditional communication path dominated by physical exhibitions, paper albums and academic reviews presents realistic challenges such as relatively low communication efficiency, obvious trend of audience stratification, and limited ability to reinterpret images. On the other hand, this transformation of communication paradigm provides new possibilities for the digital communication of oil painting art, and also requires art creators and researchers to rethink the positioning and value of oil painting in the digital era. In relevant studies, Maoling Zhang summarized AIGC art translation into three main modes: style transfer, collage and context reconstruction [7]. In the practice of oil painting digital translation, these technical mechanisms show different application values.

Through the establishment of a multi-dimensional quantitative index system including composition ratio, spatial level, environmental elements, and character behavior, this study explores the internal laws and formal language characteristics of oil painting spatial narrative, provides operable visual parameters for AI assisted creation, and ensures the integrity of the original narrative rhythm and the coherence of artistic expression in the process of digital translation.

C. The Typicality and Research Value of Xiaodong Liu's Oil Paintings

Based on the above background, choosing Liu's paintings as the research object has strong typicality and academic rationality. Liu is a representative realist painter in the field of Chinese contemporary oil painting. His artistic creation has long been concerned with ordinary people, migrants, laborers,

marginalized groups and specific social scenes in the transformation of the times. The value of Liu's paintings lies precisely in the transformation of individual life experience, social scene and era structure into a viewable spatial narrative. The space in his works is not a simple background, but a carrier of the fate of the characters, social relations and historical changes. For example, the migration of the Three Gorges, the hometown of the northeast, the edge of the city, the scene after the disaster and other themes all show the flow, fracture, reorganization and emotional tension in the process of China's social transformation through specific space. In the study of Liu's creation, Hong Wu summarized his creation method as a kind of "painting in action", emphasizing the continuous process from the scene, notes, images, painting to exhibition and communication [8].

