

Toward a culturally situated perspective: Rethinking the role of AI in intangible cultural heritage pattern creation

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Abstract: Research on generative artificial intelligence (GenAI) in cultural design has primarily focused on generative control and creative efficiency, often overlooking the misalignment between AI task definition and cultural creation. This study explores how GenAI can be culturally adapted within traditional pattern-making practices. Using an ethnographically informed generative probe, field experiments were conducted in the Huayao cross-stitch community, which practices a form of Chinese intangible cultural heritage. The findings reveal how cultural practitioners negotiate creative logic and cultural judgment when collaborating with AI, identifying four key orientations: liveliness, locality, creation-in-progress, and community creativity. Building on these insights, the paper redefines AI's role as a *generative reflexive actor* and introduces the perspective of *Culturally Situated Task Definition (CSTD)* to explain how cultural tasks are redefined through the mutual shaping of technology and practice, advancing an understanding of the mechanisms underlying AI's cultural adaptation and meaning co-construction.

Keywords: Generative Artificial Intelligence (GenAI); Intangible Cultural Heritage (ICH); Cultural Situatedness; Pattern Creation

1. Introduction

In recent years, generative artificial intelligence (GenAI) has become an important methodological tool in research on innovation in intangible cultural heritage (ICH) and traditional crafts (Chai et al., 2025; Fu et al., 2024). Previous studies have explored AI's potential to enhance creative efficiency and innovative expression in traditional craft contexts (Yuan et al., 2025; Bao et al., 2025; Wang et al., 2025). However, most of this work remains focused on technical dimensions such as algorithmic optimization, data-driven generation, or user interaction improvement.



This orientation reflects a shared assumption: that cultural creation can be decomposed into computational problems, and that AI's task is simply to "solve them better." Such a task-solving paradigm overlooks the embodied and situated nature of cultural creativity in heritage contexts (Hou et al., 2022).

In ICH and traditional crafts, creative practices are deeply embedded in local life and social relations, where meaning arises through bodily experience, oral knowledge, and communal collaboration (Hu et al., 2022; Ingold, 2011). Although generative models can enhance efficiency, their training emphasizes generalizability and scalability, leading to decontextualization—optimizing for visual similarity while neglecting cultural semantics and social values (Liu et al., 2025; Pawar et al., 2025). Thus, the core challenge of AI in cultural creation is not what to generate, but how to become culturally situated—how tasks are defined, negotiated, and adjusted within specific cultural systems. The problem lies not in algorithmic performance but in the misalignment between task definition and cultural logic. This issue resonates with discussions in design anthropology on the co-formation of culture and technology, calling for a reconsideration of how AI participates in meaning-making within cultural practices and how "situated adaptation" can be achieved through such interaction (Gunn et al., 2020).

Accordingly, this study asks:

RQ1. What are artisans' needs and expectations regarding AI's involvement in traditional pattern creation within authentic cultural contexts?

RQ2. In creative contexts led by cultural practitioners, what role does generative AI play in shaping cultural meaning?

RQ3. How can we understand the situated mechanisms through which generative AI adapts within cultural systems?

To address these research questions, this study focuses on Huayao cross-stitch, a form of Chinese intangible cultural heritage known for its narrative embroidery, which offers a distinctive context for examining AI's cultural adaptation. The study adopted an ethnographically informed multi-method framework, combining thick-data ethnography, action research, and generative probe experiments to observe artisans' thinking, judgment, and collaboration in authentic creative settings. The research proceeded in two stages: Stage 1 used ethnographic observation and interviews to identify artisans' needs and perceptions of AI's role in creation (RQ1); Stage 2 involved three generative experiments and a follow-up focus group to explore how AI influences meaning-making and how artisans reinterpret and modify AI outputs, revealing mechanisms of its situated adaptation within cultural systems (RQ2–RQ3).

This paper makes three contributions:

- Identifying four key orientations in AI–artisan co-creation and reveals three cultural adaptation disconnections: semantic, processual, and communal.

- Redefining AI's role in cultural creation as a *generative reflexive actor*, emphasizing its capacity to surface implicit cultural assumptions and stimulate meaning negotiation through generative deviation.
- Proposing the *Culturally Situated Task Definition (CSTD)* perspective, which reveals AI's adaptation mechanisms within cultural systems and offers a new lens for understanding meaning co-construction between AI and cultural practice.

The paper first reviews generative AI in cultural and design research and introduces an ethnographically informed two-stage study. It then presents the main findings, redefines AI's role in cultural creation, and develops the Culturally Situated Task Definition (CSTD) perspective. The paper concludes by reflecting on the study's limitations and outlining future research directions.

