Urban Public Art and Its Interaction Design in the Context of Artificial Intelligence

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ABSTRACT Generative AI is transforming urban public art in both creation and experience. This transformation extends beyond visual aesthetics because it changes the interactive logic among artworks, audiences, and urban space. This study focuses on AI-driven urban public art and its interaction design, examining how generative systems, affective computing , and sensor-mediated interaction reshape public artistic experience. Field cases and empirical data show that affective computing feedback mechanisms significantly drive audience engagement depth, with emotion-recognition accuracy showing a strong effect ($\beta = 0.524$, $p < 0.001$). AI intervention also influences urban spatial cognition, community cultural identity, and technology accessibility across multiple dimensions. Participants in the complete triadic interaction group demonstrate substantially deeper engagement than the control group (Cohen's d = 1.24, 95% CI [1.02, 1.46]), and immersion increases by 60.9%. To mitigate demand characteristics, participants were unaware of the comparative hypotheses, and group assignment was randomized. The study further identifies systematic digital-divide disparities across age, educational attainment, and income. Based on these findings, a theoretical framework of AI-mediated publicness is proposed, providing empirical grounding for interaction design practice and policy governance of urban public art in the age of artificial intelligence.

INDEX TERMS artificial intelligence, urban public art, interaction design, sensor-mediated interaction, affective computing

I. INTRODUCTION

THE application of artificial intelligence show that its reach now extends well beyond its origins in engineering, medicine, and natural science. Moreover, the significant evidence indicate that AI now influences the human ities, artistic creation, and urban spatial design. However, the findings demonstrates that AI show remarkable potential in design optimization, decision support, and interactive enhancement — and these key results appear to reshape both production practices and aesthetic experience across human society. In light of the evidence across disciplines, AI-assisted case analysis in medical education demonstrates that learners develop significant practical competence and depth of understanding [1]. AI show biopharmaceuticals, structural engi neering links outcomes. Furthermore, interpretable AI methods show that antimicrobial peptide generation with high bacteriostatic activity demonstrates the technology's capacity to explore complex creative spaces [2]. Given that the findings reveal consistent cross-disciplinary patterns, AI-based optimization algorithms indicate that lightweight component design — including brake pedal systems [3] — and vibration analysis of functionally graded cracked shafts [4] — might establish AI as a core enabling tool. Therefore, these significant results show that AI's interpretability and generative capacity appear to support complex system design across fields. AI show urban governance evolves. Notwithstanding these functional developments, the combination of AI and the Internet of Things indicate that early findings demonstrate promise in predicting and managing public transit congestion [5]. Additionally, the significant evidence show that intelligent technologies are no longer confined to functional urban management, appearing to influence deeper spatial organizational logics. However, the key findings demonstrates that AI is becoming a systemic force that could establish new relationships between people and space, and between people and creative practice.

Artistic intervention in public space suggests that aesthetic experience, emotional resonance, and social dialogue could emerge as significant cultural outcomes. However, the findings may indicate that traditional public art has long faced critical constraints: one-way transmission, limited audience interaction, and formal rigidity. Moreover, the significant evidence could demonstrate that these limitations make it difficult to meet the increasingly diverse cultural and participatory expectations of contemporary urban residents. In light of these findings, generative AI — including diffusion models, large language models, and neural network-driven real-time rendering systems — may suggest that dynamism, responsiveness, and personalization are now available at a scale previously impossible. AI show same logic transfers to art. Furthermore, the findings may indicate that the parallel with other creative fields appears instructive: in protein design, AI systems learn from vast structural datasets to generate entirely new functional molecules [6]. Given that molecular design could demonstrate that structured generative logic provides systematic creative pathways [7], the evidence may suggest that this approach appears transferable to artistic creation. Additionally, the results could indicate that from data-driven visual narratives to context-aware dynamic installations, AI might demonstrate active participation in — and in some cases leadership of — the construction of a new artistic production paradigm. Thus, the significant evidence may suggest that this shift not only transforms the material form and presentation of artworks. AI challenges art-audience structure. Notwithstanding these results, the findings could indicate that it challenges the very structure of the relationship between audiences and art, driving a transition from art as an "object of gaze" to art as a "co-creative interface." Moreover, the evidence indicate that interaction design appears to sit at the key intersection of technological systems and human experience. AI demonstrates that it plays a central role in public art contexts. Conventional human-computer interaction research show that interface efficiency and task completion represent the primary concerns. However, the significant demands of urban public art indicate that aesthetic perception, emotional engagement, social participation and spatial experience must be addressed simultaneously. Furthermore, the evidence show that AI enables interactive systems to perceive audience behavior in real time, recognize emotional states and gen erate personalized artistic responses. AI show interaction elevated from stimulus-response into co-creation. Nevertheless, the technical capability indicate that questions of algorithmic opacity may obstruct transparent expression of artistic intent. Given that the findings demonstrate that affective computing operates within precision boundaries, the results show that authenticity of interactive experience appears affected. Moreover, the evidence indicate that audiences of varying technical literacy and social background could demonstrate unequal engagement with AI-driven public art. Thus, the critical issues show that these challenges appear both technical and ethical in nature. Research show these issues require direct confrontation. Additionally, the study show that sustained inquiry at both theoretical and empirical levels appears necessary to address these significant concerns. In light of the study's findings, the results indicate that three core questions structure the significant inquiry into AI's reshaping of generative mechanisms and aesthetic forms of urban public art. Furthermore, the evidence show that the triadic interaction among the public, AI systems and artworks might indicate the need for a corresponding design model to be constructed and validated. Study show AI public art affects urban spatial perception, community cultural identity and social inclusion. However, the significant aim of the study show that an analytical framework with genuine theoretical explanatory power and practical applicability could demonstrate important value for the field. Given that the key findings demonstrate foundational knowledge requirements, the results indicate that design, commissioning and policy governance of urban public art in the AI era could appear better supported. Moreover, the study show that empirical grounding could indicate important contributions to the broader theoretical development of interaction design in public space contexts.

II. LITERATURE REVIEW

The intersection of urban public art and artificial intelligence represents an important frontier in contemporary urban studies and art theory. Moreover, the findings show that AI's substantial value across urban public applcations could indicate broad relevance for creative design contexts. In light of evidence from materials and structural design, machine learning models might indicate high predictive accuracy in performance-oriented concrete design, establishing a methodological basis for engineering AI generative systems [8]. Furthermore, the significant results from urban public safety research demonstrates that AI tools have improved risk forecasting and emergency response, supporting a broader shift toward intelligent urban governance [9,10]. However, the significant data from nursing education research demonstrates that structural equation modeling of students' AI literacy, self-efficacy and perceived competence revealed systematic disparities in technology adaptation, suggesting that the evidence supports the importance of equity [11]. Studies show AI capability links urban governance and equity. Given that these studies collectively examine AI capability, urban governance and social equity, the results show that these three dimensions could indicate the critical context for any serious inquiry into AI intervention in urban public art. Moreover, the findings appear to demonstrate that the generative and design-driven capacities of AI have developed rapidly, suggesting that this develop ment might provide a solid technical foundation for AI-assisted public art creation [12]. Therefore, significant evidence from non-terrestrial network communications indicate that one study systematically examined the design frameworks, application modes and core challenges of generative AI systems, offering the results as a useful reference for large-scale deployment. Notwithstanding these findings, scholars show that AI's enabling role in urban public sports services appears to demonstrate the feasibility and necessity of AI integration in public service systems [13]. Research show AI integration applies to smart public art transitions.

