Designing with Generative AI: Symbiosis, Authorship, and the Evolving Image

she ji
[ʃə: ʤi:]

Designing with Generative AI: Symbiosis, Authorship, and the Evolving Image

Morteza Abdipour

Keywords
design research
generative AI
authorship
symbiosis
interactional literacy
design pedagogy

Received
August 31, 2025
Accepted
February 2, 2026

MORTEZA ABDIPOUR
Department of Computer Science and Engineering, Chalmers University of Technology and University of Gothenburg, Gothenburg, Sweden
abdipour@chalmers.se

Abstract
This article explores how generative AI reshapes authorship, presence, and meaning in design. To situate this shift, it compares today's disruption with photography's nineteenth-century challenge to painting, when automation displaced documentation and creativity shifted toward perception and subjectivity. A similar redistribution occurs today: as generative systems automate craft, creativity is reconfigured toward prompting, iteration, and negotiation. The article advances three conceptual contributions. First, the symbiosis–agency–meaning-making triangle offers a heuristic for analyzing how authorship unfolds in human–system interaction. Second, the concept of interactional literacy names the competences required to navigate co-adaptive AI systems, extending debates on design and AI literacy toward practices of negotiation and reflection. Third, aura is reframed through three models — prompt aura, interactional aura, and algorithmic signature — translating Walter Benjamin's contested concept into design-relevant dimensions and showing how presence emerges as resonance layered across prompts, processes, and system tendencies. Together, these frameworks highlight that authorship is redistributed through negotiation and response; that aura is reconfigured as a relational presence built across iterative layers; and that literacy emerges not as mastery but as dialogue. For design research, the task is to develop systems, practices, and pedagogies that sustain authorship as accountable, plural, and open to critique in the age of generative AI.

Peer review under responsibility of Tongji University.

http://www.sciencedirect.com/journal/she-ji-the-journal-of-design-economics-and-innovation
https://doi.org/10.1016/j.sheji.2026.02.004

Introduction

This article explores a far-reaching question: what happens to authorship when creativity becomes entangled with machines?

Technological shifts repeatedly reconfigure how images are made, seen, and valued. The arrival of photography in the nineteenth century displaced the authority of hand-rendered realism, challenging the painter's role as a producer of perceptual truth. Today, generative AI poses a parallel disruption: it automates execution, generating complex visual outputs from textual prompts, and in doing so raises new questions about authorship, presence, and meaning. In both moments, creativity does not vanish but relocates, migrating into new practices of negotiation and interpretation.

The goal of this article is not to provide definitive answers but to develop conceptual tools—heuristics that make visible how authorship persists, shifts, and is contested under changing technological conditions**.** The article develops three contributions. The first is the symbiosis–agency–meaning-making triangle, a heuristic for analyzing how creative authorship is redistributed in human–system relationships.[1] The second is the concept of interactional literacy, which extends debates on media and AI literacy[2] by naming a competence that becomes central when authorship shifts from execution to negotiation.[3] The third reframes the elusive concept of aura by outlining three design-relevant models—prompt aura, interactional aura, and algorithmic signature—that situate presence not in singular works but in distributed processes.[4] Together, these frameworks suggest that authorship in the age of generative AI is not dissolved but transformed, emerging in new sites of negotiation between human intent, iterative interaction, and algorithmic influence.

Similar arguments have been advanced in recent scholarship. Sungjin Park contends that generative AI reconfigures design practice, making craft and interpretive agency more essential rather than obsolete.[5] Empirical research supports this perspective, showing that generative AI requires designers to develop new forms of interactional literacy to negotiate meaning across ideation, prototyping, and evaluation.[6] Jon McCormack, Toby Gifford, and Patrick Hutchings likewise analyze how autonomy, authorship, and intention are negotiated in computer-generated art,[7] while Steffen Holter and Mennatallah El-Assady propose a framework for understanding human-AI collaboration across dimensions of agency, interaction, and adaptation.[8]

This article does not aim to survey AI research comprehensively. Instead, it approaches generative systems from a design and visual culture perspective. The perspective is grounded in art and design history and in the practice of interaction design, while drawing selectively on Human-Computer Interaction (HCI) and AI-related studies where they intersect with questions of authorship and presence.

Design research provides a crucial foundation for this argument. Harold Nelson and Erik Stolterman describe design as a way of navigating complexity through judgment and choice,[9] while Johan Redström emphasizes that design theory itself emerges from practice and that interaction design is less about producing stable artifacts than about shaping conditions for interaction.[10] This orientation resonates with Christopher Frauenberger's

1 Harold G. Nelson and Erik Stolterman, *The Design Way: Intentional Change in an Unpredictable World*, 2nd ed. (Cambridge, MA: MIT Press, 2012), https://doi.org/10.7551/mitpress/9188.001.0001; Johan Redström, *Making Design Theory* (Cambridge, MA: MIT Press, 2017); Christopher Frauenberger, "Entanglement HCI The Next Wave?," *ACM Transactions on Computer-Human Interaction* 27, no. 1 (2020): article no. 2, https://doi.org/10.1145/3364998.

2 Sonia Livingstone, "Media Literacy and the Challenge of New Information and Communication Technologies," *The Communication Review* 7, no. 1 (2004): 3–14, https://doi.org/10.1080/10714420490280152.

3 Duri Long and Brian Magerko, "What Is AI Literacy? Competencies and Design Considerations," in *CHI '20: Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems* (New York: ACM, 2020), 1–16, https://doi.org/10.1145/3313831.3376727; Maalvika Bhat and Duri Long, "Designing Interactive Explainable AI Tools for Algorithmic Literacy and Transparency," in *DIS '24: Proceedings of the 2024 Designing Interactive Systems Conference* (New York: ACM, 2024), 939–57, https://doi.org/10.1145/3643834.3660722; Davy Tsz Kit Ng et al., "Conceptualizing AI Literacy: An Exploratory Review," *Computers and Education: Artificial Intelligence* 2 (2021): article no. 100041, https://doi.org/10.1016/j.caeai.2021.100041.

4 Walter Benjamin, *The Work of Art in the Age of Its Technological Reproducibility, and Other Writings on Media*, ed. Michael W. Jennings et al. (Cambridge, MA: Harvard University Press, 2008); Susan Sontag, *On Photography* (New York: Farrar, Straus and Giroux, 1977).

5 Sungjin Park, "The Work of Art in the Age of Generative AI: Aura, Liberation, and Democratization," *AI & SOCIETY* 40, no. 3 (2025): 1807–16, https://doi.org/10.1007/s00146-024-01948-6.

6 Jialei Jiang et al., "Toward a 'More-Than-Digital' AI Literacy: Reimagining Agency and Authorship in the Postdigital Era with ChatGPT," *Postdigital Science and Education* 6, no. 3 (2024): 922–39, https://doi.org/10.1007/s42438-024-00477-1; Samangi Wadinambiarachchi et al., "The Effects of Generative AI on Design Fixation and Divergent Thinking," in *DIS '24: Proceedings of the CHI Conference on Human Factors in Computing Systems* (New York: ACM, 2024), article no. 380, https://doi.org/10.1145/3613904.3642919.

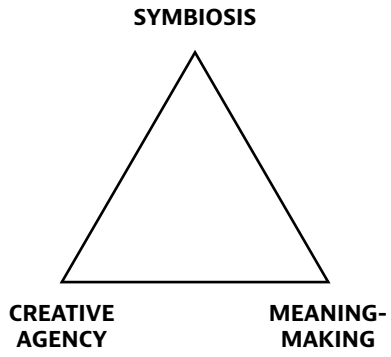

Figure 1
The symbiosis–agency–meaning-making triangle: a heuristic for analyzing authorship in human-AI collaboration. © 2026 Morteza Abdipour.

proposal for "entanglement HCI," which conceives of technology as co-constitutive of human practice and underscores that agency is always negotiated in situated contexts.[11]

Central to this framing is the symbiosis–agency–meaning-making triangle (Figure 1). The triangle is not presented as a solution but as a heuristic, holding together three dimensions that repeatedly surface in the redistribution of authorship: symbiosis highlights the entanglement of human and system; agency foregrounds the intentional choices that remain; and meaning-making situates creativity in cultural and interpretive contexts. Together, they anchor the contributions that follow.

The argument unfolds in stages. I begin with the nineteenth century, revisiting how photography unsettled realism and how painters reasserted authorship in new ways. I then turn to the present, where generative AI introduces a different disruption. Building on these trajectories, I develop the concept of symbiosis through a vignette of human-AI interaction, reframe aura through three layered models, and situate these frameworks within design research and ethical debates, before concluding with reflections on how authorship might be sustained as a contested but enduring condition. The following discussion of photography sets the historical ground for these later arguments.