2. Theoretical background and related work

2.1 Rethinking the paradigm of AI: From task-solving to task-defining

GenAI has made notable progress in image generation and pattern recognition, yet its development remains shaped by a task-solving paradigm. This paradigm assumes that task objectives and evaluation criteria are predefined before the model's involvement, concentrating on performance optimization and output controllability (Sengar et al., 2025). As a result, relatively limited attention has been paid to how tasks themselves are defined.

Recent studies have shown that such assumptions constrain AI's capacity to engage with open-ended and semantically complex problems. The data-centric AI perspective argues that improvement depends not only on model complexity but on aligning data quality with task design to maintain semantic coherence between the model and its context (Zha et al., 2023). Likewise, the human-in-the-loop approach emphasizes iterative refinement of task assumptions through human feedback, allowing AI to better respond to social and semantic complexity (Shneiderman, 2020). Yao (2025) further identifies a shift from enhancing performance to redefining tasks and evaluation systems, framing this as a utility problem in which higher algorithmic performance does not necessarily yield real-world value.

This gap becomes especially evident in cultural creation, where tasks are rarely fixed or singular. Instead, they emerge through the dynamic interplay of creative intention, community consensus, and cultural constraints (Jovchelovitch, 2019). When task definition is reduced to formal generation or style imitation, AI systems struggle to engage with the ambiguities and complexities inherent in cultural practice.

Rethinking task definition, therefore, is not only about improving technical performance but about enabling AI to engage with the cultural and social semantics of creative processes.

In this study, *task definition* refers to how an AI system's "problem space" is framed, decomposed, and represented. It shapes not only what the model generates but also how it interprets meaning and value boundaries. This perspective provides a new lens for understanding AI's role in cultural creation—shifting attention from what

AI produces to how it participates in defining tasks and co-constructing meaning within situated cultural contexts.

2.2 *Embedding AI in cultural contexts: From technical neutrality to cultural situatedness*

Corresponding to the evolution of technical paradigms, cultural studies and design anthropology have noted that AI's applications in cultural practice often rely on the assumption of technological neutrality (Govia, 2020). The situated cognition theory argues that knowledge and action are always embedded in specific social and material contexts (Suchman, 1987; Smith & Semin, 2004), while embodiment theory further emphasizes that meaning emerges through bodily experience and perceptual practice (Huet et al., 2025; Taylor, 2015).

In fields such as craft and intangible cultural heritage, creation depends on tacit knowledge and collective collaboration rather than standardized commands or abstract data logic. Current AI models, designed for generalizability, can imitate surface patterns but fail to grasp the situated judgments underlying why creation takes particular forms (Fan et al., 2025).

In this paper, *cultural situatedness* does not merely refer to applying AI in a specific cultural field. Rather, it means embedding AI's design, learning, and generative processes within cultural systems shaped by bodily experience, local knowledge, symbolic structures, and community interaction. This perspective challenges the assumption of technological neutrality and reframes AI's role within cultural systems—not as a neutral tool, but as a participant that must interpret and respond to cultural constraints.

2.3 *Research context: Huayao Cross-Stitch as a situated cultural practice*

Huayao cross-stitch is a nationally recognized intangible cultural heritage practiced by Yao women in the Huxingshan region of Longhui County, Hunan Province, China. Through stitched patterns, they narrate community stories and convey aspirations for a good life. Following the principle of “stitch what you see,” artisans work directly on cloth without sketches, composing images through embodied experience and perceptual judgment. In traditional dress, tube-skirt motifs are the most intricate and symbolically laden elements, whose themes are primarily drawn from animals and plants as metaphors for abundance, fertility, and continuity (Ruan, 2018). The most iconic motif, the “Stone Flower,” derives from circular moss patterns on rocks and is embroidered to invoke prosperity (see Figure 1).

Huayao embroidery embodies an aesthetic ideal of “fullness as beauty,” in which narrative imagery and embodied craftsmanship together form a situated cultural system linking lived experience, symbolic meaning, and creative practice. This makes Huayao cross-stitch a valuable ethnographic site for examining how AI enters culturally situated processes of task definition and meaning negotiation. Recent work has also begun to explore AI in Huayao cross-stitch practice (Li et al., 2026).



Figure 1 Huayao cross-stitch as a situated cultural practice: the tube skirt as a primary narrative carrier, embroidery as embodied making, and the iconic “Stone Flower” motif rooted in local natural forms: (a) dress context showing tube-skirt embroidery placement; (b) a representative tube-skirt embroidery piece; (c) Tangmei, a Huayao cross-stitch inheritor, embroidering in a local setting; (d) in-situ fieldwork with Tangmei in her home; (e) the “Stone Flower” motif; and (f) moss on rock as the natural source of the motif. Sources: (a, f) Ruan (2018); (b) Huayao Cross-Stitch Digital Museum (2019); (c) Lao (2016); (d, e) authors.