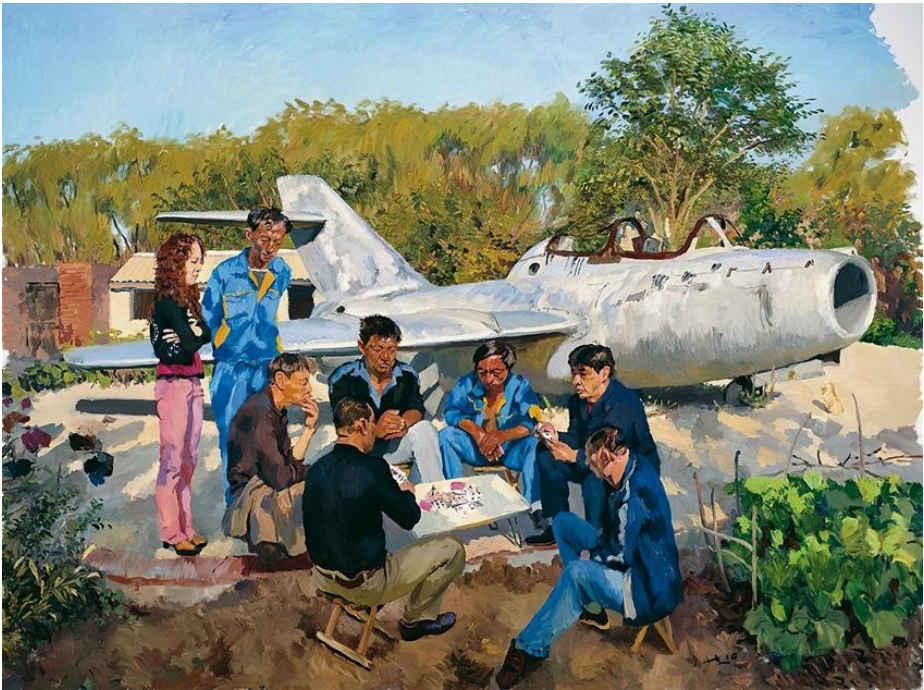


Fig. 1 *Jincheng Airport*

To sum up, this paper intends to take Liu's paintings as the core object, take digital communication as the goal and generative AI as the creative path, and carry out the pre spatial narrative analysis research. On the one hand, from the perspective of art history, iconography and spatial narrative theory, this paper analyzes the structure of character place society relationship in Liu's works; On the other hand, combined with the methods of generative AI image generation, style transfer and context reconstruction, this paper explores the practical path of oil paintings in the process of creation. This research not only helps to carry out the subsequent AI creation based on Modern Chinese oil painting, but also helps to respond to the problem of updating the traditional art communication mode in the era of artificial intelligence, and provides a research framework with practical value for the digital protection, creative transformation and mass communication of modern oil painting.

2 Qualitative Disassembly via Perceptual Description

On Liu's canvas, the environment is not a passive stage setting, but a dynamic field that forms the narrative subject with the characters. This symbiosis relationship is reflected in a decentralized spatial logic, which dispels the heroic grand narrative and embraces the complexity and authenticity of daily life.

A. The Symbiosis of The Scene Environment and the Little Man

Liu's usual technique is to deliberately create an imbalance between the proportion of people and scenery. As accurately summarized, "in a grand background, it shows ordinary people living in it. This visual difference between 'big background and small people' constitutes the core spatial tension in his works.[9]" in the series of new immigrants to the Three Gorges, "the bodies of eleven workers in the painting occupy the middle and lower parts of the picture, while the upper part is left with the open and gray Three Gorges landscape, forming a certain 'sense of weightlessness' in space"[10]. This weightlessness is the true portrayal of the individual in the current of the times. Liu himself has a clear understanding of this. He wrote in his notes: "here (at the scene of sketching), the proportion of people and scenery is out of balance. The huge mountains set off extremely small people. This proportion is narrative in itself"[8]. Through this visual strategy, the tenacity and fragility of ordinary life gain great weight against the vast background of desolation or chaos.



Fig. 2 *Three Gorges new immigrants*

In order to ensure the authenticity of this field, Liu abandoned the traditional dramatic composition rules and adopted a civilian, almost non composition strategy. He chose a horizontal line equal to the painted object. As pointed out in *famous artist and famous product · Xiaodong Liu*, "the horizontal line is usually set at the same height as the waist or chest of the person in the painting... Giving ordinary people a monumental space thickness." [11] this horizontal angle, as Xiaoxian Hou said in the dialogue, effectively dispels the grand narrative and returns to the trivial space of daily life. What Liu pursues is a casual and casual natural state. He believes that the position of the characters in the environment is not a well-designed composition, but is naturally generated according to the logic of on-site life, and the space itself is telling stories [12-13]. This respect for the logic of on-site life makes its picture free from artificial affectation and presents a straightforward, non mediated sense of authenticity.

B. Sociological Metaphor of Instantaneous Field Records

If field symbiosis constitutes the basis of Liu's spatial narrative, the treatment of spatial boundaries injects profound sociological implications into it. Through the ingenious use of physical separation, material traces and structural fracture, he transformed invisible social relations, historical changes and psychological distance into visible visual symbols.

Sense of scene is the core of Liu's artistic philosophy and a methodology to ensure the authenticity of narration. This insistence on the Scene makes his creative process itself a kind of performance art, and the canvas becomes a file recording the specific space-time coordinates. Wind and sand, light, temperature and other environmental factors are no longer obstacles to be overcome, but collaborators directly involved in creation. As the note said, "the canvas is shaking in the wind. I am not only painting the shape, but also the resistance of the painting style. Space is no longer a vacuum, but a physical field with resistance"[8]. This wrapped feeling of being in it, as Xiaoxian Hou has observed, creates a kind of field authenticity, which determines the unique narrative tension of the picture. For him, on-site sketching is "using my skills, my ability and strokes to draw this thing so attentively at the moment, this thing is unique"[12-13].