Realism and the Photographic Disruption: Painting, Authorship, and Aura

To understand today's disruption, it helps to revisit an earlier one: the arrival of photography, which unsettled realism and forced painting to redefine its role. The emergence of photography in the nineteenth century posed a profound challenge to dominant Western visual traditions. Academic realism, rooted in hand-rendered accuracy and technical mastery, was suddenly confronted by a new medium capable of reproducing detail with unprecedented fidelity and speed.[12] Painters such as Gustave Courbet, with *The Stone Breakers* (1849), and Jean-François Millet, with *The Gleaners* (1857), invested brushwork with the authority of perceptual truth, depicting the dignity and hardship of everyday labor with social weight and visual precision.[13]

7 Jon McCormack et al., "Autonomy, Authenticity, Authorship and Intention in Computer Generated Art," in *Computational Intelligence in Music, Sound, Art and Design*, ed. Anikó Ekárt et al. (Cham: Springer, 2019), 35–50, https://doi.org/10.1007/978-3-030-16667-0_3.
8 Steffen Holter and Mennatallah El-Assady, "Deconstructing Human-AI Collaboration: Agency, Interaction, and Adaptation," *Computer Graphics Forum* 43, no. 3 (2024): e15107, https://doi.org/10.1111/cgf.15107.
9 Nelson and Stolterman, *The Design Way.*
10 Redström, *Making Design Theory.*
–
11 Frauenberger, "Entanglement HCI The Next Wave?"
12 Charles Rosen and Henri Zerner, *Romanticism and Realism: The Mythology of Nineteenth-Century Art* (New York: Norton, 1985).
13 Timothy J. Clark, *The Painting of Modern Life: Paris in the Art of Manet and His Followers*, rev. ed. (1985; Princeton, NJ: Princeton University Press, 1999).

Photography threatened to bypass this interpretive labor altogether, replacing the artist's hand with a mechanical process that seemed to deliver images directly from the world.[14]

The disruption was not only technical but epistemological. Early photographs introduced an evidential mode of vision that reshaped expectations of realism. Unlike painting, which was always mediated by interpretation, the photograph appeared immediate and indexical—what Susan Sontag later called "a trace, something directly stenciled off the real."[15] Contemporary scholarship underscores that photography was never a neutral mirror but a material and cultural practice, embedding images in new forms of circulation, storage, and knowledge.[16] As Andy Grundberg argues in *Crisis of the Real*, photography's realism has always been culturally constructed, producing not only evidence but also aesthetic and ideological claims.[17] Photography was not the sole cause of painting's turn toward subjectivity, but it strongly encouraged artists to explore what cameras could not capture—light, sensation, atmosphere, and memory.

By the late nineteenth century, this reorientation took shape in Impressionism and Symbolism. Impressionist painters such as Claude Monet and Édouard Manet foregrounded fleeting perception and sensation as legitimate subjects, while Symbolist artists like Odilon Redon and Edvard Munch sought to visualize states of memory and imagination. Recent critics emphasize that photography's realism was itself unstable, continuously negotiated between evidential and expressive claims.[18] What seemed like photography's encroachment became painting's opportunity to redefine its purpose, a trajectory that opened the way to modernism.

Photography and Aura

This shift also raised new questions about authorship and presence. Walter Benjamin's account of the "aura" of the artwork—the unique, time-bound existence of a work in physical space—captured what seemed to be lost in mechanical reproduction.[19] Photographs could be endlessly duplicated, lacking the singular here-and-now of painting. Yet even as aura was said to decline, new forms of authorship emerged. Elizabeth Edwards emphasizes that photographs are historical practices rather than mere visual traces, reminding us that images are always embedded in social contexts.[20] Photographers such as Julia Margaret Cameron used blur, focus, and shadow to assert a subjective voice, while Alfred Stieglitz framed photography as a legitimate art form through expressive composition.[21] What appeared at first as a threat to artistic agency became, for many, an expansion of it.

Seen through the lens of symbiosis, this was not rupture but reconfiguration. Photography absorbed the role of mechanical documentation, while painting pursued new modes of expression. The two forms diverged but also influenced one another, reshaping both artistic practice and cultural perception. Authorship no longer meant controlling every detail of representation; it became the act of navigating a shifting visual field in dialogue with machines-mediated process.

For design research, this history highlights a recurring pattern: when a new tool automates a valued skill, creative practice adapts by redefining

14 Benjamin, *The Work of Art.*
15 Sontag, *On Photography, 154.*
16 Geoffrey Batchen, *Negative/Positive: A History of Photography* (London: Routledge, 2020); Elizabeth Edwards, *Photographs and the Practice of History: A Short Primer* (London: Bloomsbury Academic, 2022).
17 Andy Grundberg, *Crisis of the Real: Writings on Photography*, 3rd ed. (1990; New York: Aperture, 2010).
18 Robert Rosenblum, *Modern Painting and the Northern Romantic Tradition: Friedrich to Rothko* (London: Thames and Hudson, 1975).
19 Benjamin, *The Work of Art.*
20 Edwards, *Photographs and the Practice of History.*
21 Grundberg, *Crisis of the Real.*

where meaning and agency reside. The lesson is not that technology replaces human labor, but that it redistributes creativity across new sites of negotiation. This principle remains vital today: the design challenge is not to shield creativity from automation, but to design systems that preserve choice, interpretive framing, and stylistic development as creative conditions evolve.

At this point, it is important to clarify a distinction. While photography and generative AI both disrupt established practices of image-making, they do so through fundamentally different ontological relations to the world. Photography maintains an indexical connection to its subject: it records light reflected from objects, producing an image through a causal chain that links representation to a specific moment and place. Even when photographs are staged or manipulated, their authority has historically rested on this evidential relation to the real—a relation that underpinned debates about realism, truth, and aura in the nineteenth and twentieth centuries.

Generative AI, by contrast, does not record the world but synthesizes images from statistical associations learned from large datasets. Its outputs have no singular referent or originating event; they are probabilistic constructions rather than traces of presence. For this reason, the comparison between photography and generative AI should not be read as an ontological equivalence. Instead, the historical analogy functions as a heuristic: a way of understanding how creative practice adapts when technologies automate once-central skills. The value of the comparison lies not in equating photographic indexicality with algorithmic synthesis, but in tracing a recurring pattern of reconfiguration, in which authorship is displaced from execution toward framing, interpretation, and negotiation.

In this sense, the arrival of generative AI can be understood as a parallel reconfiguration: not of documenting the world, but synthesizing it, and in the process shifting authorship from manual craft toward conceptual guidance and negotiation. The reconfiguration of authorship around realism and aura therefore foreshadows how generative AI unsettles design—not by abolishing creativity, but by redirecting it.

Generative AI Turn: From Craft to Guidance

Where photography documented the world, generative AI synthesizes it. This marks a different kind of disruption. If photography redefined realism by capturing the world with mechanical precision, generative AI introduces another transformation: it invents visual worlds that have never existed. These systems do not document; they synthesize—constructing images from statistical associations learned from training data. The artist's role shifts accordingly: from manual craft to conceptual guidance and negotiation with a model. Authorship is exercised less through the hand than through framing, prompting, and curating, a process that scholars describe as distributed across human and machine agency.[22]

Prompting as Practice

Central to this practice is the prompt, which functions less as a fixed command than as an invitation to dialogue. A few words can generate entire

22 McCormack et al., "Autonomy, Authenticity, Authorship"; Holter and El-Assady, "Deconstructing Human-AI Collaboration."

scenes, but the process is iterative—intent clarified through cycles of variation, revision, and selection.[23] In this back-and-forth, authorship migrates from embodied execution toward language-based framing, exploration, and critical choice.

Studies of creative prompting describe users adapting mental models of how systems "think," developing idioms and tactics that steer outputs without fully controlling them.[24] Designers likewise report learning to anticipate algorithmic tendencies, a skill that requires building tacit models of system behavior.[25] Prompting in this sense becomes a competence that develops through practice rather than a one-off instruction.

This shift has important consequences for design research. Scholars describe "prompt-based authorship," where creative identity is shaped by the genealogy of instructions, rejections, and refinements rather than the physical trace of a hand. Recent work emphasizes that prompting itself functions as a kind of literacy—the ability to work with language strategically to shape generative outcomes.[26]

Style and Pedagogy

Design education has always redefined skill when media shift. Renaissance perspective drawing trained the eye-hand relation; Bauhaus emphasized typography and composition; CAD redefined architectural training; Photoshop brought layers and filters as literacy in digital image-making. Prompt and interactional literacy extend this lineage: they describe the competences required when authorship migrates into language, iteration, and curation.[27]

Questions of style sit at the center of this turn. Generative AI compresses years of technical training into a few lines of text. Some interpret this as democratization,[28] while others warn of aesthetic convergence, where shared training data and default parameters flatten diversity.[29] Rather than framing the issue as access versus quality, a design perspective asks how tools might expand stylistic variation—nudging exploration beyond dominant defaults, supporting personal idioms, and surfacing alternatives that resist homogenization.