3. Methods

This study adopts an ethnographically informed multi-method framework that combines thick-data ethnography, action research, and generative probe experiments (Goopy & Kassan, 2019). Following a “from observation to intervention” logic, two experimental phases were designed: the first phase employed ethnographic observation and semi-structured interviews to identify Huayao artisans’ needs and expectations regarding AI’s involvement in pattern creation (RQ1); the second phase used generative experiments and a follow-up focus group to explore how AI participates in cultural meaning-making and adapts within cultural systems (RQ2–RQ3).

A team of six researchers from Hunan University, China, collaborated with three researchers from the University of the Arts London, UK, to engage with ten artisans from the Huayao community in the mountainous region of southern China. These artisans were recruited through established community connections, and the study adhered to principles of community collaboration and cultural respect. Informed consent was obtained from the artisans, allowing the use of their names, images, and embroidery work in research publications, with approval from the ethics committee at Hunan University.

Table 1 summarizes the characteristics of the artisans, including their age, years of embroidery experience, and cultural identity. All artisans were female (N = 10), reflecting the matrilineal transmission of Huayao cross-stitch as a traditionally

inherited craft. To capture intergenerational variation in creative practice, the sample included younger learners, mid-career practitioners, and senior bearers.

Table 1 Artisans information in the Huayao cross-stitch study (Note: Names are presented in Pinyin, the romanized form of Chinese names. “Inheritor” refers to government-recognized intangible heritage inheritors, while “Embroiderer” denotes local Huayao cross-stitch practitioners.)

Name (Pinyin)	Participating Phase(s)	Age Range	Years of Embroidery Experience	Cultural Identity
Dianhua	Phase1, Phase2	70-80	>50	Embroiderer
Tangmei	Phase1, Phase2	60-70	>50	Inheritor
Bumei	Phase1	50-60	>50	Embroiderer
Yuanhua	Phase1, Phase2	40-50	20-40	Inheritor
Juanhua	Phase1, Phase2	40-50	20-40	Inheritor
Huying	Phase1, Phase2	30-40	20-40	Inheritor
Fouhua	Phase1, Phase2	50-50	20-40	Inheritor
Aihua	Phase1, Phase2	20-30	20-40	Embroiderer
Lingling	Phase1, Phase2	20-30	<3	Embroiderer
Weiting	Phase1	10-20	<3	Embroiderer

Overall, this study positions the experimental process as a generative probe: a design-led intervention that structures collaboration between artisans and AI in authentic cultural settings in order to elicit and observe situated thinking, judgment, and creative behavior. An overview of the two-phase generative probe design is shown in Figure 2. This paper forms part of the same broader research programme as Bryan-Kinns et al. (2026), with both studies drawing on partially overlapping fieldwork and experimental materials. That study focuses on the development and use of generative workflows in relation to embodied embroidery-making practices, and examines the forms of creativity that emerge through this process. The present paper, by contrast, treats the collaborative process as an interpretive entry point for examining how AI’s role is redefined in cultural co-creation and how meaning is negotiated in situated practice.

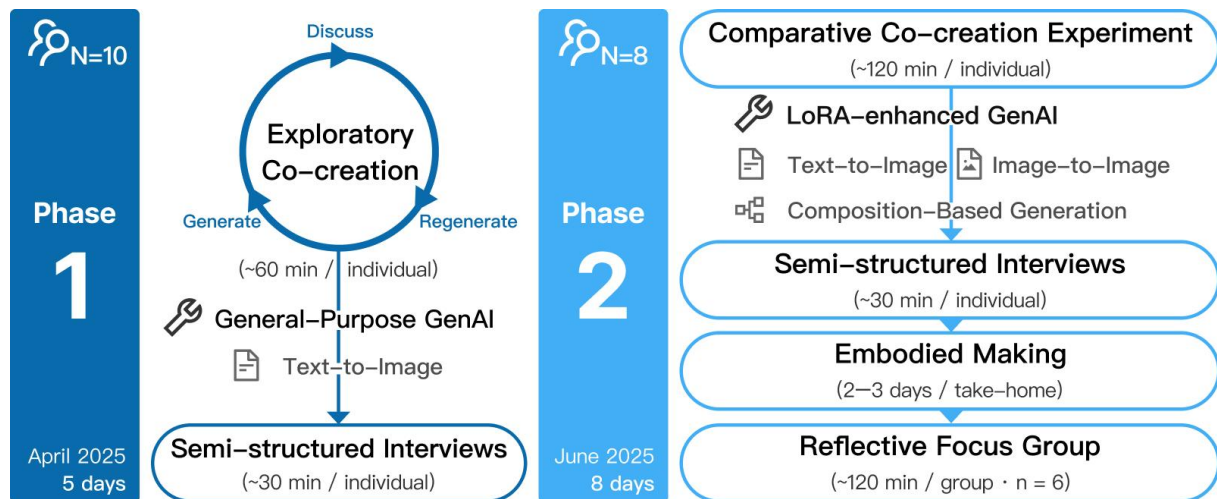


Figure 2 Overview of the two-phase generative probe design.