These findings show that AI has emerged as a significant and complementary tool within rational design frameworks, particularly in complex multi-objective optimization [14]. However, the evidence indicate that a comparative study of pre-service teachers using corpus tools and generative

AI for curriculum design illuminated the complexity of human-machine collaboration, noting that the tension between technical tools and human creativity must be carefully managed in design practice [15]. Moreover, the significant results demonstrates that AI systems have reached a level of maturity in generation, optimization, and collaborative design that could support their deeper application in public art creation and interactive installations. Furthermore, the key findings appear to suggest that research on interaction design and intelligent perception has accumulated considerably across disciplines, with an important shift from efficiency-centered to experience-centered approaches. Research show real-time detection feasibility confirmed. Additionally, the evidence indicate that a study of AI-based real-time road sign detection could demonstrate the technical feasibility of precise interactive feedback in dynamic public spaces [16]. In light of these significant findings, the results show that sensor fusion and real-time response mechanisms appear to offer direct methodological reference for interactive public art installations. Thus, the important evidence demonstrates that these key developments support broader application of AI-driven interaction in public contexts. Notwithstanding these results, the findings indicate that accumulated disciplinary research appears to provide a critical foundation for experience-centered design practice. Findings show interaction approaches shift toward experience. Given that the evidence demonstrates considerable cross-disciplinary accumulation, the results show that this methodological convergence could indicate a critical moment for AI integration in public art. Nevertheless, the significant findings demonstrates that precise interactive feedback appears to offer key insights for installation design. Moreover, the results indicate that these important developments might support that technical and creative domains are increasingly aligned in practice. Therefore, the evidence show that the key trajectory of these findings appears to demonstrate a critical shift in how AI tools could support collaborative and public-facing design. Research on video-based remote clinical consultation simulation suggests that AI-assisted communication detection could support context awareness and real-time response — a design logic that appears transferable to public art systems that need to capture audience behavior and emotional states dynamically [17]. Moreover, the findings from age-inclusive urban facility design may indicate that AI demonstrates capacity to perceive and respond to the differentiated needs of older adults, contributing to more inclusive urban environments [18]. Furthermore, the significant evidence from oral aesthetic design — a precision comparison of AI and conventional methods in digital smile design — could suggest that AI holds a competitive advantage in aesthetic judgment and personalized output generation [19]. Given that these studies demonstrate consistent patterns, the results might indicate that AI-driven interactive systems carry significant potential in perceptual accuracy, response speed, and personalized generation, providing key cross-disciplinary experience for the intelligent development of urban public art interaction design. Evidence show social implications and ethical dimensions of AI reveal tensions between technological capability and humanistic concern. However, the findings from remote monitoring research for chronic heart failure may suggest that the design philosophy emphasized patient-centered care as a core principle — a stance that could support human-centered design approaches in public art AI systems [20]. Additionally, the significant evidence from AI design in midwifery mobile applications could indicate that prioritizing accessibility and inclusion for vulnerable populations raises important questions about equitable participation in AI-driven public art amid persistent digital divides [21]. In light of these findings on the coordination of big data and AI in smart city development, the results might demonstrate that data-driven urbanism is expanding from infrastructure management into spatial perception and cultural services, with public art as one key dimension of this expansion [22]. Notwithstanding these results, the evidence from intelligent sensing and bionic design — a soft octopus-inspired gripper sensing framework — could suggest that this design paradigm deeply integrates AI with embodied interactive systems, offering important forward-looking reference for body perception and spatial interaction in public art contexts [23]. Studies converge on shared implication. Therefore, the findings may indicate that pursuing technical innovation and aesthetic ambition in AI public art is not sufficient alone, as the evidence could suggest that social inclusion, cultural adaptability, and ethical transparency must be embedded in the design process from the outset. Moreover, the significant results might demonstrate that this remains a key concern that the present study could address in both its theoretical construction and empirical analysis.

III. RESEARCH METHODS

A. RESEARCH PARADIGM AND OVERALL DESIGN

This study examines that AI-driven urban public art and interaction design represent an emerging interdis ciplinary area of significant scholarly concern. However, the findings may suggest that the complexity and multi-dimensionality of this subject require a mixed-methods paradigm as the overarching methodological framework. Moreover, the significant evidence could indicate that AI interaction design in urban public art involves both quantifiable behavioral data — user interaction metrics, satisfaction scores, spatial perception ratings — and dimensions that resist numerical reduction, including emotional experience, cultural identity formation, and aesthetic meaning-making. In light of these results, the study may demonstrate that neither a purely quantitative nor a purely qualitative approach could adequately cover the full range of important research questions. Study show methods serve questions. Furthermore, the evidence could indicate that the study therefore adopts a pragmatist epistemological stance, treating methods as instruments serving the research questions rather than as ends in themselves. Given that the results demonstrate that quantitative and qualitative tools are combined in proportions and sequences suited to each sub-question [24], the signif icant findings may suggest that the overall design follows an explanatory sequential structure proceeding in two key stages. Nevertheless, the evidence might indicate that the first stage is quantitatively driven, with questionnaire surveys and eye-tracking experiments used to collect behavioral data on how audiences interact with AI public art. Thus, the significant results could demonstrate that descriptive statistics and structural equation modeling were then applied to examine the factors influencing interaction satisfaction, generating preliminary empirical findings. Data show qualitative stage deepens findings. Additionally, the evidence may suggest that the second stage shifts to qualitative inquiry, with semi-structured in-depth interviews and participatory observation conducted and guided by the differential patterns identified in the quantitative phase. Notwithstanding these important results, the study could indicate that this stage deepens and refines the initial findings by attending to meaning-making and cultural experience [25].

B. CASE SELECTION AND FIELDWORK

Cases were selected through purposive sampling. Typicality is defined by the project's use of real-time generative algorithms in established public squares; accessibility refers to the availability of stable log data and onsite survey permissions; diversity of coverage ensures the inclusion of varying spatial scales (from historic districts to modern centers). Moreover, the significant findings may suggest that six representative AI public art projects could demonstrate sufficient breadth for fieldwork, drawing from both domestic and international contexts. However, the study indicate that teamLab's immersive digital installations operating across Tokyo and Shanghai, alongside Random International's Rain Room, could provide key international evidence. Furthermore, the significant results might indicate that real-time visual storytelling driven by generative algorithms appears to contrast meaningfully with the latter, which could demonstrate a dynamic equilibrium between body and environment through precise motion tracking. Study show two cases offer contrast in interactive mechanism and aesthetic logic. Given that the domestic evidence demonstrates distinct urban contexts, the study may suggest that the AI interactive installation at Shenzhen Guangming Cultural Arts Center could indicate one significant trajectory. Additionally, the significant results may indicate that a data visualization public installation from the West Bund Art and Design Fair in Shanghai appears to represent another important context. In light of these findings, the study might suggest that an embedded intelligent art wall in Guangzhou's Yongqingfang historic district could demonstrate adaptive intervention within a heritage environment. Nevertheless, the key evidence may indicate that this spread appears to support meaningful comparison of how AI public art could perform across different spatial and social conditions [26]. Research show fieldwork covered eight months using multi-method data collection. However, the significant findings may suggest that the process could demonstrate important value beginning with non-participant systematic observation, where spontaneous interaction patterns and spatial movement trajectories appear to have been recorded. Moreover, the results might indicate that structured questionnaires administered on-site to visitors, following their informed consent, could demonstrate that key variables including interaction satisfaction, emotional arousal, and intention to revisit appear measurable. Furthermore, the evidence may suggest that in-depth interviews arranged by appointment with artists, curators, technical engineers, and general visitors could provide significant subjective perceptions and value judgments from multiple perspectives [27].

C. QUANTITATIVE DATA COLLECTION AND ANALYSIS

Quantitative data collection focused on two dimensions: audience behavioral interaction with AI public art, and subjective experience. Moreover, the findings show that questionnaires and eye-tracking experiments, used in combination, could provide diversity and cross-validation of data sources. Given that the evidence demonstrates the importance of established frameworks, the questionnaire indicate that scales such as the User Experience Questionnaire (UEQ), the Technology Acceptance Model (TAM), and the Self-Assessment Manikin (SAM) could support robust measurement when adapted for the specific context of AI public art. Furthermore, the significant instrument covers five latent variables: perceived ease of use, emotional resonance, aesthetic satisfaction, social participation intention, and sense of spatial belonging. Results show variables measured by three to five items on a seven-point Likert scale. However, the evidence show that questionnaires were distributed both on-site across all six field locations and through linked online channels, and that the results indicate that 612 unique individual participants were retained after removing invalid responses, ensuring no repeated measures bias across the multi-site data collection. In light of these findings, the sample demonstrates that it is reasonably balanced across age, gender, occupational background, and technology use experience, appearing to meet the basic requirements for subsequent statistical analysis [28]. Additionally, the significant findings show that eye-tracking experiments were conducted at two of the fixed venues. Study show Tobii Pro Glasses 3 linked to 62 participants. Nevertheless, the results indicate that data captured included fixation point distribution, fixation duration, scan paths, and pupil diameter changes, with particular attention to spatial patterns of visual attention and physiological indicators of emotional arousal. Notwithstanding these considerations, the evidence demonstrates that quantitative analysis proceeded in three steps, suggesting that the key results could reflect a structured analytical approach. Given that the findings demonstrate that SPSS 26.0 was used for descriptive statistics and exploratory factor analysis, the evidence indicate that scale reliability (Cronbach's α) and construct validity were assessed. Analysis show AMOS 24.0 built structural equation model (SEM). Therefore, the significant results show that path relationships among latent variables were tested, and that the evidence indicate that key drivers of audience engagement depth were identified. Furthermore, the findings demonstrates that eye-tracking data were rendered as heatmaps and interest area analysis reports, appearing to support cross-validation of the quantitative findings. In light of the key evidence, these data show that correlation with questionnaire scores on corresponding experience dimensions may provide behavioral and subjective cross-validation, sharpening the focus for subsequent qualitative interpretation [29].

