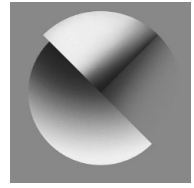


The urban aesthetics of graffiti murals: reproducing wall space in China's urban renewal

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ABSTRACT

In China, as in the West in recent decades to a lesser degree, the semantics of 'graffiti' have gradually become an alternative term for graffiti murals in urban renewal. Graffiti murals, through various renewal strategies, reproduce the wall spaces of old towns, factories and villages in Chinese urban areas, giving rise to diverse aesthetic attitudes. Taking Guangzhou, China, as a case study, this article utilizes graffiti mural images defined as 'graffiti' by people on social media as the basic material. Visual research methods such as photo evaluation and eye-tracking experiments are employed to analyse the aesthetic attitudes and mechanisms of mainstream street art, which in fact differ from traditional graffiti. The study reveals that people perceive different types of graffiti mural spaces in various ways, with a more positive aesthetic attitude towards urban mural landscapes that exhibit aesthetic coherence. Viewers with embodied practice experiences in 'graffiti' show stronger aesthetic emotions compared to those who have not visited

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the case study location. These differences are further influenced by the aesthetic atmosphere of the environment and the aesthetic practices of different subjects onsite, deviating slightly from the spatial aesthetic operational logic of traditional graffiti. From various perspectives on Chinese 'graffiti', the visual methodology constructed in this study provides new insights for the aesthetic management of urban renewal.

KEYWORDS

aesthetics • graffiti mural • urban renewal • visual analysis • wall space

INTRODUCTION

The popularity of the term 'graffiti' originated from the aesthetic resistance actions of young people in Western countries who expressed their emotions through unauthorized markings, primarily on urban walls (Yoon, 2020). By challenging the normal functioning of the city through this form of street art (Cresswell, 1992), a visually political reminder is presented (Hansen, 2021), becoming a method of debating social significance (Buentello García and Rice, 2023) and reflecting power struggles among societal subjects (Iveson and McAuliffe, 2023). The creators of these graffiti remain sensitive to social interactions, ever-changing cultural meanings and emerging dynamics of the city (Ferrell and Weide, 2010). They often do not seek control over the space or aspire to be elites; instead, their goal is to spread awareness of common social issues faced by the community (Bloch, 2012). In contrast, political and economic authorities' active opposition to graffiti reflects their defence of urban consumption, neighbourhood property values and 'authority aesthetics' (Austin, 2001; Ferrell, 1996). Therefore, the concept of 'graffiti' in this spatial production system is understood as a bottom-up challenge to authoritative spatial order, revealing the contradictions of urban space as both a commodity with exchange value and a collective resource with countless uses (Bloch, 2016).

However, the understanding of the concept of 'graffiti' varies significantly among different groups, especially when looking beyond the cultural context of Europe and the US (Valjakka, 2016). After the period of reform and opening up, Western street culture infiltrated China (Zhang and Chan, 2022) and the writing of graffiti in a specific style became a new cultural phenomenon (Pan, 2014). Consequently, 'graffiti' here was initially understood as a form of legitimate space behaviour outside established order, aligning with Western culture. However, as China's unique political, economic and cultural system internalized the meaning of urban graffiti (Agustin and Chan, 2022), the term 'graffiti' gradually began to be used top-down, expanding its original meaning. In China, the act of writing or painting in public spaces has long been linked to a manifestation of power and the government may even

sponsor 'graffiti' as a cultural project for beautification and middle-class culturalization (Deutsche, 1992).

Over the past few decades, as Chinese cities underwent extensive urban renewal and reconstruction, many old and in need of embellishment walls required beautification and activation. Against the backdrop of rapid development in the cultural industry and ongoing reforms in the cultural system, cultural arts are gradually becoming a new production element incorporated into the development of the urban economy (Montalto et al., 2019). It has become one of the crucial ways to revitalize urban spaces (Parker and Khanyile, 2024). Given that public art contributes to enhancing the creative reputation of a place in urban renewal, 'graffiti' is seen as a visual tool to attract rather than repel investors (Zukin and Braslow, 2011). Governments, capital and graffiti artists or street artists collaborate to transform the production of 'graffiti' from a spontaneous and unauthorized art form into a legitimate form of spatial production on approved wall spaces (Shand, 2020). The goal is to improve the city's image. Simultaneously, these reproduced wall spaces are promoted online by authorities and media using the keyword 'graffiti', attracting public visits. This form of political beautification through a visually appealing and easily accepted form is a new strategy for manipulating public opinion, especially among the younger generation (Valjakka, 2015). Therefore, in the Chinese context, 'graffiti' seems to have evolved into a legitimate form of public murals widely accepted (Pan, 2014), appearing to be more aimed at promoting or protecting societal values.