Phase 1 combined ethnographic observation, semi-structured interviews, and action research to explore artisans’ initial perceptions of AI’s role in creative practice. Ten artisans took part in this phase. The research team introduced general-purpose generative AI systems (e.g., ChatGPT-4o) as collaborative creative tools and conducted one-on-one co-creation sessions. Artisans expressed their ideas verbally, which researchers translated into prompts to initiate a “generate–discuss–regenerate” cycle that functioned as a situated probe, continually revealing shifts in artisans’ creative logic, cultural judgment, and acceptance boundaries.

Based on Phase 1 observations, two main expressive bottlenecks were identified: first, verbal description alone was insufficient for artisans to communicate their design intentions, leading them to rely on visual references; second, composition and spatial layout were difficult to control through text prompts, as artisans tended to follow a stepwise pattern logic of “main motifs–secondary motifs–fillers.” These findings suggested a mismatch between the interaction logic of general-purpose AI and artisans’ embodied creative processes. Consequently, two months later, Phase 2 was conducted with culturally informed refinements to the generation workflow, interaction process, and underlying technical pipeline.

Phase 2 adopted a generative–comparative experimental design, complemented by semi-structured interviews and a follow-up focus group, to investigate how artisans transformed embodied thinking into expressible and adjustable creative intentions through collaboration with AI. Eight artisans (the same cohort, with two unavailable due to work or study) took part in this phase. To explore AI’s cultural adaptability across linguistic, visual, and compositional forms of expression, the study implemented culturally adapted generative workflows integrating LoRA fine-tuning, which supported three progressively precise modes of human–AI collaboration: (1) Text-to-Image, generating Huayao-style patterns from textual descriptions; (2) Image-to-Image, introducing artisans’ photographs or collected natural imagery as visual references; and (3) Composition-based Generation, guiding stepwise creation following the traditional sequence of “main–secondary–filler” motifs to simulate an iterative “thinking-while-making” process. The three modes were presented in random order to minimize sequence effects.

After the experiments, the research team conducted semi-structured interviews around three themes—sources of inspiration, acceptability of cultural expression, and sense of creative control. Artisans were then invited to take home selected AI-generated patterns for manual embroidery, allowing the researchers to further assess the practical feasibility and cultural adaptability of the generated outcomes. In the follow-up focus group held several days later, artisans showcased their embroidered works and collectively reflected on the modifications and cultural judgments made during production, providing empirical insights into how AI's role transforms within local cultural creation.

To achieve a thick description of embodied practice, researchers used audio, photo, and video documentation throughout the experiments to capture verbal and non-verbal behaviors, supplemented by detailed field notes. Figure 3 presents field photos from key stages of the experimental process. The data corpus included interview notes, audio and video recordings, generated images, and embroidered artifacts. Given the prevalence of non-verbal data in intangible heritage contexts, the study adopted thick data analysis and interpretive ethnography, focusing on critical incidents that revealed meaningful moments of interaction between AI and artisans, which were then organized into situated narrative units (Lichterman, 2017). Two researchers with prior field experience in the Huayao community independently organized the field documentation and conducted multiple rounds of cross-validation through reflexive memoing and team discussion.

A process of reflexive triangulation was applied to cross-reference interviews, videos, and field notes, minimizing reliance on a single interpretive lens (Hammersley & Atkinson, 2019). The analysis followed a progressive logic of “data – incident – theme – meaning,” generating four interpretive constructs: liveliness, locality, creation-in-progress, and community creativity. These constructs illuminate artisans' cognitive and cultural judgments in creative practice and reveal how AI engagement reshapes their creative needs and interpretations.



Figure 3 Field photos from key stages of the experimental process: (a) comparative co-creation experiment; (b) comparison of on-screen generated images with artisans' embroidered works; (c) reflective focus group; and (d) collaborative interpretive analysis by the research team.

Author Positionality and Reflexivity Statement. This research was conducted through collaborative efforts within the research team, with the first author playing a

central role in field engagement and interpretive analysis. As a design researcher with experience in ethnographic methods, I am not a member of the Huayao community but have developed a long-term relationship of trust through six years of participatory observation and collaborative projects. Building on this background, my research focuses on the role of generative AI within cultural contexts, integrating a designer's creative inquiry with an anthropologist's cultural sensitivity to reflect on the implications and meanings of technological intervention. Throughout the study, I strived to maintain transparency and reflexivity regarding my positionality, while collaborative documentation and cross-analysis within the research team helped mitigate potential individual bias.

4. Findings and insights

This section presents the findings of the experiments, uncovering Huayao artisans' needs and expectations regarding AI's involvement in pattern creation (RQ1), and revealing how AI participates in processes of meaning negotiation and cultural adaptation within creative practice (RQ2).