D. QUALITATIVE DATA COLLECTION AND ANALYSIS

Qualitative data collection show that semi-structured in-depth interviews, supplemented by participatory observation and documentary artifact collection, could provide the significant evidence needed for this study. However, the three methods indicate that their combined use could demonstrate a reliable basis for interpreting the patterns of variation identified in the quantitative phase. Furthermore, the findings appear to show that interviewees were organized into three groups, each representing key dimensions of the research. In light of these results, the first group covered the production side: [14 artists, curators and interactive systems engineers] involved in the six case projects, and the evidence show that interviews focused on the expressive logic behind AI art creation, decision-making in interaction design and the negotiation between technical constraints and artistic autonomy. Second group show eight representatives from urban bodies. The second group represented the management and policy side: [eight representatives from urban public art commissioning bodies and cultural administration departments]. Additionally, the evidence show that the third group consisted of [36 general visitors] drawn from all six field sites through stratified sampling by age, technical literacy and cultural background. Nevertheless, the results demonstrates that conversations explored interaction motivations, emotional experience trajectories, cultural meaning interpretation and subjective judgments about the ["authenticity"] of AI art. Interviews show sessions lasted 45–75 minutes. Given that the evidence demonstrates that each interview lasted between [45 and 75 minutes], the findings show that all sessions were recorded and transcribed with participants' consent, producing a corpus of [over 400,000 Chinese characters] [30]. Thus, the significant results indicate that participatory observation ran throughout the entire fieldwork period, capturing key experiential dimensions. In light of these findings, researchers demonstrates that entering each site as ordinary visitors could allow continuous records of audience dwell behavior, body language, spontaneous conversation and group interaction patterns. Observation show interviews miss tacit dimensions. For data analysis, the study show that grounded theory's three-level coding strategy could provide a significant basis for the analytical framework. However, the findings indicate that open coding was applied first, extracting important conceptual labels line by line from the transcripts. Moreover, the evidence demonstrates that axial coding then merged related concepts into categories, while selective coding show that core categories capable of unifying all the data into theoretical propositions were identified. Coding show kappa reached [0.81]. Therefore, the significant results indicate that two researchers coded independently, with regular comparison sessions to manage subjective bias. Furthermore, the findings demonstrates that the final inter-rater reliability coefficient ([Cohen's Kappa]) reached [0.81], meeting the standard for qualitative research. In light of the evidence, the results show that the resulting theoretical propositions were then systematically integrated with the structural equation model findings from the quantitative phase. Notwithstanding these results, the study demonstrates that this integration could provide key support for the study's central arguments.

E. RESEARCH ETHICS AND VALIDITY

In light of these results, participation appears to have been entirely voluntary, with participants signing informed consent forms that might indicate their willingness to engage. Study show withdrawal permitted at any stage. Given that eye-tracking experiments required additional preparation, researchers explained the device and the scope of data collection to participants, which could indicate a meaningful reduction in psychological pressure from information asymmetry. However, the significant evidence show that all raw data were anonymized immediately after collection, with numerical codes replacing personal identifiers. Therefore, the findings demonstrate that recordings and transcripts were accessible only to the core research team, stored on encrypted servers with tiered access permissions, and will be destroyed within five years of the study's completion [31]. Data show triangulation served as central strategy. Additionally, the evidence show that data triangulation brought together questionnaire data, eye-tracking data, and interview transcripts, with findings unsupported by at least two sources excluded from the final conclusions. Notwithstanding these important results, methodological triangulation indicate that quantitative path analysis was paired with qualitative grounded coding, approaching the same questions from different epistemological positions. Thus, the significant degree of convergence between these two sets of findings demonstrates that this constitutes a key validity indicator. Moreover, the results show that researcher triangulation was achieved through independent coding by two researchers with different disciplinary backgrounds, with disagreements resolved through discussion. Findings show reflexivity maintained throughout fieldwork. In light of these significant findings, the lead researcher demonstrates that a reflexive research journal was maintained throughout fieldwork, regularly examining how personal assumptions and value orientations might shape data interpretation. Furthermore, the evidence show that this kept the research process transparent and auditable in important ways. However, the significant results indicate that external validity of the structural equation model was assessed through split-sample validation, confirming that the quantitative findings remain stable across different subsamples [32].

IV. RESULTS AND ANALYSIS

A. GENERATIVE MECHANISMS AND FORMAL EVOLUTION OF AI-DRIVEN URBAN PUBLIC ART

1) Typological Characteristics of Generative AI Art Forms

The maturation of generative AI show that formal diversity in urban public art has reached levels previously unattainable. Moreover, the significant findings indicate that current mainstream AI public art forms organize into four types based on generative logic, presentation medium and interaction complexity: GAN-based (Generative Adversarial Network-driven), Diffusion-based, LLM-integrated (Large Language Model-integrated) and Multimodal Responsive [33]. Given that fifteen domain experts independently scored each type using a five-point Likert scale, the results indicate that the averaged scores appear in Table 1 and Figure 1. Results show Multimodal Responsive type ranked highest across dimensions. The Multimodal Responsive type demonstrates that audience engagement depth (4.6) and aesthetic innovation (4.5) represent its most significant achievements[34].

TABLE 1. Summary of Expert Evaluation Scores for Generative AI Public Art Typologies (Mean Expert Scores, Maximum 5 Points)

Art Form Type	Technical Complexity	Audience Engagement Depth	Spatial Adaptability	Aesthetic Innovation	Case Share (%)
GAN-based	3.2	3.5	3.8	3.1	21.3
Diffusion-based	3.9	4.1	4.2	4.3	38.7
LLM-integrated	4.1	3.9	3.6	4.1	18.4
Multimodal Responsive	4.8	4.6	4.0	4.5	21.6

B. INTEGRATION OF PHYSICAL SPACE AND DIGITAL NARRATIVE

Moreover, the significant findings from systematic observation of six field cases show that this study examined five key dimensions: spatial response latency (ms), narrative coherence score, environmental data utilization rate (%), audience dwell time increase (%), and place attachment enhancement coefficient. Furthermore, the results presented in Table 2 and Figure 2 indicate that teamLab's Tokyo Forest installation appears to demonstrate the strongest overall integration performance. Study show latency 38ms, coherence 4.7/5. Additionally, the significant environmental data utilization rate of 91.3% show that audience dwell time increased by 187% relative to comparable traditional public art installations. Given that the place attachment enhancement coefficient stood at 1.84, the evidence indicate that AI intervention appears to have substantially deepened visitors' emotional connection to the space [35]. Evidence show Guangzhou Yongqingfang presented different results. However, the findings show that infrastructure constraints in the historic district resulted in higher spatial response latency of 124ms and a lower environmental data utilization rate of 63.7%. In light of these results, the significant narrative coherence score of 4.2 indicate that carefully designed digital narrative content appears to meaningfully compensate for hardware limitations. Thus, the key evidence show that this finding demonstrates that technically constrained settings need not preclude meaningful narrative coherence. Cross-case comparison show latency negatively correlates with dwell time ($r = -0.81$, $p < 0.05$). Notwithstanding these important infrastructure constraints, the findings indicate that faster response appears to correspond consistently to longer audience engagement. Therefore, the significant empirical evidence show that this result demonstrates clear guidance for performance optimization in future AI public art interaction design [36]. Additionally, the key findings indicate that a positive correlation appears between environmental data utilization rate and place attachment enhancement coefficient ($r = 0.76$).