Liu's paintings are like the shutter of photography, and are good at capturing those seemingly mundane but profound moments. By describing his hometown, childhood memories or ongoing social events (such as the Three Gorges Project), he superimposed personal memory, current experience and macro history on a single screen. When Xiaoxian Hou recalled the scene of shooting "beating eggs", he said, "the whole family made it clear in that picture", which just shows the powerful memory restoration function of Liu's works [13]. What he recorded was not an isolated event, but the side and instant of China's urbanization process. This instantaneous interception makes its picture go beyond the limit of linear time and become a multi-dimensional space-time body condensing the past, present and future. This kind of open narration guides the audience to interpret the continuous history and emotion behind the picture from their own experience.

To sum up, Liu's oil painting space narrative is a highly conscious and rich system. It constructs a decentralized real world full of life quality through the narrative symbiosis of field environment and characters; And through the sociological metaphor of instantaneous live space, the physical space is transformed into a profound symbol carrying social relations, historical memory and psychological distance. Through the careful analysis of the original corpus, this paper extracts a series of objective descriptors that can be used for subsequent research to construct the subsequent quantitative evaluation system, such as environment and scene, people and interaction, Scene trace retention, physical interval metaphor, instantaneous record, etc. These keywords from first-hand data have laid a theoretical foundation for the quantitative evaluation system and ensured the logical coherence and academic preciseness from perceptual cognition to rational analysis.

3 Quantitative Analysis of the Sspatial Narrative Mode

Continuing the core category of Liu's oil painting space narrative extracted in the second chapter, this study takes 175 representative oil paintings of Liu as

samples, and constructs a coding system containing 14 binary variables, which is directly derived from the qualitative discovery in the second chapter, and transforms it into an operable and observable objective index. Through descriptive statistics, correlation analysis, diachronic comparison and cluster analysis, this chapter will reveal the internal structure, evolution rules and typological characteristics of its spatial narrative, and finally verify the quantitative results and qualitative insights, so as to verify the effectiveness and explanatory power of the quantitative model constructed in this study.

A. Quantitative Anchor of Realism

Firstly, the frequency analysis is carried out on the coding data of 175 works, and the results clearly outline the stable basic plate of Liu 's artistic practice. The data showed that the three indicators of Clear figuration (88.6%), Spatial depth (81.7%) and Site specificity (80%) were extremely frequent. This quantitative result provides solid empirical evidence for the core thesis of the second chapter about Liu as a representative painter of new realism. This dedication to the trinity of human landscape field constitutes the most fundamental cornerstone of his artistic language and the premise that his works can carry the heavy social history. In addition, the high frequency of Multiple figures (55.4%) and Intentional gesture (52%) further confirms the strong social characteristics of his pictures, indicating that his narration focuses on interpersonal interaction and collective behavior rather than the inner monologue of isolated individuals.

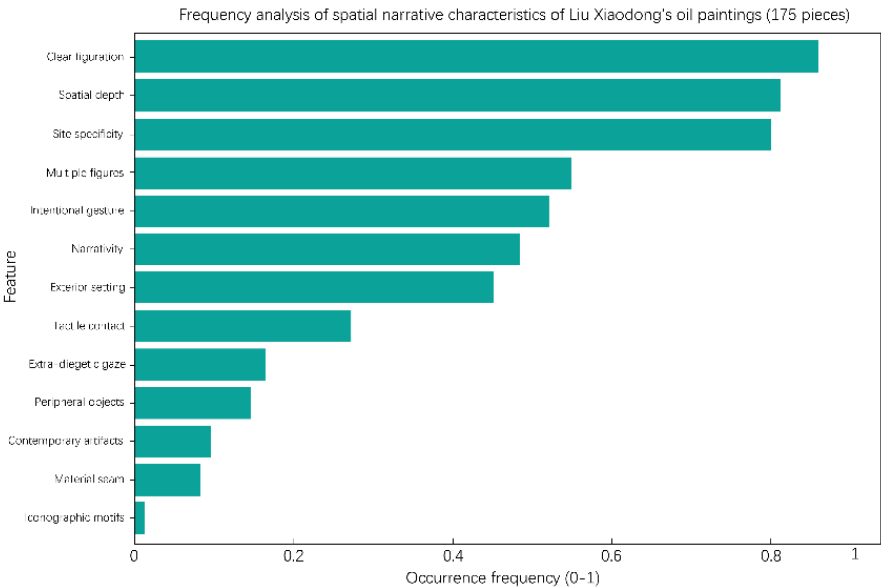


Fig. 3 Frequency analysis of spatial narrative characteristics of Xiaodong Liu's oil paintings