4.1 Cultural adaptability of AI within the creative process

Cross-generational observation of Huayao cross-stitch artisans revealed a shift from the traditional embodied mode of "thinking-in-making" to the "drawing-before-making" approach increasingly favored by younger artisans. Traditional embroidery depended on the immediate coordination of bodily movement, material feedback, and cultural memory, whereas recent practices increasingly employ tools such as paper, chalk, and digital drawing. This shift externalizes thought, transforming creative reasoning from manual intuition into visual composition, and marks an intergenerational reconfiguration of embodied knowledge. It also signals an emerging community demand for new creative and expressive modalities, as artisans increasingly turn to external representational tools in practice. Against this background, this section examines three modes of human–AI collaboration, revealing artisans' creative responses and cultural judgments.

In the text-to-image (T2I) mode, the interpretive ambiguity and randomness of text prompts often produced outputs beyond artisans' intentions. Many described the AI results as "unexpected yet reasonable," recognizing their potential to spark new ideas. Yet this openness exposed semantic misalignments: the system often failed to capture local meanings.

In the image-to-image (I2I) mode, outputs aligned more closely with artisans' lived experience and familiar motifs. Artisans tended to use photographs of local plants, animals, and landscapes as input, directly linking generation to sensory environment. This practice echoes Dourish's (2001) notion of *cultural rootedness*, emphasizing creativity as grounded in situated social experience and perception. Consequently, the I2I mode produced images visually consistent with local aesthetics and deepened artisans' emotional identification with the results.

In the composition-based mode, AI supported layered spatial control over pattern structures. Artisans adjusted the scale, position, and layout of motifs and refined compositions through step-by-step prompts. This incremental co-creation mirrored

their traditional logic of “composing while thinking,” aligning with Huayao’s embodied rhythm of making and reflection.

Across all modes, a critical incident emerged: when artisans brought AI-generated images home for embroidery, nearly all added signature Huayao motifs such as the *Eight-Petal Flower* or *Stone Flower*, reconfiguring the compositions to restore cultural coherence. This finding demonstrates that AI-generated images served not as endpoints but as starting points for cultural re-creation. Through embodied making, artisans re-inscribed cultural judgment and symbolic meaning, reaffirming their agency and authorship within the creative process. This incident reveals the mechanism of AI’s cultural adaptability in traditional creation—showing how generative outputs prompted artisans to redefine creative needs and negotiate cultural meanings through practice.

4.2 Redefining creative needs and negotiating cultural meaning

Through interviews and observations of artisans collaborating with AI, the study identified four interrelated findings that unfold progressively—from the embodied aesthetics of vitality (Finding 1), to the cultural boundaries of locality and motif (Finding 2), to the generative logic of meaning within the creative process (Finding 3), and finally to the social mechanisms of collective creativity (Finding 4). Together, these findings reveal how AI participation prompted artisans to redefine their creative needs, illustrating the multilayered evolution of cultural creation—from individual perception to collective practice, and from visual form to cultural meaning.

4.2.1 Finding 1. The demand for “lively” patterns: Aesthetics of vitality and embodied perception

In the process of generating flora and fauna imagery with AI, the word “lively” repeatedly emerged in artisans’ descriptions—particularly among senior creators. Many expressed dissatisfaction that AI’s images appeared “too stiff,” lacking the vitality and emotional resonance characteristic of living creatures. As Dianhua explained, “*A rabbit should be jumping or eating grass, not sitting still.*” Tangmei added, “*A mother pig should lower her head toward her piglets—that’s what makes it affectionate.*” The desire for liveliness thus reflects not merely visual accuracy, but a culturally situated expectation of emotional presence.

In traditional Huayao embroidery, animal and plant motifs symbolize not only auspiciousness and abundance but also a worldview of shared vitality between humans and nature. Through the rhythm of stitching and the sensitivity of bodily judgment, artisans embody this sense of life in their works. The contrast highlights a fundamental difference between human and AI perception: while AI relies on pattern recognition, artisans interpret through embodied perception, infusing emotional and symbolic meaning into every form. As Yuanhua explained, “*The animal’s expression matters most. It’s hard to describe, but I can feel it when I see the pattern. You must first observe real animals—if you don’t know them well, you can’t make them.*” This emphasis on familiarity foreshadows the next finding, which explores the local grounding of cultural imagery in Huayao embroidery.

4.2.2 Finding 2. The attachment to “local” imagery: Cultural belonging and semantic boundaries

Artisans repeatedly emphasized that generated patterns must be “from our place.” They constantly compared AI outputs with their lived experiences—if the results departed from familiar natural or cultural references, they were deemed “not Huayao.” For instance, when the prompt “dog” produced a Chihuahua, Juanhua commented, “*That’s not a Huayao dog—it’s a foreign one.*” Similarly, when figures appeared without Huayao dress, Fouhua insisted, “*They should wear our Huayao clothes.*” For these artisans, innovation was acceptable only when anchored within local symbolic systems, preserving internal cultural coherence.