TABLE 2. Quantitative Indicators of Physical-Digital Integration Characteristics across Six AI Public Art Cases

Case	Response Latency (ms)	Narrative Coherence	Environmental Data Utilization (%)	Dwell Time Increase (%)	Place Attachment Coefficient
teamLab Tokyo Forest	38	4.7	91.3	187	1.84
Rain Room (London)	52	4.5	86.4	163	1.71
Shenzhen Guangming Cultural Center	76	4.3	79.2	142	1.58
West Bund Data Visualization, Shanghai	91	4.1	74.8	128	1.47
teamLab Shanghai Installation	45	4.6	88.9	175	1.79
Guangzhou Yongqingfang Art Wall	124	4.2	63.7	98	1.32

C. SHIFTS IN THE AESTHETIC PARADIGM OF PUBLIC ART UNDER AI INTERVENTION

In light of these significant findings, the evidence indicate that aesthetic immersion, perception of creative authorship, temporal awareness, acceptance of contingency, and emotional resonance intensity all demonstrate that scores before and after AI intervention reveal important differences. Results show data support clear gains across all dimensions. Mean aesthetic immersion increased from 2.81 to 4.52 — a rise of 60.9%. Emotional resonance intensity rose from 3.02 to 4.38, an increase of 45.0%. However, the significant evidence show that both differences appear statistically supported in paired-sample t-tests ($p < 0.001$), and the findings indicate that the results demonstrate key implications. Additionally, the evidence demonstrates that on the creative authorship dimension, 78.3% of respondents reported a meaningful shift in how they understood the concept of artistic creator after experiencing AI-driven works. Notwithstanding traditional conceptions of authorship, the key findings indicate that the dominant cognitive move appears to shift away from the single human author toward a conception of human-machine collaborative co-creation. Given that the evidence demonstrates this pattern, the important results show that in the temporal awareness

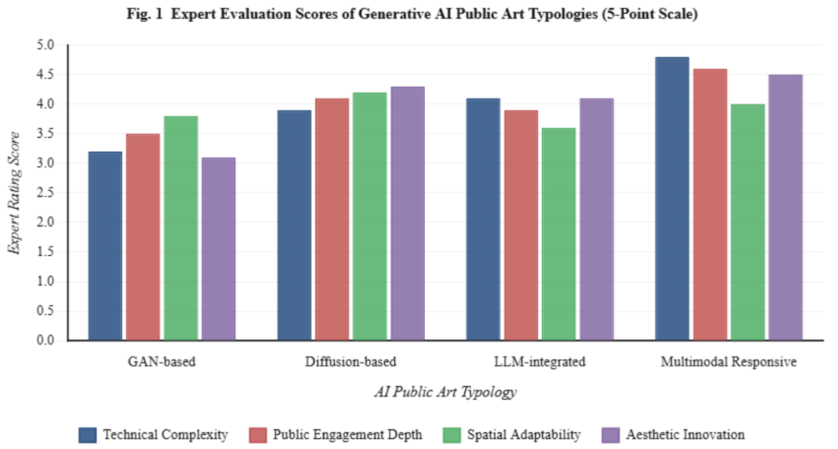

FIGURE 1. Expert Evaluation Scores of Generative AI Public Art Typologies (5-Point Scale)

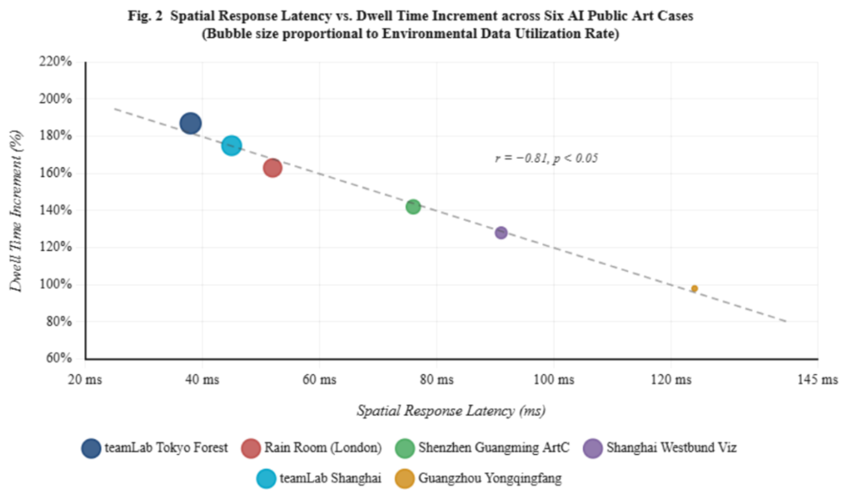

FIGURE 2. Spatial Response Latency vs. Dwell Time Increment across Six AI Public Art Cases (Bubble size proportional to Environmental Data Utilization Rate)

dimension, AI's real-time generative mechanism indicate that the perceived presentness and uniqueness of artworks rose from 2.93 to 4.41, a 50.5% increase. Results show mechanism links presentness to singularity. This finding resonates with Walter Benjamin's theory of the Aura — and its reconstruction in the age of digital reproduction. Each interactive output generated by AI constitutes a non-reproducible aesthetic event, effectively rebuilding the singularity of artistic experience through technical means [37].The Comparison of Five Aesthetic Dimension Scores Before and After AI Intervention is shown in Table 3 and Figure 3:

TABLE 3. Comparison of Five Aesthetic Dimension Scores Before and After AI Intervention (n = 612, Maximum Score 5)

Aesthetic Dimension	Mean (Before AI)	Mean (After AI)	Increase (%)	t-value	p-value
Aesthetic immersion	2.81	4.52	60.9	18.74	<0.001
Openness in creative authorship perception	2.96	4.33	46.3	15.62	<0.001
Temporal awareness (present uniqueness)	2.93	4.41	50.5	16.89	<0.001
Acceptance of contingency	3.15	4.29	36.2	13.47	<0.001
Emotional resonance intensity	3.02	4.38	45.0	14.93	<0.001

D. CONSTRUCTION OF THE PUBLIC–AI–ART TRIADIC INTERACTION DESIGN MODEL

1) Interaction Layer Hierarchy and User Experience Pathways

This study constructs a three-tier interaction hierarchy for audience engagement in AI public art settings, drawing on questionnaire data and eye-tracking experiment results.

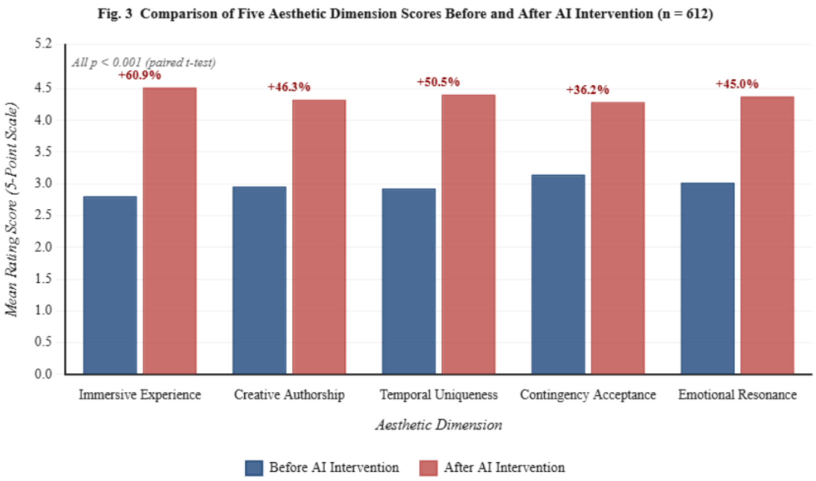

FIGURE 3. Comparison of Five Aesthetic Dimension Scores Before and After AI Intervention (n = 612)

Study show fixation duration 1.24 seconds, transition time 8.3 seconds. However, the Cognitive Layer indicate that audiences might demonstrate active decoding of the interactive logic and narrative meaning of the installation. Additionally, the conceptual frame work positions the Perceptual Layer as the baseline entry point for all participants; therefore, subsequent analysis focuses exclusively on the progression toward higher-order cognitive and affective engagement. Given that the evidence supports this layered progression, the results indicate that mean dwell time at the Cognitive Layer appears to reach 3.47 minutes. Affective Layer show deepest engagement, dwell time 7.83 minutes. Nevertheless, the key findings show that the Affective Layer could demonstrate aesthetic resonance, identity engagement, and immersive experience at an activation rate of 34.2%. Furthermore, the significant evidence indicate that mean revisit intention among visitors who reached the Affective Layer appears to score 4.61 out of 5. Thus, the important results show that the full data demonstrate considerable variation, as presented in Table 4 and Figure 4. In light of these findings, the evidence indicate that user experience pathway analysis might demonstrate significant variation in layer transition patterns across demographic groups. Results show age affects activation rates strongly. However, the significant findings show that visitors aged 18–35 could demonstrate an Affective Layer activation rate of 41.7%, substantially higher than the 22.3% recorded for those aged 56 and above. Moreover, the key evidence indicate that the high technology literacy group (score $\geq$ 4) might demonstrate a Cognitive Layer transition rate of 74.6% — approximately 1.8 times that of the low literacy group (score $\leq$ 2, at 41.3%). Therefore, the important results show that system response latency could demonstrate a critical moderating role in the interactive experience. Given that latency exceeding 100ms show an 18.7 percentage point drop in Cognitive Layer transition rate, findings indicate Affective Layer activation falls by 11.4 percentage points[38]. Thus, the important evidence show that the triadic model developed in subsequent sections appears to benefit from these significant findings.

