

Understanding Designers' Perceptions of the Usefulness of Generative AI Tools in Creative Design Processes

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1 INTRODUCTION

In September 2022, a Midjourney-generated artwork took first place at the Colorado State Fair. The unprecedented win publicized the effectiveness of Generative AI (GenAI) in the creative field and brought a hint of insecurity to professional designers and artists. In public narratives, GenAI is usually reduced to various text-based consumer chatbots like ChatGPT and Midjourney that people actively test and play with for different purposes. With the controversy around GenAI in both public and academic areas, we focus on the capabilities of GenAI in creative design processes, in relationships with organizational goals that fulfill business-oriented needs, and in the labor designers invest in. We ask these **research questions**: 1. *How do designers understand and identify creative processes in their design workflow?* 2. *How do designers use GenAI tools for their creative design work? What is helpful and what is not?* 3. *How do stakeholders in their business-oriented context assess their creativity-driven design?*

Based on our interview data, we identify three core creative processes across design practices: ideation, storytelling, and crafting. During ideation, designers generate multiple ideas emphasizing both quantity and variety while striving for quality and novelty [20], discovering new possibilities through reflective exploration of problem and solution spaces [9]. Crafting involves the thoughtful manipulation and refinement of design elements to transform abstract concepts into concrete manifestations [6]. This process demands both technical expertise and creative intuition as designers make intentional decisions about forms, materials, visual elements, and interactions to achieve both aesthetic qualities and functional outcomes [19]. Storytelling weaves narratives that connect solutions with human contexts and meanings [17]. Through this process, designers creatively construct compelling narratives that communicate not just what the design is, but why it matters and how it fits into people's lives, helping audiences envision future possibilities [2].

By focusing on designers' experiences with GenAI tools in the core creative processes, we find that AI tools excel in unexpected areas like conceptual exploration and narrative building, while struggling with material constraints and contextual nuances. We provide empirical cases that display designers' interactions with GenAI tools in their professional practices. We identify limited designers' autonomy in their interactions with GenAI tools, which limits designers' creative potential. Furthermore, GenAI tools appear to boost efficiency in the design industries but conceal

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designers' extra labor put into the design. These insights push us to reconsider how these tools can meaningfully support professional design practices.

2 BACKGROUND AND RELATED WORK: GENERATIVE AI TOOLS IN DESIGN PRACTICES

Design practices and workflows are shaped by various factors, including design goal, audience, and medium. For example, industrial design translates human needs into tangible solutions [16], urban design orchestrates living environments [13], visual and animation design focuses on narratives and conversations through using diverse media [14], product and experience design shape interactions across digital and physical realms [15] [3], and creative media and speculative design challenge technological and social conventions through narrative provocations for alternative futures [10]. In the business-oriented design industries, in response to market demands [3], designers often engage in distinctive creative processes - exploring problem and solution spaces simultaneously [9], working through cycles of ideation and reflection [18], and translating abstract concepts and ideas into concrete forms and solutions [7]. With AI tools reshaping how designers work into more fluid, hybrid approaches [22], studying specific industry workflows alone would limit our understanding of AI's impact on fundamental design processes.

The design field has seen rapid adoption of AI tools across the entire design process. For visual creation, tools like DALL-E, Midjourney, and Adobe Firefly support ideation and content generation [21]. AI's applications in interface design now span sketch-based design retrieval, layout optimization, automated UI generation, prototyping assistance, and code generation from designs [12]. AI tools are also emerging for design critique and feedback [11]. These tools span from specialized domain-specific applications to broader design assistance systems that aim to support designers' creative workflows [8]. While recent industry surveys indicate the widespread use of AI to enhance efficiency and creative workflows [1], research reveals significant challenges in meaningfully integrating these tools into established design practices [22]. A key issue is that many current AI systems operate under simplified assumptions that don't reflect the complexity of real design work - their outputs often require substantial customization and fail to account for crucial contextual factors that influence design decisions [5]. Furthermore, while AI tools seem to optimize workflows by efficiency and productivity, Caramiaux and colleagues [4] caution us that poor quality in creative works lowers the market standards and further discriminates creative workers whose work cannot be easily integrated into GenAI-oriented workflows. This gap between AI's theoretical capabilities and practical design needs highlights the importance of examining how designers are actively working to incorporate AI tools into their creative processes in organizational contexts.