When asked what constitutes “Huayao culture,” most artisans struggled to articulate a clear answer. Their creative practices are deeply intertwined with daily life and the surrounding environment, leaving little need for external cultural comparison. Yet AI’s globalized training corpus led to semantic misalignments: it could reproduce surface forms but failed to recognize local meanings, prompting artisans to reflect on what defines their culture.

To analyze this further, the study draws on two perspectives: locality and motif. The former refers to imagery rooted in local ecology and lived experience; the latter denotes symbolic forms that carry collective meaning and achieve stability through repetition and convention (Biedermann, 1994). While motifs possess stable core meanings, they also allow for formal variations (Thompson, 1955). In Huayao culture, symbols such as the *Eight-Petal Flower* and *Stone Flower* serve as fixed motifs, whereas *tigers* or *snakes* represent more flexible, context-dependent figures. Current AI models, lacking this cultural hierarchy of meaning, cannot distinguish between invariant symbols and variable themes—thus blurring the semantic boundaries that sustain cultural identity.

4.2.3 Finding 3. The “creation-in-progress” dilemma: Inspirational engagement and processual meaning

Many artisans (Dianhua, Yuanhua, Juanhua, Huying, Fouhua, and Aihua) hoped that AI could “continue the work”—to build upon partially completed designs and help them move forward when inspiration was lacking. In Huayao practice, creativity emerges through accumulated experience and daily observation, and moments of conceptual stagnation are common. If AI could extend unfinished patterns coherently, it would serve as a valuable co-creative tool.

However, existing AI systems fail to interpret this processual semantics of creation-in-progress. When artisans input partial embroidery images, the models could not perceive compositional logic or semantic relations among elements, producing results that were visually disjointed or contextually inconsistent. For humans, unfinished implies still generating meaning; for AI, it simply appears incomplete. This difference exposes a temporal disconnection between human and machine creativity: AI replaces iterative reflection with immediate generation, while artisans generate meaning through ongoing revision and embodied judgment. The challenge, therefore, lies not in performance but in AI’s inability to grasp processual meaning—the temporal mechanism by which cultural significance unfolds through continuous negotiation and correction.

4.2.4 Finding 4. The power of community “creativity”: Re-culturalization through communication and interaction

Huayao embroidery has never been an isolated act of individual creation but a collective and intergenerational process. Women collaborate through daily life and labor—discussing, selecting, and reassembling motifs passed down across generations. This process underpins both collective creativity and cultural continuity. The one-shot generation logic of AI, however, disrupts this social mechanism. While the research team facilitated a collective focus group, genuine negotiation often occurred later—when artisans brought the AI-generated images home for manual embroidery. During this process, they made adjustments guided by experience and cultural judgment: removing impractical lines, adding symbolic fillers, or altering proportions. Through these embodied modifications, the generated results were reintegrated into cultural logic, completing a process of re-culturalization. Hence, AI’s role should be viewed as a catalyst rather than a substitute for community collaboration. True cultural creativity still relies on collective judgment, embodied practice, and shared meaning-making.

Overall, these four findings reveal AI’s dual role in Huayao cultural creation. On one hand, it reshapes creative processes and cognitive structures as a technological medium; on the other, it exposes limitations in understanding cultural semantics and social dynamics. These limitations manifest as three layers of adaptation disconnection: (1) semantic disconnection, the inability to comprehend the symbolic logic behind cultural imagery; (2) processual disconnection, the failure to grasp the continuity of meaning-making in creation; and (3) communal disconnection, the absence of AI from collective negotiation and cultural judgment. Yet, these disconnections simultaneously highlight artisans’ cultural agency. Through embodied practice and collective interpretation, they continuously reconstruct the meanings of AI outputs. Thus, AI’s collaborative potential should be seen not as productive, but as co-creative—participating in meaning-making within the constraints and values of cultural systems.

5. Discussion

This section redefines the role of AI in cultural creation and introduces the perspective of Culturally Situated Task Definition (CSTD), exploring how cultural tasks are negotiated, adjusted, and co-defined through the dynamic interplay between humans, culture, and technology.

5.1 *The redefined role of AI in cultural creation*

Building on the previous findings, the semantic, processual, and communal disconnections revealed in AI’s engagement with Huayao cultural creation suggest that its adaptation challenge lies not in algorithmic performance but in the misalignment between task definition and cultural logic. To understand this, it is necessary to return to Huayao cross-stitch practice, where embodied knowledge has evolved from tacit transmission to explicit articulation.