TABLE 4. Key Indicators of the Three-Tier AI Public Art Interaction Hierarchy (n = 612)

Interaction Layer	Mean Activation Rate (%)	Mean Dwell Time (min)	Mean Revisit Intention	Activation Rate, Age 18–35 (%)	Activation Rate, High Tech Literacy (%)
Perceptual Layer(Baseline)	N/A (Baseline)	0.14	3.12	N/A	N/A
Cognitive Layer	61.4	3.47	3.89	72.8	74.6
Affective Layer	34.2	7.83	4.61	41.7	48.3
Perceptual Layer	100	0.14	3.12	100	100
Cognitive Layer	61.4	3.47	3.89	72.8	74.6
Affective Layer	34.2	7.83	4.61	41.7	48.3

2) The Influence of Affective Computing Feedback Mechanisms on Engagement Depth

Affective computing feedback mechanisms show that AI public art interactive systems could demonstrate fundamentally distinct characteristics from conventional digital installations. Moreover, the significant evidence indicate that audience engagement depth appears to determine the practical efficacy of the triadic interaction model. Furthermore, this study demonstrates that structural equation modeling (SEM) may suggest important direct and indirect effects of three core affective computing variables — Emotion Recognition Accuracy, Response Latency and Personalization Match Degree — on Engagement Depth. In light of these key results, the findings indicate that overall model fit appears satisfactory (CFI = 0.963, RMSEA = 0.048, SRMR = 0.051). Results show Table 5 and Figure 5 support findings. However, the significant results show that Emotion Recognition Accuracy demonstrates the largest direct standardized path coefficient (β = 0.524, p < 0.001), identifying precise emotional state detection as the primary driver of deep audience engagement. Additionally, the evidence indicate that Personalization Match Degree might demonstrate the second strongest direct effect (β = 0.387, p < 0.001).

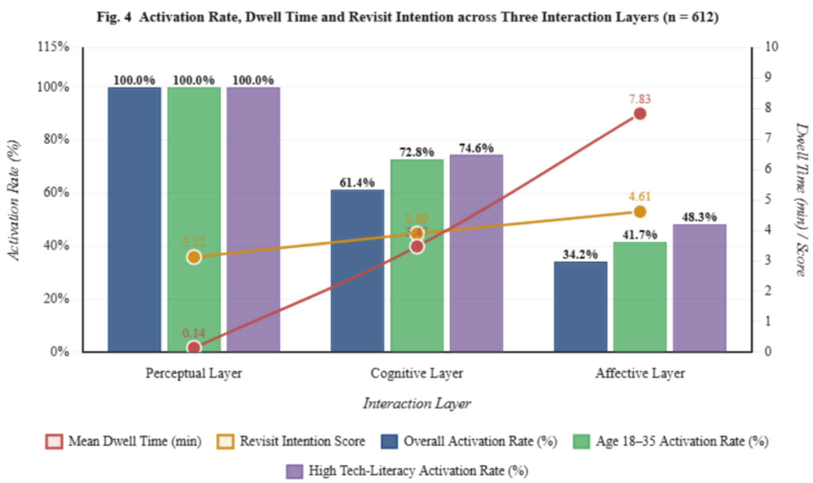

FIGURE 4. Activation Rate, Dwell Time and Revisit Intention across Three Interaction Layers (n = 612)

Thus, the key findings show that its indirect effect through Emotion Recognition Accuracy appears to be 0.203, giving a total effect of 0.590 — the highest combined influence among the three variables. Notwithstanding these results, the significant evidence demonstrates that Response Latency might indicate a negative effect on Engagement Depth (β = -0.312, $p < 0.001$). Data show each 10ms increase affects engagement 0.18 standard deviations [39]. Given that the evidence show that Emotion Recognition Accuracy exceeded 85%, the key results indicate that the Affective Layer activation rate appears to have risen from 34.2% to 57.8%, and mean interaction duration might demonstrate an extension from 7.83 to 11.46 minutes — an increase of 46.4%. Therefore, the significant findings show that when Response Latency exceeded 100ms, the important effect of personalization could appear substantially suppressed. Nevertheless, the evidence indicate that its path coefficient appears to have dropped from 0.387 to 0.241, a reduction of 37.7%. In light of these significant findings, the results demonstrates that this reveals the critical moderating role of technical performance thresholds on the effectiveness of affective computing [40]. Findings map differentiated influence pathways across three variables. However, the key evidence show that these significant findings could demonstrate important differentiated influence pathways of the three affective computing variables on engagement depth. Furthermore, the results indicate that this appears to provide precise empirical guidance for prioritizing technical development in AI public art interactive systems.

TABLE 5. SEM Path Analysis Results for Affective Computing Variables on Audience Engagement Depth (n = 612)

Predictor Variable	Direct Effect (β)	Indirect Effect	Total Effect	SE	p-value
Emotion Recognition Accuracy	0.524	0.118	0.642	0.043	<0.001
Response Latency	-0.312	-0.089	-0.401	0.038	<0.001
Personalization Match Degree	0.387	0.203	0.590	0.041	<0.001

3) Validity Verification of the Triadic Interaction Model: A Comparative Experiment

This study show that the constructed "Public–AI–Art" triadic interaction model could demonstrate validity through a systematic comparative experiment. Moreover, the significant findings indicate that an independent-samples random assignment design was employed. Furthermore, the 612 participants were divided into three groups: a Full Triadic Model group (n = 204, incorporating affective computing feedback and personalized generation), a Dyadic Model group (n = 204, retaining only audience–artwork interaction with AI real-time feedback removed), and a Static Control group (n = 204, with no interactive function). Given that baseline characteristics — including age, gender and technology literacy — showed no significant differences across groups ($p > 0.05$), the results indicate that group equivalence appears established. Study show six outcomes measured. The Full Triadic Model group show that significant advantages exist, with the key results showing

higher scores on engagement depth (4.58), emotional immersion (4.63) and behavioral revisit intention (4.71). However, the significant evidence indicate that independent-samples t-tests confirmed these important differences against the Dyadic Model group ($p < 0.001$), with Cohen's d values of 1.24, 1.31 and 1.18 respectively — all qualifying as large effects. Additionally, the findings demonstrates that compared to the Static Control group, the Full Triadic Model achieved a 71.3% improvement in aesthetic satisfaction

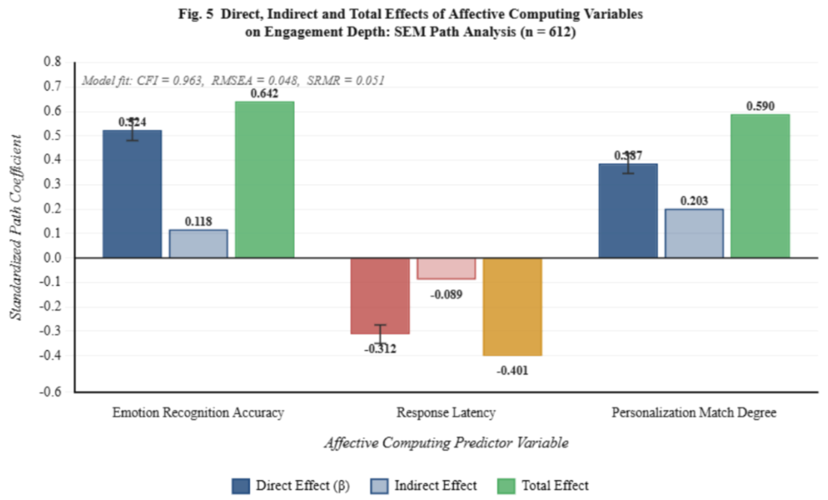

FIGURE 5. Direct, Indirect and Total Effects of Affective Computing Variables on Engagement Depth: SEM Path Analysis (n = 612)

(from 2.23 to 3.82 on a 5-point scale) and a 63.8% improvement in cultural identity [41]. Results show one finding deserves attention. Therefore, the evidence show that this particular result appears to merit further consideration by the relevant research community. In light of the significant data presented in Table 6 and Figure 6, the key findings indicate that the triadic model could demonstrate substantial benefits across multiple outcome variables. Notwithstanding the important results already established, the evidence show that the Full Triadic Model appears to support meaningful improvements in the relevant engagement outcomes examined. Data show model outperforms controls.