Under the influence of official discourse and media, citizens' understanding of 'graffiti' has also undergone changes. In any context, the Chinese public's use of the term 'graffiti' now includes street murals and wall paintings, with few associating it with political undertones or rebelliousness (Agustin and Chan, 2022). However, the art referred to as 'graffiti' also faces controversies, sparking debates about what constitutes graffiti and who gets to decide. Despite local media and the public referring to these projects as 'graffiti art' on social media, seemingly welcoming and supporting them in the digital space (Valjakka, 2015), traditional local graffiti writers and artists in China argue that the intricate wall paintings self-proclaimed as 'graffiti' on these public wall spaces are not genuine graffiti. This is because these works undergo scrutiny from municipal government officials. In the era when 'graffiti' was condemned, metropolitan agencies sometimes distinguished between graffiti and street art (McAuliffe, 2012). Street art has begun to be recognized as a legitimate urban artistic practice (McAuliffe, 2013), considered in many areas to encompass commissioned works completed by graffiti artists on the streets (Ong, 2016). The wall paintings produced in the process of urban renewal in Chinese cities fall under the broad category of street art, but perhaps can only be defined as 'graffiti murals'. These 'graffiti murals' are approved wall art sponsored and paid for by business owners and/or local governments, featuring vibrant murals created by artists imitating the graffiti style (Bloch,

2012). The authoritative discourse has reshaped the aesthetic significance of 'graffiti' in China, prompting contemplation on the deeper spatial aesthetic differences between traditional graffiti and these graffiti murals.

Aesthetics serves as a crucial dimension of spatial perception (Arnold, 2019), encouraging a creative way of viewing landscapes and a more acute awareness of how a place is presented and transformed (Patterson, 2016). Legitimate walls and approved spaces are contributing to new definitions of graffiti but, for traditional graffiti writers, factors such as spatial constraints, government funding and private support for art projects undermine the aesthetic charm of graffiti murals. These factors subject graffiti murals to economic legitimization and a conservative framework, reducing them to a form of aesthetic product (Bloch, 2016). Graffiti is not merely a visual art; its artistic essence derives not only from its content and form but also from the performative power inherent in the illegal actions of many writers from the bottom-up (McAuliffe, 2013). It is an emotional process, revealing unseen geographical boundaries and deep-seated aesthetic emotions (Halsey and Young, 2006). However, some scholars argue that, despite losing its context objectively, legal spaces and art projects provide more time and resources for composition, allowing artists to fully unleash their potential, making their graffiti murals more aesthetically appealing and easily consumable (Bloch, 2016). In the transformation process of wall spaces during urban renewal, direct aesthetic preferences emerge through the interaction between individuals and material spaces, becoming a novel form of public engagement to offer suggestions for cultural landscape planning (Tieskens et al., 2018). As a cross-section of people encountering art in their daily lives, the public is an integral part of the streets, allowing us to catch a glimpse of the public's voice (Chang, 2019).

In summary, graffiti murals produced during urban renewal in Chinese cities have influenced the urban landscape and the public's understanding of the aesthetic of 'graffiti'. Against the backdrop of a semantic distinction from Western conceptions of 'graffiti', we seek to understand the following questions:

- What public aesthetic attitudes does the official online visual promotion using the term 'graffiti' trigger? In other words, does it align with mainstream aesthetics?
- How do the urban spatial aesthetic operational logic of graffiti murals differ from traditional graffiti?
- What urban renewal strategies can strike a balance between top-down and bottom-up artistic creations on wall spaces?

Aesthetic analysis of these urban art images can reveal how they are connected to production scenarios, urban renewal and marketing strategies. Therefore, using representative graffiti murals in Guangzhou, China, as our study subject, we aim to explore people's aesthetic attitudes toward graffiti

murals, interpret their urban aesthetic operational logic and provide insights into sustainable urban art space production and dynamic management.

GRAFFITI MURALS IN GUANGZHOU, CHINA

Since 2009, Guangzhou, as one of China's earliest pilot cities for 'Three Olds' (Old Towns, Old Factories and Old Villages) transformation, has been continuously advancing urban renewal projects in old towns, old factories and old villages to revitalize existing spaces. During this period, the creation of abandoned wall spaces provided the conditions for the emergence of graffiti murals, a form of wall art that, although officially approved, is referred to as 'graffiti'. This officially sanctioned form of wall art began to sporadically appear. After the 2011 Asian Games, Guangzhou gained international attention for its creative 'graffiti', leading the government to further develop creative cultural zones to provide space for the official development of 'graffiti' in this sense. The continuous development of graffiti murals in Guangzhou and their integration with local cultural and social elements have given rise to diverse types of landscapes. They have been strategically implanted into the spaces undergoing 'Three Olds' transformation using various approaches: in the old town areas, graffiti murals serve as expressions of urban historical and cultural identity, representing the city's history through symbols of urban branding; in the old factory areas, graffiti murals thrive in creatively designed cultural parks established after renovation and express creativity through thematic unity and bright color elements; and in the old village areas, graffiti murals become one of the means to beautify villages, offering artistic decoration to old walls as a form of artistic enhancement.

The urban landscape images in the online space create a new emerging aesthetic form that is distinct from traditional representations. They adopt concise and lifelike forms, connecting local spaces and aesthetics while documenting the aesthetic preferences of the creators to evoke empathy and resonance with the public (Langemeyer et al., 2018). Therefore, we selected representative graffiti murals in Guangzhou through the Chinese social media platform 'Xiaohongshu'. Xiaohongshu is a daily life social media platform with over 100 million users and its user base continues to grow rapidly. The number of likes on posted content is a direct indicator of its popularity. The process of obtaining research materials was as follows: (1) searching for 'Guangzhou graffiti' on Xiaohongshu, a keyword that, although labelled as 'graffiti', mostly refers to the graffiti murals mentioned earlier. We selected 15 Xiaohongshu notes with over 1,000 likes; (2) filtering out photos with inappropriate sizes, unclear details, excessive text elements, numerous people, direct eye contact, or fully covered surfaces with paintings that may affect the perception of space; and (3) further selection by experts with a background in urban and landscape planning, resulting in 26 graffiti mural photos with suitable structures chosen for visual analysis. Consent was obtained from the photographers.