Interactional Literacy

Prompting is not equivalent to embodied craft. The labor of brushstroke or chisel is compressed into text, raising doubts about whether authorship here can carry the same weight. Yet disembodied authorship is not new: architects, composers, and filmmakers often guide rather than execute. What changes with AI is the immediacy and opacity of that mediation, which foregrounds negotiation with the system as the site of authorship.

Compared to photography, the stakes are also ontological. Photography captured the world as it appeared; generative systems assemble images as probabilistic artifacts—composites of interpolation and association. As Amanda Wasielewski[30] argues, AI-generated photographs destabilize assumptions about visibility and truth. For interaction design, the implication is practical: systems should help users read the status of an image—representation, invention, or something in between—so that decisions about use, attribution, and interpretation are made with awareness rather than guesswork.[31]

23 Frederic Gmeiner et al., "Exploring Challenges and Opportunities to Support Designers in Learning to Co-create with AI-Based Manufacturing Design Tools," in *CHI '23: Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems* (New York: ACM, 2023), article no. 226, https://doi.org/10.1145/3544548.3580999.

24 Sander Schulhoff et al., "The Prompt Report: A Systematic Survey of Prompt Engineering Techniques," arXiv, preprint, last revised February 26, 2025, https://doi.org/10.48550/arXiv.2406.06608; Hari Subramonyam et al., "Prototyping with Prompts: Emerging Approaches and Challenges in Generative AI Design for Collaborative Software Teams," in *CHI '25: Proceedings of the 2025 CHI Conference on Human Factors in Computing Systems* (New York: ACM, 2025), article no. 882, https://doi.org/10.1145/3706598.3713166.

25 Gmeiner et al., "Exploring Challenges and Opportunities."

26 Jonas Oppenlaender et al., "Prompting AI Art: An Investigation into the Creative Skill of Prompt Engineering," *International Journal of Human–Computer Interaction* 41, no. 16 (2024): 10207–29, https://doi.org/10.1080/10447318.2024.2431761.

27 Katja Fleischmann, "Generative Artificial Intelligence in Graphic Design Education: A Student Perspective," *Canadian Journal of Learning and Technology* 50, no. 1 (2024): 1–17, https://doi.org/10.21432/cjlt28618.

28 James Manyika et al., "Harnessing Automation for a Future That Works," McKinsey Global Institute, January 12, 2017, https://www.mckinsey.com/featured-insights/digital-disruption/harnessing-automation-for-a-future-that-works.

29 Aditya Ramesh et al., "Hierarchical Text-Conditional Image Generation with CLIP Latents," arXiv, preprint, submitted April 13, 2022, https://doi.org/10.48550/ARXIV.2204.06125.

30 Amanda Wasielewski, "Unnatural Images: On AI-Generated Photographs," *Critical Inquiry* 51, no. 1 (2024): 1–29, https://doi.org/10.1086/731729.

31 Maurice Jakesch et al., "Human Heuristics for AI-Generated Language Are Flawed," *PNAS* 120, no. 11 (2023): e2208839120, https://doi.org/10.1073/pnas.2208839120.

From this perspective, a prompt is not only instruction but action. As Terry Winograd and Fernando Flores[32] argued, language is always performative—it brings about new states of affairs. Prompts instantiate this directly: they are not neutral descriptions but interventions that provoke system behavior, enabling a dialogue in which each turn reshapes what authorship can mean.

Authorship in this setting is best understood as distributed and entangled. Outputs reflect human intention and algorithmic tendency; creation unfolds through negotiation between imagination and system behavior. As Claudio Melchior and Manuela Farinosi[33] show, early adopters of generative AI in the creative industries describe co-creative relationships in which the designer is at once director and respondent—guiding the system while also being shaped by its responses. Interfaces also matter: they become sites of negotiation rather than mere control panels. The way versions are compared, the degree to which influences are surfaced or concealed—all shape the forms of authorship that become possible.[34]

Crucially, this is not a passive role. Users develop interactional literacy by learning to work with system behaviors, manage ambiguity, and refine meaning across iterative exchanges. Interactional literacy builds on media, digital, and AI literacy traditions, but differs by foregrounding negotiation with opaque, co-adaptive systems—a competence less addressed in existing accounts. Extending media literacy and HCI work on AI literacy,[35] interactional literacy highlights skills for navigating co-adaptive systems: balancing surprise and intention, reading feedback, and cultivating a style across versions.[36]

A pedagogical corollary follows: just as perspective drawing or Photoshop once required instruction and critique, prompting and curation may now require structured teaching—critiques of decision trails rather than brushstrokes, reflections on language rather than layers.[37]

At the same time, this literacy has limits. Unlike long apprenticeships to a medium, prompting is quicker to acquire and more fragile to sustain, as it depends on shifting models, proprietary platforms, and algorithmic defaults. Infrastructural opacity and biased training data can dampen distinctiveness or funnel work toward recognizable "model signatures." This raises questions about how far prompt idioms can accumulate into stable artistic identities.[38] Scholars also warn that authorship cannot be separated from the infrastructures of labor and ownership that underlie generative systems.[39] In such settings, authorship unfolds through situated exchanges between human intention and system behavior.

Generative AI not only alters how images are produced but also complicates where responsibility and authorship are located. In prompt-based systems, designers articulate intentions through language, yet the semantic content of the resulting images is assembled through probabilistic processes that remain largely opaque. This condition introduces a gap between what is intended and what is produced, challenging traditional assumptions that authorship implies direct control over meaning. In such contexts, responsibility cannot be grounded solely in execution, since creative outcomes emerge through interactions with systems whose internal operations exceed human oversight.

32 Terry Winograd and Fernando Flores, *Understanding Computers and Cognition: A New Foundation for Design* (Boston: Addison-Wesley Longman, 1987).

33 Claudio Melchior and Manuela Farinosi, "Toward Human-AI Co-creativity? An Exploration of Early Adopters' Perspectives and Experiences with GenAI in the Creative Industries," in *Artificial Creativity: Looking at the Future of Digital Culture*, ed. Alessandra Micalizzi (Cham: Springer, 2025), 183–208, https://doi.org/10.1007/978-3-031-88334-7_15.

34 Kay Kender and Christopher Frauenberger, "The Shape of Social Media: Towards Addressing (Aesthetic) Design Power," in *DIS '22: Proceedings of the 2022 ACM Designing Interactive Systems Conference* (New York: ACM, 2022), 365–76, https://doi.org/10.1145/3532106.3533470; Fernando Delgado et al., "The Participatory Turn in AI Design: Theoretical Foundations and the Current State of Practice," in *EAAMO '23: Proceedings of the 3rd ACM Conference on Equity and Access in Algorithms, Mechanisms, and Optimization* (New York: ACM, 2023), article no. 37, https://doi.org/10.1145/3617694.3623261.

35 Livingstone, "Media Literacy and the Challenge"; Long and Magerko, "What Is AI Literacy?"; Bhat and Long, "Designing Interactive Explainable AI Tools."

36 Gmeiner et al., "Exploring Challenges and Opportunities."

37 Roger Whitham et al., "Re-imagining and Reaffirming Design Pedagogy in Response to Generative AI Tools," in *DRS2024: Boston*, ed. C. Gray et al. (Boston: DRS, 2024), https://doi.org/10.21606/drs.2024.953; Jiang et al., "Toward a 'More-Than-Digital' AI Literacy."

38 Kate Crawford, *Atlas of AI: Power, Politics, and the Planetary Costs of Artificial Intelligence* (New Haven: Yale University Press, 2021), https://doi.org/10.2307/j.ctv1ghv45t.

39 Luke Stark and Kate Crawford, "The Work of Art in the Age of Artificial Intelligence: What Artists Can Teach Us about the Ethics of Data Practice," *Surveillance & Society* 17, no. 3/4 (2019): 442–55, https://doi.org/10.24908/ss.v17i3/4.10821.

Luciano Floridi describes this condition as one of semantic delegation, in which humans entrust aspects of meaning-making to systems that operate primarily at a syntactic level.[40] When semantic decisions are delegated in this way, a responsibility gap can emerge: humans remain accountable for outcomes they neither fully specify nor directly control. While Floridi develops this argument primarily within information ethics, the concept is highly relevant for design practices that rely on generative systems. Designers do not simply use tools; they negotiate with systems that participate in shaping content, interpretation, and consequence.

From this perspective, authorship in generative AI cannot be understood as mastery or command. Instead, it unfolds as an ongoing practice of responsibility under conditions of partial control. Here, interactional literacy becomes central. Interactional literacy does not eliminate the responsibility gap, but enables designers to recognize delegation, interpret system behavior, and remain accountable through iterative engagement. Authorship is thus reframed not as ownership of outputs, but as sustained responsibility across cycles of prompting, evaluation, and revision.