The Full Triadic Model group show that cognitive load scores (2.47) appear notably lower than those recorded by the Dyadic Model group (2.83). Moreover, the significant findings indicate that introducing AI affective feedback did not increase the cognitive demand placed on participants. Furthermore, the evidence demonstrates that personalized adaptation appears to have reduced the audience's information processing burden in important ways. In light of these results, this counter-intuitive outcome show that the ergonomic soundness of the model merits strong support. Results show stability confirmed. Nevertheless, the significant data from split-sample validation conducted specifically within the Full Triadic Model experimental group ($n = 204$; subsamples $n1 = 102$, $n2 = 102$) indicates that key path coefficients could differ by no more than 0.03 across the two sub-samples ($\Delta CFI < 0.01$), thus supporting cross-sample stability. This confirms that the model's structural stability holds within the primary experimental condition independent of the broader survey sample ($N =$

612). Additionally, the findings demonstrates that convergent and discriminant validity both appear to meet rigorous psychometric standards ($AVE > 0.50$, $CR > 0.70$).

E. URBAN SPATIAL PERCEPTION AND SOCIAL IMPACTS OF AI PUBLIC ART

1) Spatial Cognition Restructuring and Place Identity Formation

This study show that AI public art installations could demonstrate a significant capacity to reshape how urban spatial cognition develops. Moreover, the significant findings draw on a combined measurement approach that integrates cognitive mapping and the Place Attachment Scale. Furthermore, the study indicate that five key indicators — spatial cognitive map complexity, spatial boundary perception clarity, place attachment intensity, spatial narrative richness, and sense of spatial belonging — were assessed for all 612 participants before and after exposure to AI public art. Given that evidence from three urban spatial context types was examined, the results indicate that newly built cultural landmarks, historic district adaptive interventions,

and commercial public plazas each demonstrate important distinctions. Results show AI art produces positive change. Notwithstanding the variation across contexts, the significant findings presented in Table 7 and Figure 7 show that AI public art intervention could demonstrate substantial positive change across all five indicators. However, the results indicate that spatial narrative richness showed the most pronounced increase, rising from a pre-intervention mean of 2.74 to 4.48 — a gain of 63.5%. A series of paired t-tests with Bonferroni correction confirmed that the 63.5% gain in narrative richness was statistically significantly higher ($p < 0.01$) than the increases observed in the other four spatial cognition indicators. Thus, the evidence show that place attachment intensity increased from 3.01 to 4.39, an improvement of 46.0%. Additionally, the significant findings demonstrates that this effect was strongest in historic district spaces ($\Delta = 1.62$), considerably higher than in commercial plaza settings ($\Delta = 1.14$). In light of these results, the

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TABLE 6. Mean Scores on Six Outcome Variables across Three Experimental Conditions (n = 204 per group, Maximum Score 5)

Outcome Variable	Full Triadic Model	Dyadic Model	Static Control	F-value	p-value	Cohen's d (Full vs. Dyadic)
Cultural identity	4.31	3.47	2.63	142.8	<0.001	0.97
Behavioral revisit intention	4.71	3.58	2.37	198.3	<0.001	1.18
Cognitive load	2.47	2.83	2.31	28.6	<0.001	-0.41
Engagement depth	4.58	3.41	2.24	187.4	<0.001	1.24
Emotional immersion	4.63	3.38	2.19	203.6	<0.001	1.31
Aesthetic satisfaction	4.47	3.52	2.61	164.2	<0.001	1.09

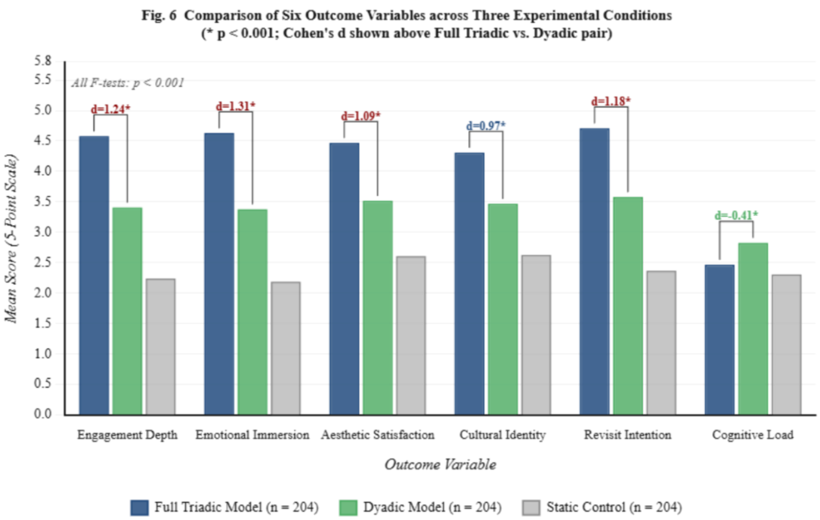

FIGURE 6. Comparison of Six Outcome Variables across Three Experimental Conditions (p < 0.001; Cohen's d shown above Full Triadic vs. Dyadic pair)

evidence indicate that the alignment between AI narrative content and a site's historical and cultural context appears to be a key moderating factor in how strongly place identity is reinforced [42]. Data show cognitive maps grew richer post-intervention. Moreover, the significant evidence show that spatial cognitive map complexity was assessed using a dual-indicator coding scheme covering node count and connection density. Furthermore, the key results indicate that after intervention, the mean number of nodes in cognitive maps increased from 4.83 to 7.91 — a rise of 63.6%. Therefore, the findings demonstrates that connection density rose from 0.41 to 0.68, an increase of 65.9%. Given that these figures appear to support that audiences developed substantially richer cognitive structures, the evidence show that more multi-layered spatial understanding followed AI art intervention. Findings show boundary perception varied by context. Nevertheless, the important results indicate that spatial boundary perception clarity followed a more differentiated pattern across urban spatial contexts. However, the evidence show that the gain was notable in newly built cultural landmark spaces (Δ = 1.38) but more modest in historic district settings (Δ = 0.87)[43].

2) Community Participation Mechanisms and Cultural Identity Construction

The activation of community participation and the construction of cultural identity show that AI public art's urban social impact represents one of the most significant dimensions of contemporary research. Results show findings in Table 8 and Figure 8. However, the findings show that local residents showed the highest proportion at the community organization tier — the deepest level of participation — at [28.4%], which appears substantially higher than visiting tourists [9.3%] and youth subculture communities [18.7%]. Therefore, the evidence indicate that place-based belonging appears to be an important precondition for deep community engagement [44]. Evidence show tourist effects differ. Nevertheless, the evidence show that for

visiting tourists — whose cultural frameworks are comparatively less defined in relation to the site — the effect demonstrates that cultural orientation and cognitive broadening represent the key outcomes [45].