Traditional teaching relied on an implicit sense of “rightness,” with apprentices learning how to compose patterns but rarely what counted as wrong. This closed symbolic system formed implicit cultural assumptions—rules intuitively followed,

orally passed down, and embodied through repetition, constituting a pre-reflexive layer of meaning. Participatory collaborations later introduced shifts, yet external designers—constrained by ethical considerations—often deferred judgment to local artisans, resulting in “cautious innovation” that fostered surface dialogue without challenging implicit assumptions, leaving cultural boundaries ambiguous (Yuan, 2021). The introduction of generative AI, however, forced tacit knowledge into articulation: lacking semantic understanding and operating through formal resemblance, AI generated deviations—such as foreign dog breeds or missing costume details—that exposed gaps between algorithmic and cultural logics and made hidden assumptions visible.

AI’s significance thus lies not in efficiency but in prompting communities to reflect on cultural boundaries—what counts as Huayao—and in acting as a reflexive medium that transforms unconscious traditions into negotiable cultural knowledge. This process echoes design anthropology’s discussions on externalizing tacit knowledge (Bofylatos & Spyrou, 2017; Smith et al., 2016), yet here it emerges through algorithmic deviation as the trigger for reflection.

This transformation must also be contextualized within broader AI paradigms that define its role across disciplines. Table 2 summarizes these paradigms and outlines this study’s theoretical extension. Most existing work emphasizes efficiency, risk governance, or novelty and assumes tasks are predefined and universal, with AI’s role limited to execution or optimization. Consequently, these paradigms treat cultural semantics as static inputs or constraints rather than dynamic meaning-making, failing to explain how AI triggers reflection through deviation or its reflexive function. This gap forms the theoretical starting point here: AI is no longer just a tool for execution or collaboration within cultural systems, but an actor provoking reflection and redefinition.

Table 2 Representative paradigms of AI’s role across disciplines and the theoretical extension proposed in this study.

Research Domain	Typical Role of AI	Representative Scholars	Approach to Culture and Meaning	This Study’s Theoretical Extension
HCI / Co-Creation	Collaborative Partner	Lindgren (2025); Xie et al. (2025); Zhang et al. (2025)	Treats culture as design context, material, or input	Shifts focus from collaborative support to AI’s role in triggering cultural co-definition
Responsible / Ethical AI	Governed System	Peters et al. (2020); Deshpande & Sharp (2022); Dignum (2019)	Addresses culture mainly through bias, fairness, and representational risk	Moves beyond bias and governance toward cultural reflexivity in situated practice
Computational	Autonomous	Ventura (2019); Veale & Pérez y	Emphasizes novelty and	Rejects AI’s creative autonomy,

Creativity	Creator	Pérez (2012)	recognizable creative intention	arguing that task definition should remain with cultural practitioners
This Study	Generative Reflexive Actor	—	Treats cultural meaning as negotiated, situated, and made visible through deviation	Defines AI as a generative reflexive actor that facilitates cultural reflection, negotiation, and task co-definition

Accordingly, this study defines AI as a *generative reflexive actor*—a technological agent exposing implicit cultural assumptions through semantic deviations and unexpected outputs, prompting humans to redefine tasks and meanings during creation. This role can be understood through three interrelated dimensions: Generativity—AI’s probabilistic mechanisms produce outputs exceeding human expectation, making semantic mismatches catalysts for reflection; Reflexivity—deviations prompt practitioners to recognize overlooked meanings, rendering implicit cultural logics visible and discussable; and Agency—AI alters communication and negotiation modes within communities, transforming implicit norms into explicit subjects of dialogue and exerting a mediating influence within the cultural system.

Thus, AI should be regarded neither as a passive tool nor as an autonomous creator, but as a reflexive medium—one that triggers reflection through deviation and facilitates negotiation through articulation. This reconceptualization lays the groundwork for the next section, which develops the *Culturally Situated Task Definition (CSTD)* perspective to further explain how AI participates in the co-definition of “what is worth generating.”

5.2 Toward a Culturally Situated Task Definition (CSTD) perspective

Building upon the redefinition of AI as a generative reflexive actor, this section develops a perspective on how engagement with AI in cultural practice reshapes the definition of creative tasks. It responds to the three types of cultural deviation identified earlier—semantic, processual, and communal—and asks how such deviations prompt a reconsideration of creative tasks in practice.

When AI exposes implicit cultural assumptions and triggers reflection, these moments become part of the creative task itself. This insight aligns with Science and Technology Studies (STS), which regards technology not as a static tool but as a dynamic medium that continuously adjusts and reshapes meaning through cultural feedback loops (Latour, 2005).

Expanding on this understanding, the study proposes the Culturally Situated Task Definition (CSTD) perspective. It argues that the challenge of AI’s cultural adaptation lies not in completing predefined tasks more efficiently, but in how creative tasks themselves are defined, negotiated, and transformed within cultural contexts. Here, GenAI functions as a generative-reflexive trigger that introduces deviation,

externalizes hidden assumptions, and activates subsequent reflection and negotiation.