Finally, it is important to note that this discussion does not attempt to resolve the ethical questions raised by semantic delegation or to offer a comprehensive account of responsibility in AI systems. Rather, it positions the present framework within ongoing debates about delegation, agency, and accountability. By foregrounding responsibility as a design concern, the article situates interactional literacy as a critical competence for navigating authorship in co-adaptive, generative environments.

This paradox frames the next step in the argument. Like photography, generative AI does not abolish authorship; it reconfigures it—this time by dispersing presence into language, iteration, and system behavior. To understand how authorship and presence can persist when originality is distributed and algorithmically entangled, the following section develops the concept of symbiosis in more depth.

Human-Tool Symbiosis in the Age of AI: Agency and Interaction

Symbiosis as Asymmetry

In the triangle introduced earlier (Figure 1), symbiosis names the relational context in which authorship unfolds. Here, I develop this more concretely as human-tool symbiosis in generative AI.

Symbiosis often implies harmony, but in generative AI it exposes asymmetry: human intention meets opaque infrastructures. The paradox outlined in the previous section—authorship as both everywhere and nowhere—comes into focus when viewed through symbiosis, understood as the co-adaptive relationship between humans and the systems they work with. In biology, symbiosis describes relationships in which organisms live together, shaping each other's survival. Applied to design, the term highlights how creativity in AI-mediated systems is not the product of one actor but emerges through a continual back-and-forth: human intention,

40 Luciano Floridi et al., "AI4People—An Ethical Framework for a Good AI Society: Opportunities, Risks, Principles, and Recommendations," *Minds and Machines* 28, no. 4 (2018): 689–707, https://doi.org/10.1007/s11023-018-9482-5.

algorithmic response, and interpretive adjustment. As Ezio Manzini[41] reminds us, design is relational—less about isolated artifacts than about configuring conditions in which different actors co-shape outcomes. Symbiosis, in this sense, foregrounds process rather than outcome, and negotiation rather than harmony.

Yet symbiosis is not a simple metaphor of balance. In nature, symbiotic relationships include mutualism but also parasitism and commensalism; some partners benefit while others are diminished or made dependent. The metaphor therefore draws attention not only to reciprocity but also to vulnerability. Generative AI systems likewise do not meet humans on equal terms: they embody corporate infrastructures, proprietary datasets, and opaque biases that shape outcomes long before an individual enters a prompt. To speak of symbiosis in design is therefore to name a relationship structured by asymmetry.[42] Just as early industrial tools bound artisans to new rhythms of production, generative systems tie designers to shifting platforms, subscription models, and algorithmic defaults. A critical account of symbiosis must therefore include dependency and constraint alongside cooperation and creativity.[43]

Cybernetic Feedback and Recursive Symbiosis

The asymmetry described above is not static but is dynamically reinforced through feedback. In generative AI systems, each interaction contributes to a loop in which human choices shape system responses, and system responses, in turn, shape subsequent human intentions. Designers adapt their prompts in response to outputs, learning to anticipate tendencies, constraints, and stylistic biases, while models are continuously refined through aggregated patterns of use, fine-tuning, and retraining. Authorship in this setting therefore unfolds within a system structured by feedback, rather than as a linear chain of intention and execution.[44]

Over time, these feedback loops can become recursive, producing second-order effects that exceed any single interaction. Generative systems trained on large corpora that increasingly include AI-generated content may amplify stylistic conventions, reinforce dominant visual tropes, or gradually drift toward aesthetic convergence. At the same time, designers working within these systems adapt their practices in response to perceived norms and affordances, further shaping the visual field from which future outputs emerge. From a cybernetic perspective, creativity here operates within a self-referential environment, where outputs feed back into the conditions of their own production.

Seen in this light, symbiosis in generative AI is best understood not as a balance of control but as a condition of ongoing instability. There is no final equilibrium in which authorship can be fully secured; instead, creative agency is exercised through continuous adjustment, interpretation, and intervention within evolving systems. Cybernetic feedback thus clarifies why authorship in generative AI remains provisional and contested: it emerges through adaptive regulation rather than mastery, a dynamic that directly informs the situated practices of prompting and iteration discussed in the following section.

41 Ezio Manzini, *Design, When Everybody Designs: An Introduction to Design for Social Innovation*, trans. Rachel Coad (Cambridge, MA: MIT Press, 2015).
42 Frauenberger, "Entanglement HCI The Next Wave?"
43 Stark and Crawford, "Work of Art."
44 Norbert Wiener, *Cybernetics: Or, Control and Communication in the Animal and the Machine*, reissue of 1961 the 2nd ed. (1948; Cambridge, MA: MIT Press, 2019), https://doi.org/10.7551/mitpress/11810.001.0001.

Situated Practice and Iteration

In AI systems, this asymmetry becomes visible in the feedback loop of prompting and response. Unlike brushes, cameras, or direct-manipulation interfaces,[45] generative systems rarely afford incremental control. They return probabilistic results—plausible but not guaranteed—shaped by internal models that remain largely invisible. The user describes intent, interprets the reply, and reframes accordingly. This cycle of articulation, surprise, and refinement is not a flaw but the very mechanism through which authorship is co-constructed. Seen through the lens of design research, this is a situated practice:[46] authorship unfolds in the moment, contingent on constraints, expectations, and interpretive strategies.

The following vignette is offered as an illustrative construct rather than an empirical case, intended to clarify how authorship takes shape through situated interaction with generative systems:

> A designer working on an editorial spread begins with the prompt: "a soft-focus photograph of a memory from childhood, in pastel tones." The result feels generic and emotionally flat. The designer revises: "evocative memory, hazy atmosphere, muted pink and beige tones, medium close-up." Still unsatisfied, they push further: "gentle film grain, intimate eye contact, matte blacks." Across cycles, clichés are pruned, intent sharpened, and variations curated into a coherent direction. No single "magic prompt" explains the outcome. Instead, the final image carries the trace of situated choices—edits, exclusions, and adjustments that together form a record of authorship.

This vignette illustrates how symbiosis reframes authorship. The work does not emerge from a single command but from an iterative arc, through which authorship takes shape in the ongoing dialogue between human intention and system response. Yet these exchanges are rarely seamless: friction, failure, and misalignment often drive the process forward. Ambiguity here becomes a resource,[47] inviting interpretation rather than closure, and breakdowns become moments for reflection and reorientation.[48] As Winograd and Flores[49] argued in their account of language and action, technologies are not neutral instruments but conversational partners that shape the conditions of practice. Similarly, Jonas Löwgren and Erik Stolterman[50] emphasize that digital design is always defined by its use qualities—the felt dynamics of interaction. From this perspective, symbiosis is less a harmonious balance than a condition of unstable equilibrium.

Design Values and Pedagogy

Thinking symbiosis through design values also shifts attention away from feature lists toward deeper commitments. While interfaces may offer tools for history tracking, branching, or parameter exposure, their purpose is not efficiency alone but the preservation of interpretation and authorship as cultural values. This resonates with the classic call for user-centered design, where systems are evaluated not just by efficiency but by how they shape human experience.[51] A branching mechanism matters because it sustains plurality: authorship is present not only in the chosen outcome but also in the discarded alternatives that testify to a field of possibilities. Annotated histories matter not simply for workflow but because they externalize

45 Ben Shneiderman, "Direct Manipulation: A Step beyond Programming Languages," *Computer* 16, no. 8 (1983): 57–69, https://doi.org/10.1109/MC.1983.1654471; Donald A. Norman and Stephen W. Draper, eds., *User Centered System Design: New Perspectives on Human-Computer Interaction* (Boca Raton, FL: CRC Press, 1986).

46 Lucy A. Suchman, *Human-Machine Reconfigurations: Plans and Situated Actions*, 2nd ed. (2006; New York: Cambridge University Press, 2009).

47 William W. Gaver et al., "Ambiguity as a Resource for Design," in *CHI '03: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (New York: ACM, 2003), 233–40, https://doi.org/10.1145/642611.642653.

48 Susanne Bødker, "Creating Conditions for Participation: Conflicts and Resources in Systems Development," *Human–Computer Interaction* 11, no. 3 (1996): 215–36, https://doi.org/10.1207/s15327051hci1103_2.

49 Winograd and Flores, *Understanding Computers and Cognition*.

50 Jonas Löwgren and Erik Stolterman, *Thoughtful Interaction Design: A Design Perspective on Information Technology* (Cambridge, MA: MIT Press, 2004).

51 Norman and Draper, *User Centered System Design*.

judgment, making visible the choices that define style. Exposing system tendencies is not merely transparency but an invitation to acknowledge co-authorship with the algorithmic voice.[52] In this sense, the design task is to construct ecologies of interaction that hold authorship open, allowing it to be read and critiqued rather than collapsing it into polished outputs.