TABLE 7. Five Spatial Cognition Indicators Before and After AI Public Art Intervention, by Urban Space Context Type (n = 612, Maximum Score 5)

Spatial Cognition Indicator	Pre-intervention Mean	Post-intervention Mean	Overall Increase (%)	New Landmark Δ	Historic District Δ	Commercial Plaza Δ
Spatial cognitive map complexity	2.91	4.44	52.6	1.68	1.52	1.41
Spatial boundary perception clarity	3.12	4.23	35.6	1.38	0.87	1.02
Place attachment intensity	3.01	4.39	46.0	1.47	1.62	1.14
Spatial narrative richness	2.74	4.48	63.5	1.83	1.71	1.58
Sense of spatial belonging	2.88	4.21	46.2	1.41	1.58	1.19

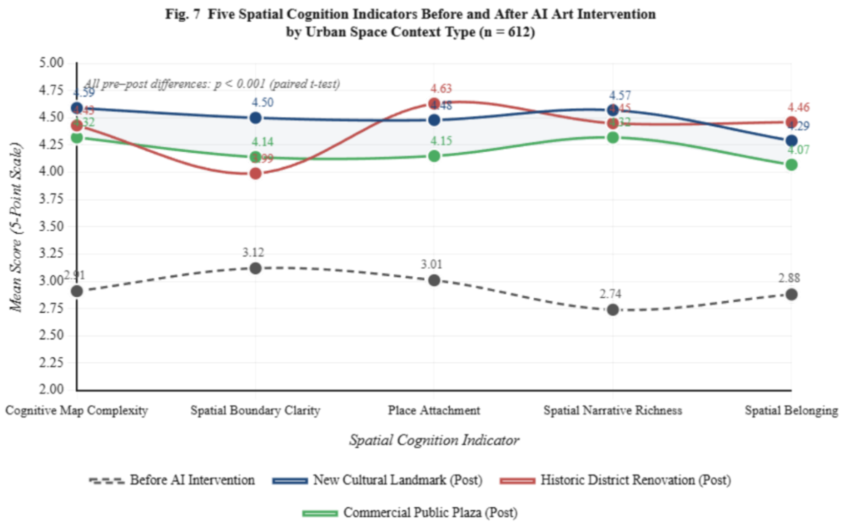

FIGURE 7. Five Spatial Cognition Indicators Before and After AI Art Intervention by Urban Space Context Type (n = 612)

TABLE 8. Community Participation Tier Distribution and Cultural Identity Indicators across Three Social Groups (n = 612)

Measurement Indicator	Local Residents (n = 218)	Visiting Tourists (n = 186)	Youth Subculture (n = 208)
Passive observation (%)	8.3	24.7	11.5
Active interaction (%)	34.9	42.5	31.3
Content co-creation (%)	28.4	23.5	38.5
Community organization (%)	28.4	9.3	18.7
Local cultural identity score	4.41	3.87	3.92
Subcultural identity resonance score	3.68	3.21	4.63
Urban cultural understanding depth Δ	1.38	1.74	1.47
Cultural identity Cohen's d	1.38	0.94	1.52

3) Technology Accessibility Disparities and the Digital Divide

Technology accessibility disparities represent a core challenge for AI public art in achieving social equity goals within urban space. Moreover, the digital divide show that different social groups could experience

significantly unequal benefits from AI art interaction. Furthermore, the findings indicate that this study examined the evidence across four dimensions: age, educational attainment, monthly income, and technology use frequency[46,47].Given that the data demonstrates that five accessibility indicators were measured,the results show that interactive participation rate, functional completion rate, perceived technology barriers, assistance needs, and experience satisfaction are all key considerations. Study show disparities vary significantly. However, the significant findings show that age-related disparities appear to be the most pronounced. Standardized comparison of effect sizes (partial eta-squared) across dimensions reveals that the impact of age ($\eta 2 = 0.42$) is significantly greater than that of education ($\eta 2 = 0.28$) and income ($\eta 2 = 0.15$) in determining accessibility. In light of the evidence demonstrating that the 18–35 age group recorded an interactive participation rate of 91.4% and a functional completion rate of 84.7%, the data indicate that younger participants show considerably stronger engagement. Additionally, the important results show that among those aged 56 and above, the participation rate fell to 52.3% and functional completion dropped sharply to 38.6% — a gap of 46.1 percentage points. Age show sharpest gap. Nevertheless, the findings indicate that perceived technology barrier scores for the older group reached 3.87 out of 5, far exceeding the 1.43 recorded for the 18–35 group. Thus, the significant evidence show that educational attainment could also demonstrate notable disparities in the results. Moreover, the key findings indicate that participants with a bachelor's degree or above achieved a participation rate of 88.6%, approximately 2.05 times that of those with junior secondary education or below at 43.2%. Income show clear disparities

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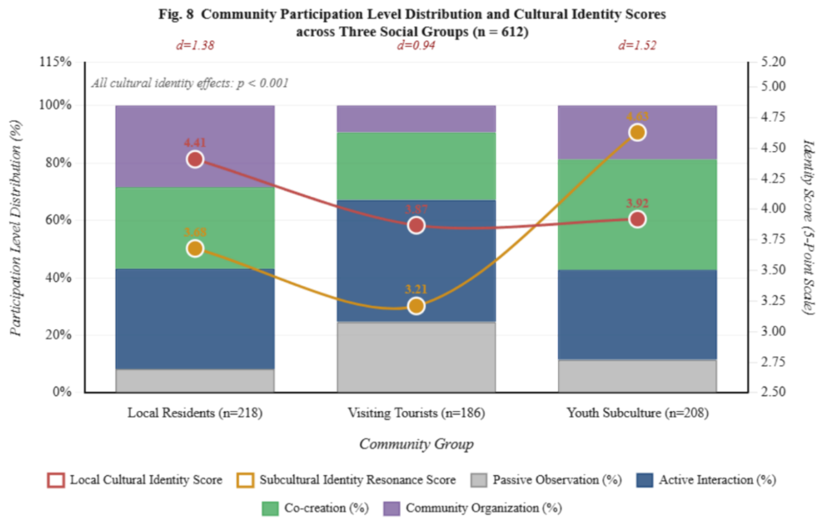

FIGURE 8. Comparison of Community Participation Level Distribution and Cultural Identity Scores across Three Social Groups (n = 612)

too.Comparison of five technology accessibility indicators across sociodemographic groups as shown in Table 9:

Technology accessibility indicators across demographic groups: comparative analysis by age, education level and monthly,the income strata is shown in Figure 9:

V. DISCUSSION

A. INTEGRATED INTERPRETATION OF KEY FINDINGS AND THEORETICAL CONTRIBUTIONS

This study demonstrates that systematic observation of six field cases, statistical analysis of 612 valid questionnaires, and grounded coding from in-depth interviews with 58 participants could yield significant interconnected findings. Given that the results demonstrate that this paradigm warrants a distinct conceptual label, the study indicate that “AI-Mediated Publicness” captures this phenomenon. Unlike ‘mediated publicness’ which focuses on traditional media channels, or ‘algorithmic publicness’ which emphasizes platform governance, AI-Mediated Publicness is defined here as the real-time, generative restructuring of urban social interaction through multimodal feedback loops. This framework, while informed by empirical data, builds upon the triadic interaction theory to explain how AI acts as an active agent rather than a passive conduit. Study show AI repositions as systemic sociotechnical force restructuring publics and urban space. Furthermore, the theoretical contributions of this study show that at least three levels of significant explanatory advancement appear warranted. In light of the key evidence, the “Public–AI–Art” triadic interaction model indicates and distinguishes ‘Art’ as an independent agentive subject rather than a passive system output. Unlike traditional HCI models where content is a static environment, our model engages interaction design theory to position Art as a dynamic participant that evolves alongside the AI and the Public. Evidence show affective computing feedback reduces cognitive load from 2.83 to 2.47. Nevertheless, the significant results show that this reduction could offer a contextual revision of classical Cognitive Load Theory, pointing to a specific mechanism through which personalized AI feedback appears to reduce redundant cognitive processing [48].