Figure 1. Case area location and photos.

These photos cover five locations: old town (six photos in Beijing Road Fuxue West Street), old factory areas (two photos in B.I.G. Haizhu Bay Art Park, six photos in O2 Creative Park, six photos in Vipshop Co-creation Hub) and old village areas (six photos in Nanbeitai Village). Their geographical distribution is shown in Figure 1.

In this context, Fuxue West Street in Beijing Road is located within the historical and cultural district of the city. Seizing the opportunity of area renewal and transformation, the government invited 3D street artists to create a ‘Graffiti Street’, decorating the old streets. This artistic endeavours incorporates themes of Cantonese temple fairs, lion dances, mud sculpture and other urban intangible cultural heritage, blending them with contemporary trends. B.I.G. Haizhu Bay Art Park, O2 Creative Park and Vipshop Co-creation Hub, three cultural and creative industry parks, all underwent transformation from abandoned factories. They have evolved into art districts with a focus on creative industries. With government approval, these parks invited renowned graffiti artists to create murals, covering brick walls with vibrant graffiti murals and becoming catalysts for the creative atmosphere within the parks. Nanbeitai Village initiated efforts to enhance the aesthetic quality of the village’s appearance. They formed teams of villagers, university student volunteers and grassroots artists for mural painting, transforming relatively outdated facilities and walls in the area. These locations gained popularity on social media due to their eye-catching graffiti murals, being promoted as ‘graffiti’ in both top-down and bottom-up narratives, attracting numerous citizens to visit and take photos. We selected these representative ‘street art’ spaces in Guangzhou to conduct a survey on public aesthetic attitudes and analyse the underlying aesthetic mechanisms.

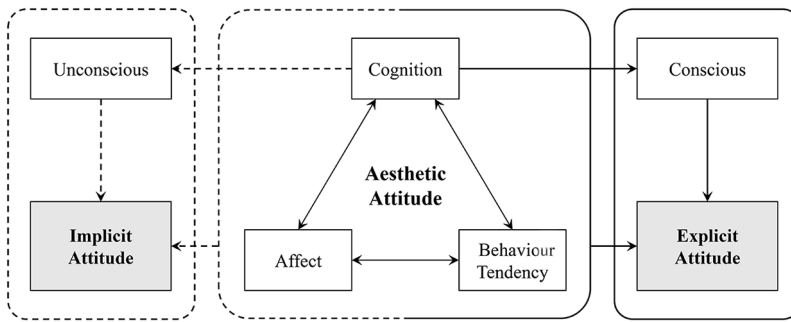


Figure 2. Analytical framework.

VISUAL METHODOLOGY

Analytical framework

Visual research methods are considered effective tools for perceptual analysis (Zhang et al., 2023) and graffiti murals, as visual elements in urban space, are suitable for exploring audience aesthetic attitudes through the visual sensory level. Before constructing visual analysis methods, we introduce the ABC attitude model from the field of social psychology, specifically, the ‘Cognition–Affect–Behaviour’ attitude model, to uncover people’s aesthetic attitudes toward graffiti murals. The proponents of the ABC attitude model, including Rosenberg and Hovland (1960), suggest that attitudes are composed of three components: Cognition, Affect and Behavioural tendency. Here, Cognition refers to the perception of the attitude object, Affect represents the feelings towards the attitude object and Behaviour signifies the behavioural intention or actual behaviour towards the attitude object. At the same time, we acknowledge the dual-process capability: controlled, conscious, explicit thinking and automatic, habitual, implicit thinking (Myers, 2002). In other words, the expression of attitudes is influenced by external factors, and utilizing both explicit and implicit attitudes together may predict behaviour more accurately than using one alone. Therefore, we adopt a dual-path approach, incorporating both explicit and implicit pathways, to capture people’s aesthetic attitudes (Figure 2).

At the explicit attitude level, the photo evaluation method, utilizing images as stimuli, can reflect respondents’ perceptions of space (Russell et al., 1981). In parallel, eye-tracking technology from the field of neuroscience objectively translates participants’ image perceptions into intuitive eye movement data for processing and analysis (Dupont et al., 2014). This technique allows for the analysis of implicit perceptions. Interviews serve as a supplementary validation for the results of these methods (Wang et al., 2024), providing additional insights into the aesthetic processing of graffiti murals. After obtaining 26 images of graffiti murals in Guangzhou as the foundational research material, we initially conducted an online survey to collect

Table 1. Visual research methods and indicator selection in the ABC attitude model.

Visual analysis methods	Cognitive dimension indicators	Affective dimension indicators	Behavioural dimension indicators
Photo evaluation	Attractiveness level	Pleasure level	Willingness to engage
Eye-tracking experiment	Cognitive load	Emotional arousal	Behavioural experience

subjective aesthetic evaluations of these murals using the photo evaluation method. Following the completion of photo evaluation, we delved into eye-tracking experiments to unearth implicit aesthetic attitudes, aiming for more accurate assessments. Interviews were then conducted to interpret the results comprehensively. For each dimension of the ABC attitude model, we selected different visual analysis indicators (Table 1). The specific principles guiding indicator selection are explained below.