Symbiosis also has pedagogical dimensions. If creativity today is co-adaptive, then design education may need to teach not only tools but orientations toward practice. Just as students once learned perspective to train the eye or typography to master composition, they may now need to practice interactional symbiosis: learning to engage with system responses critically, to use ambiguity productively, and to recognize how their decisions accumulate into presence. Exercises might involve curating process maps, reflecting on abandoned iterations, or deliberately provoking system biases to understand how they shape outcomes.[53] Such practices do not aim to stabilize authorship but to cultivate literacy in negotiation—the skill of working with a partner that is neither entirely obedient nor entirely autonomous.

Seen in this light, symbiosis is not an alternative to creativity but rather its current condition. Authorship becomes distributed rather than dissolved: it rests in situated practices that guide, refuse, and reframe machine outputs. This returns us to the conceptual triangle introduced earlier: symbiosis as the relational context in which work unfolds; agency as the evolving distribution of authorship across human and system; and meaning-making as the cultural resonance that accrues through process rather than singular gesture. If presence no longer resides in the singular object, the challenge is to locate it in the dynamics of process themselves. This question leads directly to aura: how authenticity and resonance might persist when originality is dispersed across prompts, iterations, and algorithmic signatures. What emerges is not harmony but situated practice, where authorship is shaped as much by friction and failure as by creativity.

Reframing Aura: From Singular Object to Dialogic Process

From Object to Process

If authorship is redistributed, what happens to presence? This section rethinks aura for design practice, introducing three models that situate presence in processes rather than singular objects.

Benjamin's concept of aura—the "unique appearance of a distance, however near it may be"—remains a touchstone for understanding how technological reproduction reshapes artistic value.[54] He argued that photography and film loosened the artwork from its singular time and place; reproducibility diminished the authority of originality. As the discussion of photography showed, these concerns shaped painting's redefinition of authorship and presence. In the context of generative AI, the question of aura returns with renewed urgency, because these systems produce not reproductions but synthetic images—outputs with no singular original to anchor authenticity.

52 Frauenberger, "Entanglement HCI The Next Wave?"; Delgado et al., "Participatory Turn."
53 Whitham et al., "Re-Imagining and Reaffirming Design Pedagogy."
54 Benjamin, *The Work of Art*.

Rather than disappearing, aura in AI-mediated practice is better understood as migrating from the singular object toward processes, interactions, and algorithmic signatures. Mark Hansen[55] has argued that digital media already shift aura toward modes of reception and situated experience. More recently, Park[56] argues that generative AI reframes aura as liberation and democratization, shifting presence and value into new forms of negotiation. For design research, this suggests that aura can be intentionally cultivated through the ways systems record processes, expose biases, and frame outputs for audiences.

Empirical studies confirm that authenticity and aura are not fixed properties but contingent perceptions. For example, Maurice Jakesch et al.[57] show that audience attributions of authorship shift depending on how system and human contributions are framed, while everyday practices on social media demonstrate how recognizable tool use can itself function as a marker of authorship and aura.[58] These findings underscore that aura is not an essence but a relational effect—something that shifts with cultural expectations, practices of reception, and the ways creative processes are revealed or concealed. Just as nineteenth-century painters reasserted authorship through brushwork, perception, or imagination, contemporary creators may cultivate aura through prompt idioms, iterative traces, or stylistic negotiation with systems.

Three Design-Relevant Models of Aura

Reframing aura as process raises two related challenges. First, why focus on these three models rather than others? Aura is a multifaceted concept: one might also speak of collective aura, anchored in ritual or shared practice, or social aura, produced through circulation and reception. The present focus on prompt aura, interactional aura, and algorithmic signature is therefore deliberately selective. These dimensions are foregrounded because they map directly onto the conceptual triangle introduced earlier—agency, symbiosis, and meaning-making—and thus offer design-relevant points at which presence and authorship can be examined as practices rather than properties. The models are not intended as exhaustive categories, but as heuristics: analytic lenses through which presence can be understood as something cultivated, contested, and negotiated in situated interaction.

A second challenge concerns the relationship to Benjamin's original formulation of aura. Benjamin's concept was bound to singularity, distance, and the irreproducible presence of the artwork in time and space. Translating aura into layered or processual terms therefore risks flattening its philosophical richness. Aura's enduring force has always resided partly in its ambiguity—its resistance to stabilization or full capture. To approach aura as process is not to resolve that ambiguity, but to redistribute it: to locate presence across prompts, interactions, and system tendencies rather than in singular originals.

From this perspective, the present reframing does not seek to preserve Benjamin's concept in its original ontological form. Instead, aura is treated as a design-theoretical heuristic for examining how presence and authorship are reconfigured in generative systems. By retaining ambiguity as a

55 Mark B. N. Hansen, *New Philosophy for New Media* (Cambridge, MA: MIT Press, 2006).
56 Park, "Work of Art."
57 Jakesch et al., "Human Heuristics."
58 Saeideh Bakhshi et al., "Why We Filter Our Photos and How It Impacts Engagement," *Proceedings of the International AAAI Conference on Web and Social Media* 9, no. 1 (2015): 12–21, https://ojs.aaai.org/index.php/ICWSM/article/view/14622.

productive tension rather than a problem to be solved, this approach allows aura to function as a critical lens — one that helps design research attend to how meaning, authorship, and presence emerge through interaction with generative technologies.

Prompt Aura

Prompt aura forms the foundation for understanding how authorship migrates in generative AI: from the trace of the hand to the trace of language. In prompt-based systems, the text input becomes a record of creative intention. Prompts carry semantic, stylistic, and affective cues, and through refinement, chaining, and iteration, creators often develop distinctive "prompt idioms" that form a recognizable style.[59] An author's repeated use of descriptors such as "hazy," "glowing," or "dusk" may function much like a painter's recurring motifs or a writer's distinctive phrasing. Here, aura arises not from the irreproducibility of an object but from the coherence of a prompting practice.

Failure mode: Prompt aura can collapse into cliché when communities converge on shared recipes, producing homogeneity rather than distinctiveness.

Interactional Aura

If traditional aura was tied to the hand and its gestures, in AI image-making it can be located in the dialogue of interaction. Each cycle of prompt, refusal, variation, and curation contributes to a visible narrative of process.[60] Meaning accrues not only in the image itself but in the paths taken to arrive there. A designer iterating for an editorial spread — discarding clichés, refining mood, curating variations — might treat that iterative arc as part of the authored work, much as sketchbooks or drafts serve as evidence of artistic process. In this sense, aura resides in the history of decisions, not in the singularity of an outcome.

Failure mode: Interactional aura risks becoming spectacle when process maps are staged for performance rather than documenting authentic decisions.

Algorithmic Signature

Generative models also imprint images with their own algorithmic signature — tendencies shaped by training data and architecture.[61] Midjourney, for instance, is often recognized by its painterly lighting and surreal textures, while Stable Diffusion has distinctive rendering biases. Even when a user authors the work, the model leaves its mark. Acknowledging this signature reframes aura as co-authored, arising from the entanglement of human intention and machine bias.

This aligns with broader accounts of computational aesthetics. Lev Manovich[62] emphasizes that software aesthetics emerge through coded defaults and interfaces, while Margaret Boden[63] describes computational creativity as the recombination of constrained patterns. Building on this foundation, Simon Colton and Geraint Wiggins[64] propose a widely adopted framework for computational creativity that incorporates process, product,

59 Oppenlaender et al., "Prompting AI Art."
60 Hansen, *New Philosophy for New Media.*
61 Ramesh et al., "Hierarchical Text-Conditional Image Generation."
62 Lev Manovich, *Software Takes Command* (New York: Bloomsbury Academic, 2013), https://doi.org/10.5040/9781472544988.
63 Margaret A. Boden, "Creativity and Artificial Intelligence," *Artificial Intelligence* 103, no. 1-2 (1998): 347–56, https://doi.org/10.1016/S0004-3702(98)00055-1.
64 Simon Colton and Geraint A. Wiggins, "Computational Creativity: The Final Frontier?," in *Frontiers in Artificial Intelligence and Applications* (Amsterdam: IOS Press, 2012), 21–26, https://doi.org/10.3233/978-1-61499-098-7-21.

65 Jakesch et al., "Human Heuristics."
66 Stark and Crawford, "Work of Art."

and audience evaluation. Algorithmic signature can therefore be understood not only as a technical artifact but as part of a wider cultural condition, where style itself emerges from infrastructural choices. Here, aura is entangled with system bias, making machine tendencies legible as part of authorship.

Failure mode: Algorithmic signature can overshadow human authorship when system biases dominate, reducing works to recognizable "platform aesthetics."