The high frequency of the above spatial narrative features reveals the main constituent elements in Liu's paintings, which are also an important part of social history and urban development. In the process of urbanization, the development of the urban fringe has rapidly changed the living environment of small people. Ordinary people who follow the big stream are confused about transforming the environment in the process of development and have to

change themselves due to environmental factors. This conclusion successfully confirms the summary of Liu's oil paintings symbiosis between the scene environment and the narration of small people in the existing research literature.

B. Visualization of Social Relationship Network

In order to further explore the internal logical relationship between the narrative elements, this study calculated the Pearson correlation coefficient between the variables. The thermodynamic diagram analysis reveals two key dimensions:

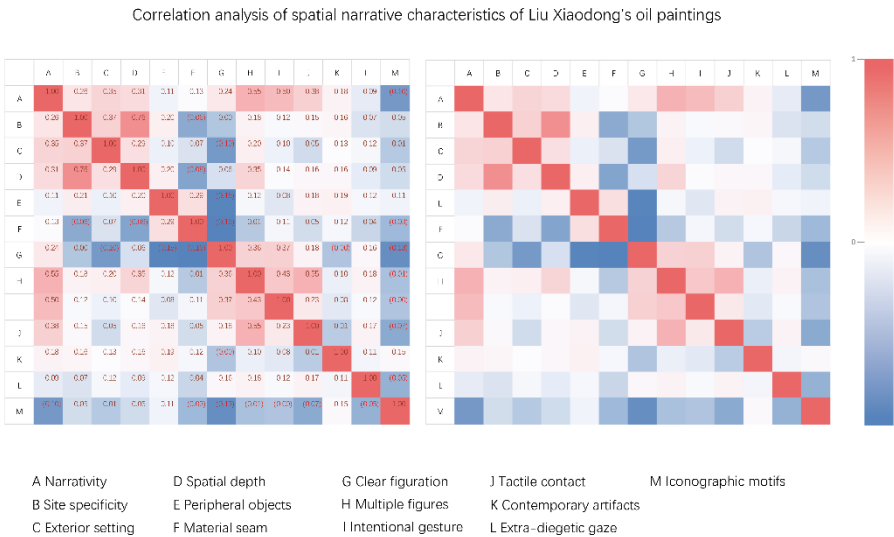


Fig. 4 Correlation analysis of spatial narrative characteristics of Xiaodong Liu's oil paintings

First of all, Narrativity and Multiple figures ($r=0.55$), Intentional gesture ($r=0.50$), and Tactile contact ($r=0.38$) were significantly positively correlated. This shows that Liu's narrative strength is not derived from dramatic scenes or symbolic symbols, but is highly dependent on the construction of the social relationship network within the screen. This discovery perfectly echoes the decentralized narrative logic extracted from the perceptual description in Chapter 2, that is, through the interaction between multiple characters, purposeful behavior and even physical contact to jointly drive the plot development. This coincides with Bourdieu's field theory: the characters in the painting are not isolated atoms, but in a tension filled relationship network, whose position and posture are determined by their social field[15-16].

Secondly, there is a strong positive correlation between Site specificity and Spatial depth ($r=0.76$). This shows that when Liu creates a real field, he must strengthen the sense of volume and depth of space through the processing of depth of field, which are the twin elements of his sense of scene. Maurice Merleau Ponty's phenomenological view holds that depth of field is not only a technique of visual reproduction, but also a way of perception in which the body is embedded in the world, which enables the audience to enter the space in the painting and experience its materiality and atmosphere[17]. Therefore, in Liu's paintings, this kind of space with depth can well convey the narrative content to the audience, and even guide the audience to immerse in it, so that

the development of the past timeline is familiar to the audience in a real and perceptible form. The above analysis results also confirm the social metaphorical value conveyed by the instantaneous live record of Liu's paintings.