Photo evaluation

The attitude generated when individuals perceive, cognise and evaluate the attractiveness of a place is referred to as aesthetic attitude (Giné et al., 2021). This process can awaken the nervous system, eliciting positive emotional expressions of pleasure in individuals (Russell and Snodgrass, 1989). This sense of pleasure can influence their motivation to visit and significantly impact their choices and recommendations to others about the destination (Carlson and Berleant, 2004). Therefore, we chose the indicators of attractiveness level (cognitive dimension), pleasure level (affective dimension) and willingness to engage (behavioural dimension) when participants viewed these pictures as the evaluation criteria for photo assessment, reflecting their aesthetic attitudes during this process. Specifically, participants were asked to view each of the 26 pictures related to graffiti murals one by one. After viewing each picture, they were instructed to rate their pleasure level, attractiveness level and willingness to engage on a 5-point Likert scale (ranging from 1 = very low to 5 = very high). The higher the participant's rating of the picture, the more evident their positive aesthetic attitude toward perceiving the graffiti murals. Through the distribution of an online questionnaire, we collected a total of 52 responses regarding the aesthetic evaluation of graffiti murals. The reliability of the scale design was confirmed through a reliability test (Cronbach's $\alpha = 0.956 > 0.6$). We statistically analysed these results to gain an explicit understanding of whether this legitimate 'graffiti' could generate positive spatial perceptions.

Eye-tracking experiment

In our study, we designed an eye-tracking experiment, recruiting participants to observe the aforementioned 26 pictures of graffiti murals. We used Tobii

Table 2. Main acquisition indicators for eye-tracking experiment.

Indicator	Content	Meaning
Fixation duration	The duration of staying at each fixation point	Longer duration indicates more cognitive effort and focused attention
Fixation rate	The ratio of fixation duration to the number of fixation points	Higher frequency indicates a greater interest in the overall image
Pupil diameter	The size of the dilatable hole on the iris of the eye	Larger variations indicate a higher level of emotional arousal

Pro Fusion eye tracker (120Hz) to collect major eye-tracking data, including fixation duration, fixation rate and pupil diameter (Table 2). By reflecting cognitive load through fixation indicators and emotional arousal through pupil indicators, we could infer the participants' cognitive and affective states while viewing the pictures (Guo et al., 2018; Kanovský et al., 2022). This formed the basis for a scientific analysis of their aesthetic experiences that were not explicitly revealed through behaviour. As there were variations in the average pupil diameter among different participants, we calculated the Z-Score of the stimulus interval pupil diameter in subsequent statistics to represent the participants' changes in pupil diameter. In terms of the behavioural dimension, we were unable to analyse their behavioural intentions towards spatial activities through eye-tracking indicators. However, we could reverse deduce this by examining eye movements driven by actual behavioural experiences. Embodied practices emphasize the interaction between the body and the environment, considering both as essential components of cognition (Ye, 2014). Thus, the cognitive process and psychological states are deeply rooted in the interaction between the body and the world (Lorimer, 2005). In this context, the on-site perception of graffiti murals brings about an embodied experience embedded in the environment. During this process, various sensory modalities, such as vision, audition and touch, collectively influence people's cognition and affects (Kock and Ringberg, 2019). People receive information from the external visual interaction, which is transmitted through the visual system, auditory system and nervous system to the brain, where it is broken down to form perception and experience (Hu and Lin, 2012). Therefore, we divided the experimental participants into two groups: those who had visited the locations and those who had not. This allowed us to observe if there were differences in aesthetic experiences between the two groups, representing aesthetic attitudes reflected in the behavioural dimension.

In March 2022, we conducted a formal eye-tracking experiment, inviting a total of 24 participants, all of whom were valid samples. The basic

Table 3. Basic information of the participants.

Information	Group	Number	%
Gender	Male	13	54
	Female	11	46
Age	18–25	24	100
Visited research locations	Yes	11	46
	No	13	54
Major	Urban and landscape planning	13	54
	Other	11	46

characteristics of the participants are shown in Table 3. To control for the potential influence of variables such as age, occupation, income and education background on the experimental results (Dupont et al., 2014), the participants were university students. University students are chosen due to their higher education levels, aesthetic appreciation needs, diverse preferences and broad aesthetic range (Gao et al., 2020). They are also a primary audience for graffiti mural appreciation. Some studies suggest that eye movements may not exhibit significant differences based on demographic attributes such as nationality or gender (Elsadek et al., 2019), but could be influenced by professional or local backgrounds (Dupont et al., 2015). Therefore, we included participants with diverse backgrounds, including those with expertise in urban and landscape planning. Among them, 11 participants had visited the locations depicted in the research images. Participants were encoded based on gender and sequence in the experiment. For example, if a participant was male and had the sequence number 1, he was labelled as M1; likewise, if a participant was female, she was labelled as F1. After collecting eye-tracking indicators, we conducted interviews to promptly inquire about participants' specific experiences with the experimental stimuli, supplementing the analysis of the data results to explore the deeper mechanisms of spatial aesthetics.

RESULTS

The public's aesthetic attitudes toward graffiti murals in urban renewal areas

Explicit attitude. From the results of the photo evaluations (Table 4), we can preliminarily assess the differences in people's aesthetic attitudes toward graffiti murals in different urban renewal areas. In terms of the degree of pleasure, B.I.G. Haizhu Bay Art Park scored the highest, while O2 Creative Park scored relatively lower but, overall, the graffiti murals in the old town renewal area still evoke the highest level of pleasure. The evaluations of attractiveness are similar to those of pleasure, while the overall score for willingness to participate is relatively lower than the former two. However, all dimensions of evaluation in Nanbeitai Village are lower than other graffiti murals, indicating that

Table 4. Statistics of photo evaluation results.