Layers and Presence

The three models — prompt aura, interactional aura, and algorithmic signature — can be understood as layers that together reconfigure aura as a process. This layered reframing resonates with painting traditions, where presence was built not through a single gesture but through successive layers of paint. By contrast, photography appeared to collapse presence into a single mechanical trace, its aura tied to indexical immediacy. Generative AI reopens the field: aura emerges as a layered resonance distributed across language, interaction, and algorithmic signature.

What first appears as merely technical can, over time, be read as expressive. Brushstroke was once just a method of application; it became style. The same may occur with prompt idioms or process traces, which audiences may gradually come to recognize as signatures of authorship. This does not guarantee authenticity, but demonstrates that aura is historically contingent — shaped by the interpretive practices of audiences as much as by the intentions of creators.[65]

At the same time, there is a risk in making aura too designable. Aura has always drawn part of its power from ambiguity — its resistance to capture. Codifying it into prompts, iterations, or explainable outputs risks producing engineered "presence effects" that feel contrived rather than authentic. For design research, this is less a flaw than a provocation: aura should not be stabilized as a feature but cultivated as a space of negotiation.[66] Its value lies in tension, not resolution.

Reframing Presence

Reframed in this way, aura is not lost but redistributed. Instead of being tied to a singular, original work, it emerges as a distributed presence, carried across prompt histories, in the transparency of iterative decisions, and in the interplay between human intention and algorithmic influence. For design research, the task is not to safeguard a fragile essence, but to design conditions for expressive presence in reproducible image systems. By embedding process histories, surfacing system tendencies, and supporting intentional stylistic authorship, creative AI systems can cultivate aura as a dialogic process rather than a static property.

Discussion: Authorship, Literacy, and the Paradoxes of Design

The frameworks of triangle, literacy, and aura reveal broader patterns that link photography's disruption with AI today. This article has compared two

technological inflection points — photography in the nineteenth century and generative AI today — to examine how tools reshape authorship, presence, and meaning. Taken together, these frameworks do not offer a progressive narrative of creative empowerment, but rather a situated account of authorship shaped by constraint, asymmetry, and potential loss. The aim has not been to equate these technologies directly, but to use the historical example of photography as a lens for understanding how creativity adapts when automation alters the conditions of practice. A consistent pattern emerges: when one dimension of practice is displaced, creativity migrates elsewhere. Photography automated documentation, but painting responded by exploring perception, atmosphere, and subjectivity. Generative AI automates craft, but designers respond by cultivating process, language, and negotiation. In both cases, authorship is not eliminated but redistributed.

Photography as Reconfiguration

The history of photography underscores that disruption is rarely rupture; it is more often reconfiguration. As Jonathan Crary[67] argues, photography introduced new "techniques of the observer," reorganizing vision rather than simply replacing earlier practices. Nicholas Mirzoeff[68] similarly shows that media shape cultural practices of looking, embedding perception in new social and technical contexts. Painting was therefore not abolished by the camera but redirected toward new terrains of expression, opening pathways to modernism.[69]

AI as Continuity

In a similar fashion, AI does not abolish authorship but repositions it within new registers. The triangle of symbiosis, agency, and meaning-making helps clarify this continuity. In the nineteenth century, symbiosis described how painting and photography entered into dialogue, dividing labor between documentation and interpretation. Agency was reasserted through distinctive styles — from Courbet's realism to Monet's fleeting impressions or Cameron's expressive blur. Meaning-making was contested in debates over aura and authenticity.

In the twenty-first century, the dynamics repeat with new materials: symbiosis unfolds between humans and generative models, agency is asserted through prompt idioms and curational practices, and meaning-making is renegotiated through interactional and algorithmic strata of aura. Recent studies reinforce this view, showing how authorship in creative AI is distributed across human and system contributions[70] and how agency emerges as a negotiated process of collaboration.[71] This comparison shows that authorship is best understood as a relational practice, historically contingent and shaped by technological mediation.

The Triangle as Heuristic

The symbiosis–agency–meaning-making triangle offers a clarifying lens for analyzing how authorship shifts in human-AI systems. Its schematic clarity is a strength: it makes visible dynamics that might otherwise remain

67 Jonathan Crary, *Techniques of the Observer: On Vision and Modernity in the Nineteenth Century* (Cambridge, MA: MIT Press, 2005).
68 Nicholas Mirzoeff, *An Introduction to Visual Culture*, 3rd ed. (1999; New York: Routledge, 2023).
69 Rosenblum, *Modern Painting*; Batchen, *Negative/Positive*.
70 McCormack et al., "Autonomy, Authenticity, Authorship."
71 Holter and El-Assady, "Deconstructing Human-AI Collaboration."

diffuse. Yet no diagram can capture the full messiness of practice. Symbiosis is never pure cooperation; agency is never fully secured; meaning-making is never resolved. The triangle should therefore be read as a heuristic that helps locate tensions and negotiations, much like Lucy Suchman's[72] situated action or Paul Dourish's[73] embodied interaction. Its value lies in foregrounding negotiation, not in resolving it.

The framework also raises cultural questions. The triangle emerges from Western art and design histories, where authorship has often been individualized. Yet in collective or ritual traditions, authorship is dispersed across communities, environments, or cosmologies. Here, symbiosis may extend beyond human–tool relations to include social and cultural actors. Recognizing this does not diminish the triangle's value; rather, it emphasizes its role as one lens among many, open to expansion and reinterpretation.[74]

Positioning Interactional Literacy

Interactional literacy builds on but also extends earlier literacy debates. Media literacy[75] focused on critical consumption; digital literacy emphasized access and technical fluency; AI literacy in HCI highlights interpretability and trust.[76] Kay Kender and Frauenberger show how design power operates even in aesthetic practices on social media, underscoring the entanglement of technology, agency, and culture.[77] Interactional literacy names a new capacity: the ability to negotiate meaning in systems that are unpredictable, opaque, and co-adaptive.

It extends literacy debates into the domain of design, where authorship emerges not from consumption but from iterative, dialogic practice. It is less about decoding messages or mastering interfaces than about developing repertoires for dialogue—reading model tendencies, articulating intention through prompts, and curating outputs as stylistic acts. Recent contributions emphasize that AI literacy is best understood as situated practice,[78] while design pedagogy research shows how AI is reshaping the skills and critiques required in the classroom.[79]

This framing positions interactional literacy as a necessary competence in contemporary design. It identifies a concrete site where authorship now resides: in the practices of negotiation, iteration, and reflection that unfold across human-system interactions. Future studies can investigate how such literacies are cultivated in design education and professional practice, but their conceptual articulation already signals a shift in how design understands agency and creativity.

Rethinking Aura

The three aura models—prompt aura, interactional aura, algorithmic signature—translate Benjamin's elusive concept into designable dimensions. Where earlier scholarship often treated aura as either lost[80] or displaced into reception,[81] this framework reframes aura as layered across language, process, and system. The models are valuable because they locate presence in designable sites: the idioms of prompts, the transparency of process, and the biases and tendencies of algorithms.

72 Suchman, *Human-Machines Reconfigurations*.
73 Paul Dourish, *Where the Action Is: The Foundations of Embodied Interaction* (Cambridge, MA: MIT Press, 2004), https://doi.org/10.7551/mitpress/7221.001.0001.
74 Frauenberger, "Entanglement HCI The Next Wave?"
75 Livingstone, "Media Literacy."
76 Long and Magerko, "What Is AI Literacy?"; Bhat and Long, "Designing Interactive Explainable AI Tools."
77 Kender and Frauenberger, "Shape of Social Media."
78 Bødker, "Creating Conditions for Participation."
79 Fleischmann, "Generative Artificial Intelligence"; Jiang et al., "Toward a 'More-Than-Digital' AI Literacy."
80 Benjamin, *The Work of Art*.
81 Hansen, *New Philosophy for New Media*.

Yet this reframing also surfaces productive tensions. Benjamin's aura depended on singularity and distance; layering aura makes it legible but risks flattening its richness. The strength of the model lies not in resolving this paradox but in making it explicit: aura in generative systems must be nurtured as an unfolding practice without sacrificing its ambiguity. Moreover, the framework reflects Western notions of authorship as individual presence. In other traditions, aura may be collective, ritual, or communal. Future work should extend these models into such contexts, but their present articulation already provides design with a vocabulary for analyzing how presence migrates in algorithmic media.

Empirical studies reinforce this point: evaluations of AI images show that perceptions of value shift depending on attribution and context. For example, Jakesch et al.[82] demonstrate that the framing of collaboration—whether a system is presented as an assistant or a co-creator—changes how authorship is assigned. These findings highlight aura as relational and contingent, produced not only by creators but also by interpretive communities.