3 METHOD

We conducted semi-structured interviews to understand participants' experiences with AI tools in their creative and design work. We recruited industry practitioners who "have experience with using AI tools for their design work." We broadly defined design work as both work done in their role as designers in an organizational setting and personal design projects. We reached out to potential participants via the authors' professional networks and the authors' direct contacts who matched the criteria. Our 13 interview participants shared their experiences in 12 companies and in these design practices: product and experience design, graphic and animation design, urban design, creative media design, and speculative design. The interviews were conducted in English (n=7) and Chinese (n=4). During the semi-structured interviews, we first asked participants to describe their typical design workflow and then situated the questions we asked in their design goals and organizational settings, following our main research questions. Our study was approved by the Institutional Review Board at the University of Michigan.

4 FINDINGS: SITUATING THE ROLE OF GENAI TOOLS IN CORE CREATIVE PROCESSES

4.1 Ideation

Knowledge into ideas. Participants shared that they leveraged AI's capabilities of making associations and introducing technical concepts to gain inspiration for ideation. For example, P1 used AI to brainstorm how to optimize the design of a mobile app to solve battery drain issues: *"When I don't know what I want, give me the terms and the vocabulary to be able to articulate to myself what I want so I can do it. I don't know what caching was in this context. Before, I wouldn't even have thought of that because I'm not an expert, but now it gives me the Google-able term ... that's been very inspiring."* The exposure to technical concepts like "caching" and "background refreshes" led them to reimagine how the app could function. Similarly, when P2 explored baseball field layouts in her urban design work, the case studies that AI tools provided gave her a starting point to iterate on different arrangement possibilities she hadn't considered, which she then further analyzed using tools like Google Earth. The exposure to new domains and concepts triggers unexpected connections and novel approaches that designers might not have conceived from within their existing knowledge framework.

Rapid variation in early designs. AI's ability to rapidly generate multiple design variations proves valuable not just for efficiency, but for expanding designers' initial solution space. As P3 shared when exploring a navigation design, AI didn't simply produce variations of her initial search bar concept, but introduced fundamentally different approaches like tab bars with icons and category-based organization: *"I wouldn't have thought of using this categorization method to make navigation clearer."* This rapid exposure to different approaches early in the design process helps designers break out of their habitual thinking patterns and motivates them to consider alternative solutions they might not have conceived on their own.

Creative serendipity. AI's hallucinations and imperfect outputs serve as powerful catalysts for creative imagination. For example, AI's "nonsensical" generations—a reverse hot dog or a mysteriously baseless record player—sparked innovative design thinking for P3 in her I-SPY project. She embraced the strangeness of objects: *"One generated image immediately gave me the impression of a record player. But the problem was—it didn't have a base, no power source, nothing that made it work in a conventional sense. Instead of seeing this as a flaw, I thought: maybe this is its advantage. So, I assigned it a new job nature—a portable record player that you could place anywhere."* These hallucinations become springboards for imaginative problem-solving and storytelling.

Limited returns. AI's outputs in early ideation stages often prove disappointingly basic or unusable. Despite starting with the expectation that AI could generate useful rough ideas, P2 found that *"experience with them hasn't been great,"* even after trying various tools. This limitation becomes more concrete in her pet healthcare app project, where only about 20% of AI's generated wireframes proved useful enough to reference in the final design. The effort required to parse and substantially modify AI's suggestions might outweigh any potential time savings in the ideation phase.

4.2 Crafting

AI-powered iteration. AI's ability to rapidly generate and refine content facilitated designers to turn ideas into prototypes. P3 efficiently generated multiple design variations for clients to choose from, and then iteratively refined the selected option. This "reverse design" approach saves time and effort, especially in the early stages of communication with clients, minimizing the need for extensive revisions of hand-drawn sketches. Likewise, when P5 worked on a booth design project, he edited the AI-generated images from Midjourney in Photoshop by extending the canvas, creating variations, filling in spaces, and adding details, all of which he had to do manually to make the images "photorealistic-looking".

Lowering craft technical barriers. AI enables designers to realize their creative visions more freely and immediately. For P1, *"being able to not have to worry about technicalities here and there in terms of communicating my thought frees up my brain space...so that now that the conduit from going from an idea to execution is a little bit more lubricated."* Echoing his experience, P5 *"see[s] AI as an extension of my capabilities."* When creating a watercolor-style illustration of a hero image, rather than navigating a six to seven-week process of hiring and iterating with an illustrator, he could execute his vision in just 20 minutes using AI tools, despite not having traditional watercolor skills. This dramatic compression of the execution process expands designers' creative range while preserving their creative agency.