Location	Mean		
	Pleasure level	Attractiveness level	Willingness to engage
Beijing Road Fuxue West Street	3.698	3.607	3.316
B.I.G. Haizhu Bay Art Park	4.346	4.279	4.029
O2 Creative Park	3.282	3.272	3.147
Vipshop Co-creation Hub	3.814	3.721	3.429
Nanbeitai Village	3.625	3.423	3.108

the aesthetic positivity reflected in the graffiti murals of the old village renewal area is not as high as in other locations.

After conducting variance homogeneity tests, we performed ANOVA tests using SPSS software to examine differences among different types (as shown in Table 5). It is observed that people rate the attractiveness of graffiti murals in old town and old factory renewal areas higher than those in the old village, and this difference is statistically significant. In terms of willingness to participate, people show the strongest willingness in the old factory renewal area, followed by the old town renewal area with the lowest in the old village renewal area, indicating significant differences in aesthetic attitudes among the three types. However, there is no significant difference in pleasure level among the three types. In summary, there are significant differences in people's perceptions of graffiti murals in urban renewal areas, with more positive aesthetic evaluations for murals in the old town and old factory compared to the old village.

Implicit attitude. Furthermore, through eye-tracking experiments, we obtained eye movement data from participants viewing three types of graffiti murals (Table 5). The smaller values for fixation duration and pupil diameter Z-score reflect the lower attractiveness of graffiti murals in the old village renewal area, while the opposite is true for the old town. Looking at the fixation rate indicator, the graffiti murals in the old village actually increased participants' visual search frequency. After performing homogeneity of variance tests, we conducted ANOVA tests on these three sets of results (Table 5). The results show significant differences in fixation duration and pupil diameter for each image of graffiti murals in the three types of renewal areas, but there is no significant difference in the fixation rate. This reveals noticeable differences in participants' cognitive effort and emotional arousal for different types of murals, but their overall interest in graffiti murals in different renewal areas is not significantly different. In post-hoc tests of analysis of variance, participants showed a significant difference in fixation duration for graffiti murals in the old town and old village renewal areas ($p = 0.003 < 0.01$), indicating a greater aesthetic cognitive effort for the former. Regarding pupil diameter, the

Table 5. Differences in the aesthetic attitudes of different types of graffiti landscapes.

Dimension	Mean			<i>F</i>	<i>p</i>
	Old town renewal area	Old factory renewal area	Old village renewal area		
Pleasure level	3.698	3.662	3.625	0.399	0.671
Attractiveness level	3.607	3.757	3.423	3.397	0.034*
Willingness to engage	3.316	3.535	3.108	6.153	0.002**
Fixation duration (s)	10.555	9.522	8.386	4.572	0.011*
Fixation rate (pcs/s)	99.320	98.398	99.595	0.675	0.509
Pupil diameter (mm)	3.179	3.091	3.035	6.501	0.002**
Z-score of pupil diameter	0.232	-0.020	-0.184	6.501	0.002**

Notes: * $p < 0.05$, ** $p < 0.01$.

difference between the old factory and old village renewal areas is not significant, while the difference between the old town and the old factory, old village renewal areas is more pronounced ($p = 0.011 < 0.05$, $p = 0.000 < 0.001$), indicating that graffiti murals reflecting urban culture have the highest aesthetic emotional arousal.

Additionally, in our eye-tracking experiment, participants were divided into two groups: those who had visited the case site and those who had not. After conducting homogeneity of variance tests, we further compared the two groups' experimental data using ANOVA (Table 6), exploring the differences in aesthetic attitudes toward graffiti murals under the influence of embodied experiences. The results of the tests reveal significant differences between the two groups in three variables: fixation duration, fixation rate and pupil diameter. Regarding fixation duration, participants who had not visited the research site showed a greater cognitive effort towards the stimuli compared to those who had visited. Since participants who had not visited were seeing these graffiti mural images for the first time, they needed to invest more attention in observing the landscape of the images and forming perceptions of the space, requiring a longer time to develop a complete aesthetic experience. In terms of fixation rate, participants who had visited the research site demonstrated a higher level of interest in the stimuli compared to those who had not visited. As for the Z-score of pupil diameter size, the emotional arousal level for the image stimuli was greater for participants who had visited the case site. Overall, behavioural experiences in three-dimensional space are likely to enhance people's aesthetic positivity towards two-dimensional images, influencing their aesthetic attitudes toward graffiti murals.

We selected two participants, FM24 and FM6, who share similar age, gender and professional backgrounds, to compare and analyse their process of observing a graffiti mural image from FuXue West Street (Figure 3). The key difference is that FM24 had not visited the location depicted in the image,

Table 6. Differences in aesthetic attitudes toward graffiti murals induced by embodied experiences.