Ethics and Power

Symbiosis also brings ethical asymmetries into view. Generative systems are not neutral collaborators, but infrastructures built on vast datasets, corporate ownership, and algorithmic biases. Luke Stark and Kate Crawford argue that artists' perspectives reveal the hidden ethics of AI datasets, showing how creative practice can critique data politics directly.[83] Authorship is therefore entangled with questions of consent, labor, and ownership: Who authored the training data? Whose defaults are embedded in the model? And how should these influences be made visible?

Here, interactional literacy acquires an ethical dimension: it is the ability to recognize where authorship is constrained, to read system tendencies critically, and to situate creative decisions within opaque infrastructures. This does not resolve dilemmas of bias or exploitation, but it reframes design as a site of accountability—where interfaces, affordances, and process histories can either conceal or reveal the politics of authorship. Designing for symbiosis therefore means designing under asymmetry and constraint, largely shaped by platform governance, model architectures, and training data, while still preserving interpretive agency and acknowledging the uneven structures through which creativity unfolds—an orientation that resonates with calls for human-centered AI.[84]

Future Directions

The frameworks proposed here—triangle, aura models, interactional literacy—should not be read as fixed solutions but as openings for inquiry. Their strength lies in making the invisible visible, turning diffuse intuitions into objects for reflection and critique.

Future research could develop these openings in several directions. Empirical studies might test whether prompt idioms function as expressive signatures, whether decision histories influence audience reception, or whether surfacing algorithmic signatures alters perceptions of presence.[85]

Future work could also deepen this conceptual framing through empirical studies of design practice or deeper engagement with cybernetic theory,

82 Jakesch et al., "Human Heuristics."
83 Stark and Crawford, "Work of Art."
84 Shneiderman, "Direct Manipulation"; Crawford, *Atlas of AI*.
85 Gmeiner et al., "Exploring Challenges and Opportunities"; Subramonyam et al., "Prototyping with Prompts."

86 Long and Magerko, "What Is AI Literacy?"

examining how feedback dynamics unfold across longer temporal and cultural scales. Design experiments could prototype interfaces that preserve process, visualize branching iterations, or expose system biases, exploring how such interventions shape creative authorship. Comparative work could examine traditions beyond Western art history, where authorship is collective or ritual rather than individual. Pedagogical inquiry could explore how design education incorporates prompting and negotiation into curricula, training students to reflect on process as much as on product, building on emerging accounts of AI literacy as situated practice.[86]

Symbiosis as Critical Condition

Across history and the present, symbiosis emerges not as harmony but as a critical condition of creativity. Photography redirected the role of realism in painting; AI redirects authorship. In each case, presence is preserved not in singular works but in relational processes. The frameworks developed here—interactional literacy, layered aura, and the triangle—make visible how these processes unfold. Their role is not to resolve paradoxes but to hold them open as sites of creative negotiation. For design research, the challenge is to sustain these paradoxes, to recognize them not as weaknesses but as the conditions under which authorship continues to take shape.

Conclusion: Authorship as Negotiation

In this article, I have argued that when technologies automate once-central skills, creativity does not disappear but migrates. Photography displaced the labor of documentation, and painting responded by exploring perception, atmosphere, and subjectivity. Generative AI automates craft, and designers respond by cultivating process, language, and negotiation. Across both moments, authorship is not abolished but redistributed, and presence is not erased but reconfigured—moving from singular objects toward layered processes of interaction.

Three frameworks have been proposed to trace this redistribution. The triangle of symbiosis, agency, and meaning-making provides coordinates for analyzing how humans and systems entangle in creative practice. The three aura models—prompt aura, interactional aura, algorithmic signature—translate Benjamin's contested concept into dimensions that design can work with. Interactional literacy, in turn, names the competences required to navigate co-adaptive systems. None of these frameworks resolves the complexities of authorship. Their value lies in keeping those complexities visible, in making the negotiation itself legible.

The contribution is therefore conceptual rather than prescriptive. Authorship can be understood as a relational practice of adjustment, choice, and interpretation; aura as a resonance distributed across prompts, processes, and infrastructures; and literacy as an ongoing dialogue rather than mastery of tools. Together, these reframings move design research beyond polarized narratives of loss or liberation, toward a vocabulary for attending to the shifting conditions of creative presence.

To stand on this ground is to treat paradox as resource. Symbiosis is not harmony, aura is not essence, literacy is not certainty. They are sites where design can sustain authorship as a contested but enduring condition. If authorship moves into negotiation and literacy emerges as dialogue, presence likewise persists—less as singular aura than as resonance layered across prompts, processes, and system tendencies. The task ahead is not to stabilize these frameworks, but to treat them as openings: to design systems, practices, and pedagogies that preserve accountability as an ongoing, situated responsibility rather than a condition of full control, while nurturing expression and holding authorship open to critique in the age of generative AI. The challenge for design is not to master generative systems, but to cultivate practices through which creativity stays accountable, plural, and responsive to critique.

Declaration of Interest

There are no conflicts of interest involved in this article.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

While preparing this manuscript, the author used ChatGPT to assist with language editing and stylistic refinement. All content was reviewed by the author, who takes full responsibility for the final published work.

References

Bakhshi, Saeideh, David Shamma, Lyndon Kennedy, and Eric Gilbert. "Why We Filter Our Photos and How It Impacts Engagement." *Proceedings of the International AAAI Conference on Web and Social Media* 9, no. 1 (2015): 12–21. https://ojs.aaai.org/index.php/ICWSM/article/view/14622.

Batchen, Geoffrey. *Negative/Positive: A History of Photography*. London: Routledge, 2020.

Benjamin, Walter. *The Work of Art in the Age of Its Technological Reproducibility, and Other Writings on Media*. Edited by Michael W. Jennings, Brigid Doherty, and Thomas Y. Levin. Cambridge, MA: Harvard University Press, 2008.

Bhat, Maalvika, and Duri Long. "Designing Interactive Explainable AI Tools for Algorithmic Literacy and Transparency." In *DIS '24: Proceedings of the 2024 Designing Interactive Systems Conference*, 939–57. New York: ACM, 2024. https://doi.org/10.1145/3643834.3660722.

Boden, Margaret A. "Creativity and Artificial Intelligence." *Artificial Intelligence* 103, no. 1-2 (1998): 347–56. https://doi.org/10.1016/S0004-3702(98)00055-1.

Bødker, Susanne. "Creating Conditions for Participation: Conflicts and Resources in Systems Development." *Human–Computer Interaction* 11, no. 3 (1996): 215–36. https://doi.org/10.1207/s15327051hci1103_2.

Clark, Timothy J. *The Painting of Modern Life: Paris in the Art of Manet and His Followers*. Revised edition. Princeton, NJ: Princeton University Press, 1999. First published 1985.

Colton, Simon, and Geraint A. Wiggins. "Computational Creativity: The Final Frontier?" In *Frontiers in Artificial Intelligence and Applications*, 21–26. Amsterdam: IOS Press, 2012. https://doi.org/10.3233/978-1-61499-098-7-21.

Crary, Jonathan. *Techniques of the Observer: On Vision and Modernity in the Nineteenth Century*. Cambridge, MA: MIT Press, 2005.

Crawford, Kate. *Atlas of AI: Power, Politics, and the Planetary Costs of Artificial Intelligence*. New Haven: Yale University Press, 2021. https://doi.org/10.2307/j.ctv1ghv45t.

Delgado, Fernando, Stephen Yang, Michael Madaio, and Qian Yang. "The Participatory Turn in AI Design: Theoretical Foundations and the Current State of Practice." In *EAAMO '23: Proceedings of the 3rd ACM Conference on Equity and Access in Algorithms, Mechanisms, and Optimization*, 37. New York: ACM, 2023. https://doi.org/10.1145/3617694.3623261.

Dourish, Paul. *Where the Action Is: The Foundations of Embodied Interaction*. Cambridge, MA: MIT Press, 2004. https://doi.org/10.7551/mitpress/7221.001.0001.

Edwards, Elizabeth. *Photographs and the Practice of History: A Short Primer*. London: Bloomsbury Academic, 2022.

Fleischmann, Katja. "Generative Artificial Intelligence in Graphic Design Education: A Student Perspective." *Canadian Journal of Learning and Technology* 50, no. 1 (2024): 1–17. https://doi.org/10.21432/cjlt28618.

Floridi, Luciano, Josh Cowls, Monica Beltrametti, et al. "AI4People—An Ethical Framework for a Good AI Society: Opportunities, Risks, Principles, and Recommendations." *Minds and Machines* 28, no. 4 (2018): 689–707. https://doi.org/10.1007/s11023-018-9482-5.

Frauenberger, Christopher. "Entanglement HCI The Next Wave?" *ACM Transactions on Computer-Human Interaction* 27, no. 1 (2020): 2. https://doi.org/10.1145/3364998.

Gaver, William W., Jacob Beaver, and Steve Benford. "Ambiguity as a Resource for Design." In *CHI '03: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 233–40. New York: ACM, 2003. https://doi.org/10.1145/642611.642653.