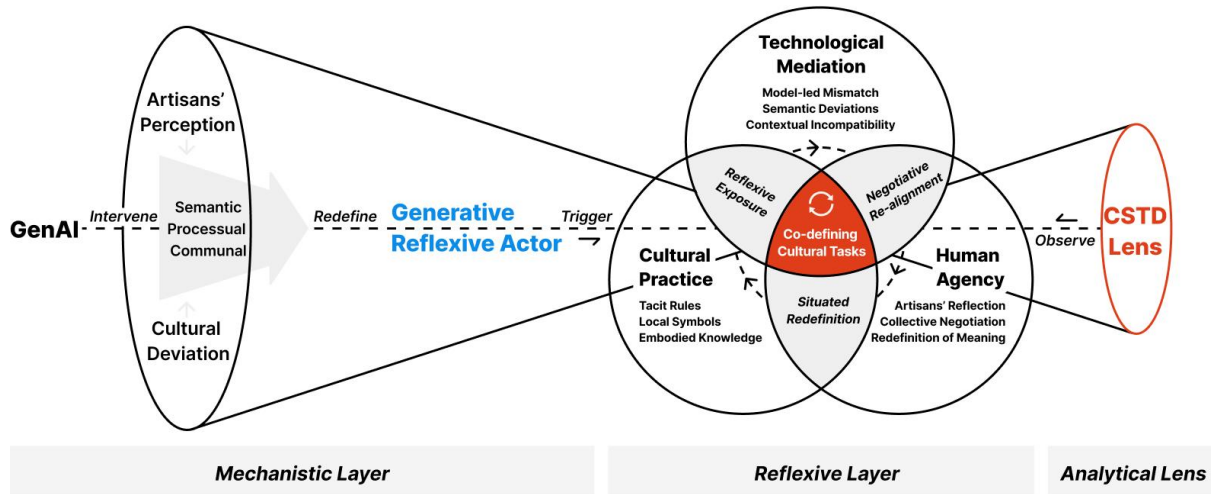


Figure 4 Overview of the Culturally Situated Task Definition (CSTD) framework.

As illustrated in Figure 4, the framework moves from a mechanistic layer to a reflexive layer. At the mechanistic layer, deviation appears as a perceptible mismatch that makes tacit assumptions discussable. The reflexive layer then captures how these exposed assumptions are interpreted, negotiated, and translated into redefinitions of the task. CSTD organizes this process through three interrelated dimensions—Cultural Practice, Technological Mediation, and Human Agency—whose associated elements indicate how situated task reformulation unfolds. Their intersections capture three reflexive moments through which deviation is exposed, negotiated, and re-situated in practice; at the centre, these processes converge in the ongoing shaping of what is worth generating, how it should be judged, and what counts as culturally meaningful transformation.

As an analytical lens, CSTD allows the framework to be read in reverse: not only to trace how deviation leads to task reformulation, but also to examine how situated practices, mediations, and forms of agency make such reformulation possible. It can therefore be used to analyse not only what kinds of deviations emerge, but also how communities interpret them, which assumptions become contestable, and how creative criteria are reworked in practice.

Although CSTD is abstracted from the Huayao embroidery case, it offers a transferable, process-oriented lens for analysing how AI-triggered deviation becomes a resource for redefining task in practice. This lens is most applicable to culturally grounded creative contexts in which meaning remains tacit, situated, and open to negotiation, rather than to domains with standardized tasks and fixed evaluation criteria.

6. Conclusion and future work

Through ethnographically informed generative experiments in Huayao cross-stitch practice, this study shows how generative AI exposes implicit cultural assumptions and triggers meaning negotiation through semantic deviation. It proposes the Culturally Situated Task Definition (CSTD) perspective to explain this mechanism

and offers a basis for future work in design anthropology and ethnographically informed AI research. The study has three main limitations. First, the findings are drawn from a single community and need to be tested across other heritage cultures and generational contexts. Second, AI was positioned as a generative probe rather than a productive tool, so semantic modeling and algorithmic performance were not systematically examined. Third, the study does not include longitudinal tracking of the broader social effects that may emerge as AI becomes embedded in cultural ecosystems.

Future work should extend this study technically, culturally, and socially. Technically, AI design should integrate contextual and cultural feedback mechanisms to make its generative logic more responsive to local symbolic systems and creative rhythms, while avoiding the algorithmization of “cultural deviations,” which could flatten diversity and weaken reflexivity. Culturally, longitudinal studies could examine how AI-induced deviations cultivate or reshape cultural awareness, particularly in evolving notions of authenticity and creative value. Socially, future inquiry should explore how AI might move beyond one-time generation to become meaningfully embedded in community collaboration and collective judgment, serving as a medium for re-culturalization rather than replacing traditional mechanisms of social creativity.

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