Dimension	Mean		<i>F</i>	<i>p</i>
	Have been to the case sites	Never been to the case sites		
Fixation duration(s)	7.411	11.265	67.943	0.000***
Fixation rate (pcs/s)	97.341	100.195	9.625	0.002**
Pupil diameter (mm)	3.207	3.007	56.914	0.000***
Z-score of pupil diameter	0.315	-0.266	56.914	0.000***

Notes: ** $p < 0.01$, *** $p < 0.001$.

while FM6 had. It is evident that, despite the potential adoption of similar observation strategies by different participants, individual experiences start to play a role in the visual observation process, as reflected in distinct pupil diameter changes, fixation durations and fixation counts among participants. Due to a lack of familiarity with the case site, FM24 spent more time and had more fixations to become acquainted with and understand the graffiti mural in the image. This difference is further highlighted in the cognitive load represented by different pupil dilations. The comparison in Figure 3 reveals that FM6 had a larger pupil diameter than FM24, and the changes in pupil size were more pronounced. Throughout the entire process, a higher proportion of observation time for FM6 was spent in a dilated pupil state, indicating a more easily awakened aesthetic emotion.

The urban aesthetic logic of graffiti murals

China's graffiti murals emerge within the context of urban renewal. Understanding the process and forms of graffiti mural production is a crucial starting point for a nuanced comprehension of urban art images and their roles in urban spaces. The reproduction of wall space through this form is intricately connected not only with city administrators, graffiti mural creators and the viewing public but also manifests in the social interactions between these entities and between subjects and spaces. These urban graffiti murals align with Lefebvre's perspective, asserting that space emerges through continuous interaction with social relations and is represented through such interactions (Lefebvre, 2000). Therefore, we apply Lefebvre's spatial triad, involving the representations of space, spaces of representation and spatial practice (Lefebvre, 1991), to the reproduction of wall space in the context of urban renewal in China. Studying the urban spatial aesthetic logic underpinning the differences in aesthetic attitudes presented earlier requires a multi-faceted contextual analysis. This involves considering not only the content, forms, styles and spatial choices of urban graffiti murals (Valjakka, 2015) but also the responses of different subjects within these spaces (Valjakka, 2016).

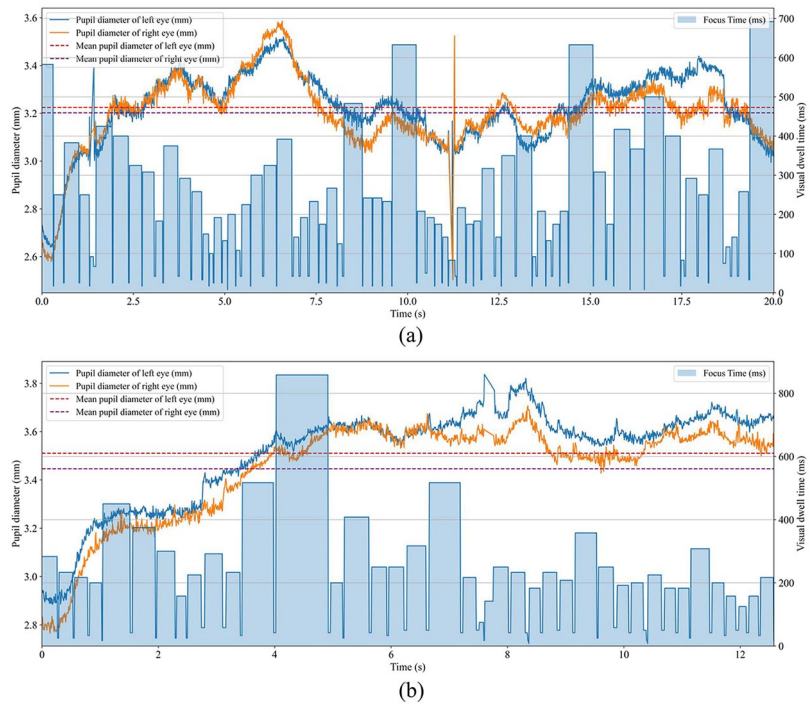


Figure 3. Pupil change and sight dwell time of participants FM24(a) and FM6(b) (dwell time >100ms is considered as gaze), taking one of the pictures of Fuxue West Street as an example.

Corresponding to the spatial triad, we present the mechanism diagram of this spatial aesthetic logic through Figure 4 and interpret it in the subsequent sections, integrating insights from interviews.

Aesthetic coherence: universality of spatial representation. Differences in the background environment and the artistic community from traditional graffiti give rise to distinctions in the types, styles, functions and meanings of urban graffiti murals in China compared to traditional graffiti. As a result, Chinese urban graffiti murals carry fewer political implications. Unlike traditional graffiti, the content and style choices in urban graffiti murals are more rooted in local subjectivity. Urban graffiti murals, in contrast, require aesthetic coherence to garner support beyond the creators, such as from graffiti and street art communities (Bloch, 2012). In other words, graffiti creators focus more on expressing attitudes within small community groups, while urban graffiti murals need cultural significance that resonates universally, evoking emotional responses from a broader scale of urban citizens. This reflects the differences in the target audience for the two forms. Aesthetic coherence, based on ‘authoritative aesthetics’, aligns with the order-oriented processes conducted by urban managers and planners. In terms of spatial representation, the government aims to embellish derelict wall spaces with symbolic, common cultural elements shared by citizens. This essentially gives

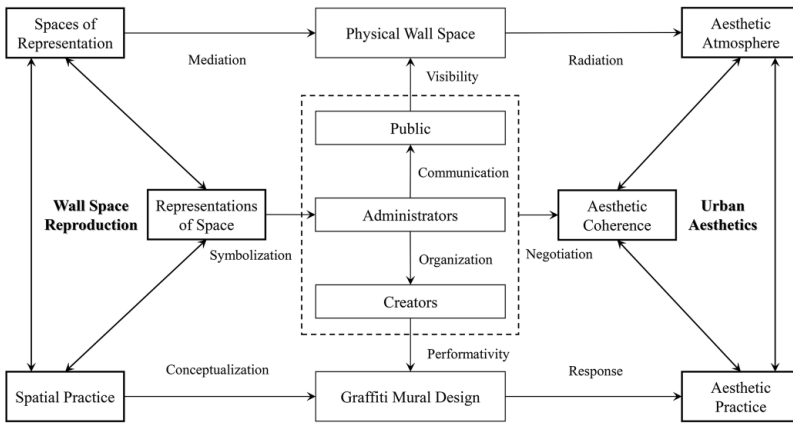


Figure 4. The spatial aesthetic operation logic of Chinese graffiti murals.

creators a thematic task to explore content that aligns with mainstream culture and lacks any anti-political connotations.