Gmeiner, Frederic, Humphrey Yang, Lining Yao, Kenneth Holstein, and Nikolas Martelaro. "Exploring Challenges and Opportunities to Support Designers in Learning to Co-create with AI-Based Manufacturing Design Tools." In *CHI '23: Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems*, 226. New York: ACM, 2023. https://doi.org/10.1145/3544548.3580999.

Grundberg, Andy. *Crisis of the Real: Writings on Photography*, 3rd ed. New York: Aperture, 2010. First published 1990.

Holter, Steffen, and Mennatallah El-Assady. "Deconstructing Human-AI Collaboration: Agency, Interaction, and Adaptation." *Computer Graphics Forum* 43, no. 3 (2024): e15107. https://doi.org/10.1111/cgf.15107.

Jakesch, Maurice, Jeffrey T. Hancock, and Mor Naaman. "Human Heuristics for AI-Generated Language Are Flawed." *PNAS* 120, no. 11 (2023): e2208839120. https://doi.org/10.1073/pnas.2208839120.

Jiang, Jialei, Matthew A. Vetter, and Brent Lucia. "Toward a 'More-Than-Digital' AI Literacy: Reimagining Agency and Authorship in the Postdigital Era with ChatGPT." *Postdigital Science and Education* 6, no. 3 (2024): 922–39. https://doi.org/10.1007/s42438-024-00477-1.

Kender, Kay, and Christopher Frauenberger. "The Shape of Social Media: Towards Addressing (Aesthetic) Design Power." In *DIS '22: Proceedings of the 2022 ACM Designing Interactive Systems Conference*, 365–76. New York: ACM, 2022. https://doi.org/10.1145/3532106.3533470.

Livingstone, Sonia. "Media Literacy and the Challenge of New Information and Communication Technologies." *The Communication Review* 7, no. 1 (2004): 3–14. https://doi.org/10.1080/10714420490280152.

Long, Duri, and Brian Magerko. "What Is AI Literacy? Competencies and Design Considerations." In *CHI '20: Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*, 1–16. New York: ACM, 2020. https://doi.org/10.1145/3313831.3376727.

Löwgren, Jonas, and Erik Stolterman. *Thoughtful Interaction Design: A Design Perspective on Information Technology*. Cambridge, MA: MIT Press, 2004.

Manovich, Lev. *Software Takes Command*. New York: Bloomsbury Academic, 2013. https://doi.org/10.5040/9781472544988.

Manyika, James, Michael Chui, Mehdi Miremadi, Jacques Bughin, Katy George, Paul Willmott, and Martin Dewhurst. "Harnessing Automation for a Future That Works." McKinsey Global Institute, January 12, 2017. https://www.mckinsey.com/featured-insights/digital-disruption/harnessing-automation-for-a-future-that-works.

Manzini, Ezio. *Design, When Everybody Designs: An Introduction to Design for Social Innovation*. Translated by Rachel Coad. Cambridge, MA: MIT Press, 2015.

McCormack, Jon, Toby Gifford, and Patrick Hutchings. "Autonomy, Authenticity, Authorship and Intention in Computer Generated Art." In *Computational Intelligence in Music, Sound, Art and Design*, edited by Anikó Ekárt, Antonios Liapis, and María Luz Castro Pena, 35–50. Cham: Springer, 2019. https://doi.org/10.1007/978-3-030-16667-0_3.

Melchior, Claudio, and Manuela Farinosi. "Toward Human-AI Co-creativity? An Exploration of Early Adopters' Perspectives and Experiences with GenAI in the Creative Industries." In *Artificial Creativity: Looking at the Future of Digital Culture*, edited by Alessandra Micalizzi, 183–208. Cham: Springer, 2025. https://doi.org/10.1007/978-3-031-88334-7_15.

Mirzoeff, Nicholas. *An Introduction to Visual Culture*. 3rd ed. New York: Routledge, 2023. First published 1999.

Nelson, Harold G., and Erik Stolterman. *The Design Way: Intentional Change in an Unpredictable World*. 2nd ed. Cambridge, MA: MIT Press, 2012. https://doi.org/10.7551/mitpress/9188.001.0001.

Ng, Davy Tsz Kit, Jac Ka Lok Leung, Samuel Kai Wah Chu, and Maggie Shen Qiao. "Conceptualizing AI Literacy: An Exploratory Review." *Computers and Education: Artificial Intelligence* 2 (2021): 100041. https://doi.org/10.1016/j.caeai.2021.100041.

Norman, Donald A., and Stephen W. Draper, eds. *User Centered System Design: New Perspectives on Human-Computer Interaction*. Boca Raton, FL: CRC Press, 1986.

Oppenlaender, Jonas, Rhema Linder, and Johanna Silvennoinen. "Prompting AI Art: An Investigation into the Creative Skill of Prompt Engineering." *International Journal of Human–Computer Interaction* 41, no. 16 (2024): 10207–29. https://doi.org/10.1080/10447318.2024.2431761.

Park, Sungjin. "The Work of Art in the Age of Generative AI: Aura, Liberation, and Democratization." *AI & SOCIETY* 40, no. 3 (2025): 1807–16. https://doi.org/10.1007/s00146-024-01948-6.

Ramesh, Aditya, Prafulla Dhariwal, Alex Nichol, Casey Chu, and Mark Chen. "Hierarchical Text-Conditional Image Generation with CLIP Latents." arXiv, preprint. Submitted April 13, 2022. https://doi.org/10.48550/ARXIV.2204.06125.

Redström, Johan. *Making Design Theory, Design Thinking, Design Theory*. Cambridge, MA: MIT Press, 2017.

Rosen, Charles, and Henri Zerner. *Romanticism and Realism: The Mythology of Nineteenth-Century Art*. New York: Norton, 1985.

Rosenblum, Robert. *Modern Painting and the Northern Romantic Tradition: Friedrich to Rothko*. London: Thames and Hudson, 1975.

Schulhoff, Sander, Michael Ilie, Nishant Balepur, et al. "The Prompt Report: A Systematic Survey of Prompt Engineering Techniques." arXiv, preprint. Last revised February 26, 2025. https://doi.org/10.48550/arXiv.2406.06608.

Shneiderman, Ben. "Direct Manipulation: A Step beyond Programming Languages." *Computer* 16, no. 8 (1983): 57–69. https://doi.org/10.1109/MC.1983.1654471.

Sontag, Susan. *On Photography*. New York: Farrar, Straus and Giroux, 1977.

Stark, Luke, and Kate Crawford. "The Work of Art in the Age of Artificial Intelligence: What Artists Can Teach Us about the Ethics of Data Practice." *Surveillance & Society* 17, no. 3/4 (2019): 442–55. https://doi.org/10.24908/ss.v17i3/4.10821.

Subramonyam, Hari, Divy Thakkar, Andrew Ku, Juergen Dieber, and Anoop K. Sinha. "Prototyping with Prompts: Emerging Approaches and Challenges in Generative AI Design for Collaborative Software Teams." In *CHI '25: Proceedings of the 2025 CHI Conference on Human Factors in Computing Systems*, 882. New York: ACM, 2025. https://doi.org/10.1145/3706598.3713166.

Suchman, Lucy A. *Human-Machine Reconfigurations: Plans and Situated Actions*, 2nd ed. New York: Cambridge University Press, 2009.

Wadinambiarachchi, Samangi, Ryan M. Kelly, Saumya Pareek, Qiushi Zhou, and Eduardo Velloso. "The Effects of Generative AI on Design Fixation and Divergent Thinking." In *DIS '24: Proceedings of the CHI Conference on Human Factors in Computing Systems*, 380. New York: ACM, 2024. https://doi.org/10.1145/3613904.3642919.

Wasielewski, Amanda. "Unnatural Images: On AI-Generated Photographs." *Critical Inquiry* 51, no. 1 (2024): 1–29. https://doi.org/10.1086/731729.

Whitham, Roger, Naomi Jacobs, Paul Coulton, Glynn Stockton, and Joseph Lindley. "Re-imagining and Reaffirming Design Pedagogy in Response to Generative AI Tools." In *DRS2024: Boston*, edited by C. Gray, E. Ciliotta Chehade, P. Hekkert, L. Forlano, P. Ciuccarelli, and P. Lloyd. Boston: DRS, 2024. https://doi.org/10.21606/drs.2024.953.

Wiener, Norbert. *Cybernetics: Or, Control and Communication in the Animal and the Machine*. Reissue of 1961 the 2nd ed. Cambridge, MA: MIT Press, 2019. First published 1948. https://doi.org/10.7551/mitpress/11810.001.0001.

Winograd, Terry, and Fernando Flores. *Understanding Computers and Cognition: A New Foundation for Design*. Boston: Addison-Wesley Longman, 1987.