C. Paradigm Shift from Social Events to Spatial Records

In order to investigate the diachronic evolution of Liu's artistic style, this study divided his creative career into stage 1 (before 2000) and stage 2 (after 2000), and analyzed the cross frequency of the two stages. The results show a significant shift in the focus of his creation: first, in stage 2 works, the frequency of Narrativity and Intentional gesture decreased significantly, while the frequency of Exterior setting and Material seam increased significantly. Second, the frequency of Tactile contact also showed a significant decreasing trend in the late stage.

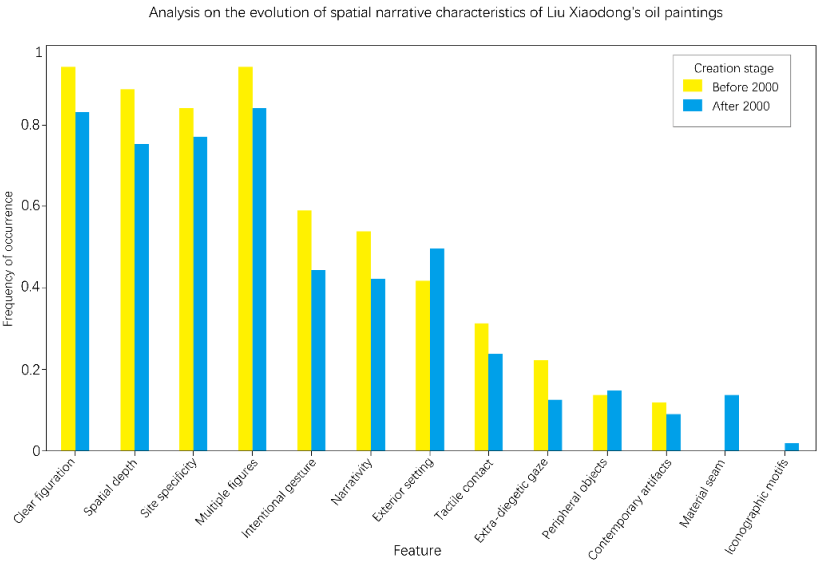


Fig. 5 Analysis on the evolution of spatial narrative characteristics of Xiaodong Liu's oil paintings

These data changes reveal that his creation has gradually shifted from focusing on the description of specific events with clear plots and strong interactions in the early stage to the exploration of instantaneous scene records and spatial ontology.

The quantitative analysis of this chapter systematically describes the basic appearance, internal correlation and diachronic evolution of Liu's oil painting space narrative. All these quantitative findings can form a close echo and mutual evidence with the qualitative research based on perceptual description in Chapter 2. For example, the quantitative data confirmed the authenticity of the symbiosis of person scene field, revealed that social relations was the core driving force of its narrative, and clearly showed the evolution path from strong plot to spatial record. This high consistency of qualitative and quantitative verifies the rationality and feasibility of the quantitative index system constructed in this study. It not only provides a novel and solid analytical framework for understanding Liu's art, but also connects with the path of generative AI creation, opens up new possibilities, and proves the academic value of transforming perceptual art experience into rational analysis model.

4 Conclusion

This study systematically deconstructs and verifies the spatial narrative logic of Xiaodong Liu's oil paintings through the mixed research mode of qualitative and quantitative. It proves that it is possible to transform complex artistic language into calculable and analyzable rational indicators. On this basis, the next work of this study will naturally move from Deconstruction to generation.

Specifically, the descriptive features that have been empirically tested, such as Spatial depth, Site specificity, Multiple figures, Intentional gesture, Material seam, will be constructed according to the requirements of paintings and encoded into the prompt words required by AI image and video generation models. In this way, we are expected to create works that are synchronized with the spatial narrative rhythm of Liu's oil paintings. This creation will help to explore the communication space of Chinese style easel oil painting and turn the fixed expression form to a more flexible presentation.

DECLARATIONS

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