However, in our survey, the public seems to have stricter requirements for content acceptance compared to the government. For participants who viewed the three sets of images, murals in areas other than the old village renewal zone generated more positive aesthetic attitudes compared to the ‘non-narrative’ graffiti murals in the old village renewal zone. For instance, in the old factory renewal area, most graffiti murals creatively expressed a unified theme through cartoon and anime elements, making it easier to establish a coherent aesthetic experience and aligning with the creative spatial nature of the cultural and creative industry park. In contrast, the murals in Nanbeitai Village depicted independent elements in each image, lacking thematic connections to coordinate the drawing style. In terms of the cultural significance conveyed by graffiti murals, participants exhibited the highest cognitive load and richer aesthetic emotions when observing murals in Fuxue West Street, reflecting urban culture. Regardless of personal experiences of embodiment, viewers expressed more positive aesthetic emotions and spatial perception towards murals containing historical and cultural features. In their view, graffiti murals in this urban cultural category, generated through graffiti practices, imbue building façades with ever-changing social scenes and spatial narratives, facilitating the production, maintenance and continuity of local culture. For example, in the graffiti expressions on Fuxue West Street, elements such as Manchurian windows and lion dances, which are important cultural symbols in Guangzhou, are incorporated, awakening participants’ urban memories. These graffiti murals, combined with more universally understood elements, generate greater aesthetic identification compared to the other two categories.

In terms of content, other graffiti is definitely more monotonous than Fuxue West Street, because the patterns on Fuxue West Street have a

deeper meaning, allowing me to concentrate on experiencing urban culture. (Interviewee M23, 2022)

Therefore, when conceptualizing the space of walls in urban renewal, if graffiti adds value to a place and enhances community connections, it is positively regarded as a dimension of 'place brand' (Dovey et al., 2012). For the public, good street art can contribute to the cultural identity of a place and is suitable for creative communities working there (Chang, 2019). They are not just aesthetic or symbolic tools but also enable people to perceive and identify a place in different ways (Austin, 2010).

Aesthetic atmosphere: holistic nature of physical space. The content of graffiti murals is a crucial factor in making them popular in urban areas. However, people's aesthetic attitudes toward them are not only influenced by the images themselves but also by the physical space they represent. These depoliticized urban art images undergo scrutiny, limiting the forms of visual expression and their locations (Valjakka, 2016). Creating an aesthetic atmosphere that resonates with the entire neighbourhood within limited spatial media makes these murals more easily noticeable. In contrast, traditional graffiti also pay attention to the visibility of the artwork but may overlook their aesthetic radiation on a larger spatial scale.

Certainly, this factor is closely related to whether individuals have visited these spaces in person. For participants who have not been to the locations in question, the graffiti murals they see are merely presented as images in the experiment. These images have limitations and often only depict murals confined to a single building, unable to convey the broader environmental interactions. Consequently, it is more challenging to evoke positive aesthetic perceptions in these participants. Additionally, the lack of embodied experiences in the visited locations for these participants hinders their aesthetic perceptions. This absence may lead them to associate the murals with negative cognitive experiences from similar locations, resulting in a negative aesthetic emotion towards the graffiti. They are more likely to perceive the atmosphere and imagery created by these street arts as monotonous, unappealing and not necessarily interacting well with the surrounding environment:

I have previously visited some buildings with similar graffiti, they are individual structures, not a cluster of buildings, and I didn't feel the atmosphere was very good. (Interviewee FM24, 2022)

In contrast, for participants with embodied experiences in the actual environment of the case site, the aggregation of graffiti elements with the same theme in the area can effectively enhance their positive perception of the wall space. When viewing these experimental images, they automatically visualize the overall landscape of the neighbourhood or street in their minds, activating a sense of the ambient atmosphere of the entire region, which matches

their real experiences. Moreover, in the interviews, almost all participants with embodied experiences, when asked about their willingness to recommend, consistently chose to do so, and their reasons for recommending were based on their positive cognitive practices. The effective interaction between the body and space allows participants who have visited the site to have a more positive aesthetic evaluation of the graffiti murals. They not only perceive the colours and styles of the murals visually but also recall positive information generated through the interaction between their bodies and the space, thereby influencing their behavioural intentions and aesthetic emotions.