An implementation gap. Crafting a digital and physical product is challenging for AI tools. P6 points out that the sensory aspects and material properties of the final product, such as the hardness and welding process of stainless steel, cannot be fully captured by AI models or computer renderings alone. Apart from the tactile experience of the end product, P7 also recognized the limitations of AI outputs: *"they don't follow the company's design guidelines or use components from the design library, so engineers would struggle to understand the mock."* In P3's words, *"these designs don't really align well with the specific structure of your homepage or service configurations—they're mostly generic, just giving you some basic buttons."* Their insights emphasize the need for massive manual fine-tuning to bring human expertise and context-specific knowledge to AI-mediated crafting tasks.

4.3 Storytelling

AI as a storytelling partner. AI tools help designers construct and articulate narratives, particularly in situations requiring quick story development from disparate elements. P4 found AI tools useful to bridge communication gaps when client direction is unclear: *"One time we had to make a video for a project, and the client did not have any script for us. We didn't even know what the process was going to be like, so I just asked ChatGPT to generate a script for me. Somehow it made it into the final cut."* In P8's logo design for Queering China Archive, they first identified conceptual elements like queer, rainbow flag, and hermaphrodite mythical creatures in Chinese myth tales, as well as personal stories, archives, and fluidity as keywords. P8 then asked AI to provide a story: *"It found me a story about a hermaphrodite mythical creature that has colorful feathers. And suggested me to further imagine how the bird sings the stories of people, which I find pretty amazing."* These unexpected connections and narrative frameworks proposed by AI provide a starting point for designers to develop and refine.

5 POTENTIAL CONTRIBUTIONS

In the context of business-oriented organizations, we observe that GenAI tools fail to reflect nuances that designers intend to display and the physical and organizational contexts they need to take into account. As such, in organizations that are run by capitalist logic, the collaboration workflow with GenAI becomes time- and labor-consuming, requiring extra human labor to adjust and polish the outputs. In addition, it is challenging to implement GenAI outputs—conceptual design products—in real-life settings, as materialization requires additional sets of knowledge about the physical world. Second, while GenAI tools as consumer products advertised for creative industries are predefined with underlying technologies to predict and generate what is close to the designers' intention, random and even hallucinated outputs of GenAI also indicate possibilities for creativity. Lastly, GenAI has imposed ethical concerns on the design industry. We have shown that designers' focus shifts in order to integrate GenAI outputs in their design. Designers enjoy creative processes such as sketching ideas, crafting details, and experimenting with visual elements. Such fun processes have been diluted with GenAI's intervention, which further perpetuates the stereotype that creative design cares only about results and omits human labor invested in the design processes.

A APPENDIX: MATRIX OF AI USAGE PATTERNS IN CREATIVE PROCESSES.

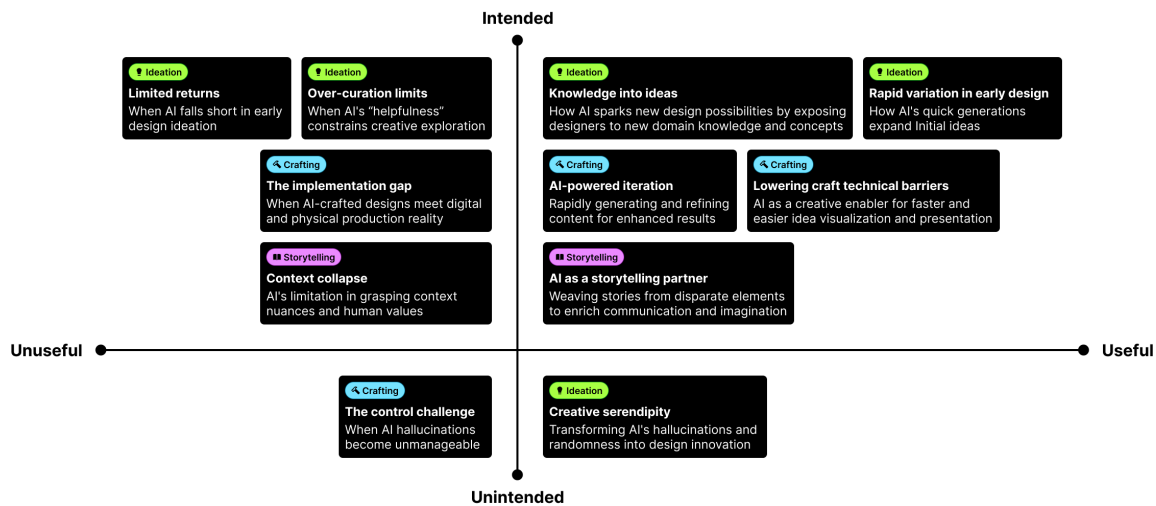


Fig. 1. Matrix of AI Usage Patterns in Creative Processes

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