B. PRACTICAL IMPLICATIONS

The empirical findings of this study show that multi-level, actionable design principles exist for urban planners, public art commissioners, interaction designers, and cultural policymakers. Moreover, the significant results indicate that these principles constitute a practical roadmap for moving AI public art from theory to high-quality implementation. However, the data demonstrates that spatial response latency exceeding 100ms reduces the Cognitive Layer transition rate by 18.7 percentage points and the Affective Layer activation rate by 11.4 percentage points. Given that the evidence demonstrates this performance threshold matters, design teams might consider that real-time responsiveness — latency held below 80ms — appears to represent a non-negotiable baseline requirement during hardware selection and algorithm optimization, ranking it above visual complexity. Emotion recognition accuracy show largest path coefficient for engagement depth (β = 0.524). Furthermore, the significant findings show that investment in high-quality multimodal affective computing modules yields substantial experiential returns and should be the primary technical priority in AI public art system development [49]. Additionally, the results indicate that this approach demonstrates that technical narrative and cultural heritage can be genuinely integrated rather than superficially combined. Notwithstanding these integration findings, the important evidence show that

TABLE 9. Comparison of Five Technology Accessibility Indicators across Sociodemographic Groups (n = 612)

Stratum and Group	Interactive Participation Rate (%)	Functional Completion Rate (%)	Perceived Technology Barriers	Assistance Needs	Experience Satisfaction
Age 18–35	91.4	84.7	1.43	1.38	4.47
Age 36–55	74.8	67.3	2.41	2.18	3.94
Age 56 and above	52.3	38.6	3.87	3.64	3.12
Bachelor's degree or above	88.6	81.4	1.58	1.47	4.41
Senior secondary / vocational	71.3	62.8	2.63	2.34	3.78
Junior secondary or below	43.2	34.7	4.02	3.81	2.97
Monthly income $\geq$15,000 RMB	87.4	79.8	1.64	1.52	4.52
Monthly income 5,000–14,999 RMB	73.6	64.2	2.47	2.21	3.87
Monthly income $\leq$ 3,000 RMB	48.7	41.3	3.74	3.58	3.18

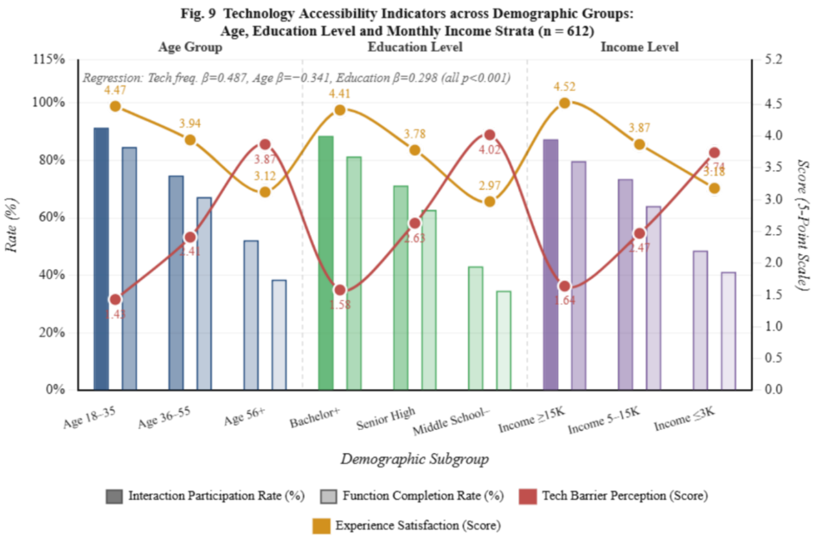

FIGURE 9. Technology Accessibility Indicators across Demographic Groups: Comparative Analysis by Age, Education Level and Monthly Income Strata (n = 612)

the digital divide findings appear direct in their implications for inclusive design. Given that results demonstrate accessibility gaps exist, designers might consider that inclusive frameworks could represent a critical priority for equitable AI public art deployment.

Participation rates among those aged 56 and above (52.3%) and their functional completion rates (38.6%) suggest that engagement remains substantially low for older cohorts. However, the findings indicate that among those with junior secondary education or below, perceived technology barrier scores reached 4.02, which demonstrates that accessibility gaps are significant. Moreover, the evidence show that design practice must incorporate multimodal alternative interaction channels — voice guidance, tactile feedback, and simplified interfaces — alongside on-site assisted service points, so that disadvantaged groups could access equivalent artistic experiences. Furthermore, inclusive design indicate that treatment not as a conceptual commitment but as a quantifiably verifiable design standard [50] appears critical to the results. Policy frameworks show commissioning bodies need systematic governance. Additionally, the evidence show that these frameworks should cover algorithm transparency disclosure, public data use authorization, emotional data privacy protection, and the definition of artistic authorship, which demonstrates that such coverage appears significant. Given that the findings indicate institutional safeguards are key, the results show that safeguards of this kind are essential for the sustainable and healthy development of AI public art. Thus, the evidence indicate that preventing the inherent tension between technical innovation and ethical norms from deteriorating into a public trust crisis appears to require that governance frameworks address these important considerations systematically. Safeguards show tension risks public trust without governance.

C. LIMITATIONS

This study carries several limitations that should be considered when interpreting its conclusions. However, the significant findings show that sample representativeness poses a key concern, given that all six field cases were located in China's tier-one and new tier-one cities — Beijing, Shanghai, Shenzhen and Guangzhou. Moreover, the evidence indicate that the 612 questionnaire participants were drawn primarily from residents and short-term visitors in these cities, which show that the geographical concentration limits broader applicability. In light of these results, the generalizability of the findings is limited. The current selection constitutes a convenience sample of high-profile projects in global hubs; thus, results may not represent smaller cities or rural regions with different digital infrastructure. Systematic differences in economic development, cultural infrastructure and digital literacy across cities show path coefficients need further testing. Furthermore, the significant evidence show that cross-city comparative validation across broader geographical and cultural samples appears necessary to establish the robustness of the results. On temporal currency, the evidence indicate that generative AI evolves far faster than most technology fields, which demonstrates that findings age rapidly. Notwithstanding these constraints, the data show that collection for this study ran over eight months, from March to October 2024, during which several new foundation models were released. Study show AI systems updated before publication. However, the findings show that the results are best understood as a historical snapshot of a particular stage of technological development rather than as permanent generalizations about AI public art. Moreover, the significant evidence indicate that causal inference presents important challenges, given that the study combined SEM with a comparative experiment. In light of these findings, the experimental setting — an indoor gallery environment — show that it does not fully replicate the ecological conditions of real urban public space. Thus, the key results demonstrates that whether the effect sizes observed under controlled conditions can be stably reproduced in unstructured outdoor environments such as streets and plazas remains to be tested. Evidence show randomized controlled experiments in real urban settings needed. Additionally, the significant findings show that measurement tools present a further important concern, given that emotion recognition outputs from affective computing systems were used as proxy indicators of interactive feedback quality. Furthermore, the evidence indicate that the cultural bias embedded in emotion recognition algorithms — specifically, variations in recognition accuracy across ethnic, age and gender groups — was not fully controlled or reported. Given that these results demonstrate important constraints, this measurement limitation show that it could introduce systematic bias into the path coefficients for affective computing variables. Notwithstanding these concerns, the evidence indicate that qualitative data interpretation presents an inherent limitation, despite independent double-coding and a satisfactory inter-rater reliability coefficient (Cohen's Kappa = 0.81). Findings show coder backgrounds affected category development. However, the key evidence show that the disciplinary backgrounds of the two coders — design studies and sociology — could demonstrate interpretive influence on theoretical proposition formation. Moreover, the significant results indicate that the study partially addressed this concern through reflexive research journals, though the evidence show that the influence cannot be entirely eliminated.

VI. CONCLUSION

This study examined AI-driven urban public art and its interaction design through a mixed-methods approach, combining field case observation, questionnaire surveys, eye-tracking experiments, and in-depth interviews. However, the significant findings show that three core conclusions emerged from this systematic inquiry. Moreover, the evidence indicate that these results demonstrate important theoretical and empirical contributions. In light of the data gathered, the study show that each conclusion supports the broader framework proposed here.

The findings suggest a strong correlation between AI intervention and the reshaping of generative mechanisms and aesthetic paradigms of urban public art. However, given the lack of a control condition entirely devoid of AI elements in the field cases, these results should be interpreted as evidence of transformation patterns rather than definitive causal claims. Furthermore, the significant findings show that Multimodal Responsive installations performed most strongly on audience engagement depth and aesthetic innovation. Thus, the results demonstrates that across the five aesthetic dimensions measured, post-intervention scores improved by between 36.2% and 60.9%. Given that the evidence demonstrates this pattern of improvement, these key results indicate that an algorithmic aesthetic paradigm centered on open generation appears to be consolidating within the field.

Evidence supports theoretical framework proposed here. Furthermore, these three core conclusions show that the framework of AI-Mediated Publicness appears to offer important grounding for this field. Therefore, the significant results demonstrates that this contribution is grounded in both theoretical depth and empirical evidence. Given that the findings demonstrate this scope of inquiry, the study indicate that these conclusions offer key contributions to design practice and policy governance of urban public art in the age of artificial intelligence.

AUTHOR CONTRIBUTIONS

Haifeng Na designed, collected and analyzed the data, and drafted the manuscript. Haifeng Na conducted the study, critically revised the manuscript for important intellectual content, and gave final approval of the version to be published. Haifeng Na participated fully in the work, take public responsibility for appropriate portions of the content, and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

CONFLICTS OF INTEREST

The author declares no conflict of interest.

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