Aesthetic practice: interactions between space and subjects. Aesthetic practices in space refer to purposeful human actions and processes of creating beauty in space, manifested in interactions between individuals, and between individuals and space. In the context of traditional graffiti, the emphasis lies on the actual interactions among the site, the artwork and the creator, and the ongoing impact of this interaction on the meaning of the artwork – a visual dialogue known as ‘Site Responsiveness’ (Valjakka, 2015). In terms of interactions among subjects, the spatial aesthetics of graffiti represent a comprehensive experience that encompasses both the content and form of the artwork, and involves the creator’s creative process and interaction with the audience. Graffiti artists express personal emotions, ideas, or creativity during the creative process, imbuing graffiti with a unique artistic charm characterized by freedom, spontaneity and a challenge to traditional notions. When shifting our focus to graffiti murals in China, although these works do not originate from illegal bottom-up activities, the public does not overlook the performative power of their creative process. From our interviews, we found that the public is highly interested in how ‘graffiti’ is created. Due to the larger scale, the creation process of graffiti murals typically requires more time, and their legitimate nature allows passersby to stop and appreciate them. Therefore, viewers have more opportunities to closely observe the creation process. In the participants’ perception, this public performance aspect makes graffiti murals an open art form, allowing citizens to immerse themselves in the content of the artwork and creating an interactive aesthetic experience. Additionally, since the creative process may take some time, the public can observe the changes in the artwork at different stages. This temporal variation adds a sense of drama, allowing viewers to witness how the artwork gradually evolves and becomes refined, leading to a more profound aesthetic experience.

In terms of the interaction between individuals and space, traditional graffiti may appear in various locations, and public viewing is often passive, with people stumbling upon them by chance while passing by. In contrast, graffiti murals are typically present in public spaces as part of urban beautification projects, making them more likely to evoke active participation and dialogue from the audience, as they may become focal points in the community. The aesthetic interaction with these wall spaces also lies in the three-dimensional relationship between graffiti elements and the architectural elements presented in the images, for example, whether the windows of a building are

integrated into the graffiti and the virtual sense of three-dimensionality created by the graffiti – 3D graffiti murals often stimulate people's desire to take photos. Viewers seek the best angles and positions to capture the moment when the artwork exhibits its most striking 3D effects. This interactivity extends through platforms such as social media, where the public is willing to share photos and experiences of their interactions with these graffiti murals.

I like those 3D graffiti, they give me a sense of being there, and the photos taken are very beautiful. (Interviewee FM11, 2022)

CONCLUSIONS

Based on visual analysis methods such as photo evaluation and eye-tracking experiments, this study focuses on five cases of urban graffiti murals in Guangzhou. The experimental material consists of images of urban graffiti murals with more than 1,000 likes on Xiaohongshu, a popular social media platform. The research investigates people's visual cognitive processes and aesthetic attitudes towards these street arts widely conceptualized as 'graffiti', exploring their urban spatial aesthetic logic. The study reveals that people's emotional experiences and spatial perceptions of graffiti murals are influenced by different urban renewal strategies and whether they have had on-site experiences. Individuals tend to have more positive aesthetic perceptions of creative spaces that incorporate historical and cultural elements, and exhibit harmonious thematic colour coordination. In contrast, they hold more negative attitudes toward graffiti murals in old village renewal areas lacking cultural universality. This phenomenon is validated through eye-tracking experiment data analysis, which shows that participants exert more cognitive effort and experience higher emotional arousal when perceiving graffiti in Fuxue West Street, reflecting urban culture, compared to the less responsive graffiti landscape in Nanbeitai Village. This emphasizes the significant role of locally distinctive urban symbols in creating aesthetic coherence. Moreover, individuals who have visited these graffiti murals in person tend to be more positive in both cognitive and emotional aspects compared to those who have not. This also stimulates their willingness to recommend. The overall aesthetic atmosphere of physical spaces and the interaction between space and individuals in the field influence these aesthetic attitudes, showing slight differences from the aesthetic operational logic of authentic 'graffiti'.

The formation of graffiti murals in Chinese cities is a process shaped by the interaction of capital, institutions and social elements. Different urban development backgrounds and regional development emphases in different periods have led to graffiti landscapes dominated by different elements. Currently, the mainstream street art officially promoted as 'graffiti' has become an essential component of urban image and industrial economy. The 'graffiti' walls have established a positive visual image on the internet to enhance

visibility, attract pedestrians and revitalize economic spaces, even though they may not entirely align with mainstream public aesthetic attitudes. In contrast to the officially labelled 'graffiti', which is often part of urban image and economic strategies, what urban renewal strategies can strike a balance between top-down and bottom-up artistic creation for wall spaces? In fact, the evolution of graffiti from illegal items to street art implies that urban planners cannot blindly follow what other places have done under different historical and cultural trajectories (Chang, 2019; Cresswell, 1996). With the rise of 'legal graffiti' in the urban renewal process in Chinese cities, urban managers and planners must allow and design street art content and participation in a way that aligns with local street culture, meeting the needs of artists, communities and the public. From the perspective of aesthetic coherence, graffiti mural content should differ from the free-spirited and politically charged nature of traditional graffiti. Instead, it should fully consider the construction of local significance, emphasizing the integration of drawing content with local culture and citizen memories. In terms of aesthetic atmosphere, rational layout of various elements within the radiation range of wall spaces should be considered in order to create a consistent regional environmental ambiance. This ensures that graffiti murals blend into the urban environment, enhancing the overall attractiveness of the landscape to people. Regarding aesthetic practice, communication and negotiation among different urban stakeholders contribute to unleashing the performative power of graffiti murals. Viewing the creative process of graffiti as part of urban beautification and fostering interactive graffiti content can create a more inclusive and creative urban space where citizens can meet each other, live and work.

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DATA AVAILABILITY STATEMENT

Data will be made available on request.

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