

On the Importance of Tool Selection in the Creative Process: Figure Drawing as a Research Site

MIRANDA LI, Massachusetts Institute of Technology, USA

ZIV EPSTEIN, Massachusetts Institute of Technology, USA

CYNTHIA BREAZEAL, Massachusetts Institute of Technology, USA

CCS Concepts: • **Human-centered computing** → **Human computer interaction (HCI)**.

Additional Key Words and Phrases: Creativity, Creative activity traces

ACM Reference Format:

Miranda Li, Ziv Epstein, and Cynthia Breazeal. 2018. On the Importance of Tool Selection in the Creative Process: Figure Drawing as a Research Site. *Proc. ACM Meas. Anal. Comput. Syst.* 37, 4, Article 111 (August 2018), 5 pages. <https://doi.org/XXXXXXXX.XXXXXXX>

1 Introduction

We propose that tool selection—how and when creative practitioners choose to use different tools for the same task—is a critical but under-theorized dimension of creative activity traces. Current creative activity trace (CAT) approaches largely fail to account for how creative practitioners choose, learn, and form relationships with their tools over time. Drawing on theories of craft and making, which define creativity as emerging from dynamic, learned relationships with tools and materials [1, 2, 6, 10], this paper argues that tool selection should be treated as a creative activity trace in its own right. We will illustrate this argument by proposing live figure drawing as a source of rich, underexplored empirical data for studying tool selection in creative practice. As a motivating example, Figure 1 shows sketches produced by the first author during a single live figure drawing session. While the subject did not change, the drawings vary due to ongoing decisions about media: the left sketches were rendered in pencil, after which the artist moved to markers for the right sketches, with one marker drawing further developed using black gel pen for outlining. These decisions are made in response to the unfolding drawings rather than in advance. In live figure drawing—where pose duration and subject matter are externally constrained—creative control is exercised primarily through tool choice, making figure drawing a compelling site for studying tool selection in practice. We claim that a dataset drawn from figure drawing allows us to measure tool selection as its own activity trace—for example observing habits of exploration and convergence in tool choice over different timescales (one session, which spans a few hours, versus many sessions over multiple months / years).

Authors' Contact Information: [Miranda Li](mailto:m1randa@media.mit.edu), m1randa@media.mit.edu, Massachusetts Institute of Technology, Cambridge, Massachusetts, USA; [Ziv Epstein](mailto:zive@mit.edu), zive@mit.edu, Massachusetts Institute of Technology, Cambridge, Massachusetts, USA; [Cynthia Breazeal](mailto:cynthiab@media.mit.edu), cynthiab@media.mit.edu, Massachusetts Institute of Technology, Cambridge, Massachusetts, USA.

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for components of this work owned by others than the author(s) must be honored. Abstracting with credit is permitted. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee. Request permissions from permissions@acm.org.

© 2018 Copyright held by the owner/author(s). Publication rights licensed to ACM.

ACM 2476-1249/2018/8-ART111

<https://doi.org/XXXXXXXX.XXXXXXX>

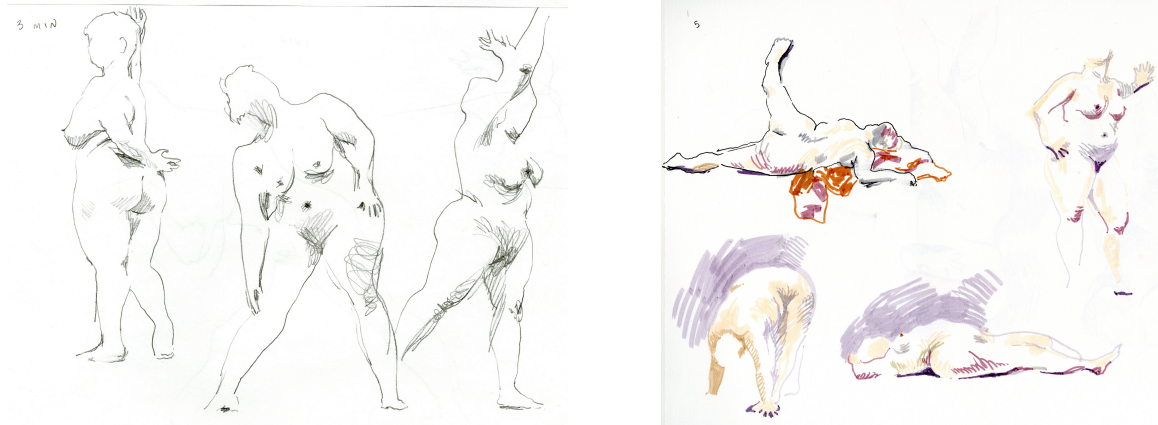


Fig. 1. Figure drawings of the same model produced in a single session, illustrating variation driven by tool choice. The left 3-minute sketches were drawn in pencil; the right 5-minute sketches were drawn in marker and pen. Photos courtesy of the first author.

2 Motivation

2.1 Tool selection as an analytic blind spot in CAT research

In practice, tool selection is a routine and necessary part of the creative process: tools are rarely used in isolation, but instead belong to broader toolkits from which practitioners select as work unfolds [10]. This flexibility is essential because different tools afford different interaction qualities and often support distinct stages of the creative process, such as ideation versus evaluation [3, 5]. Understanding what tool a practitioner chooses to complete a task, when given the freedom to choose, is paramount to understanding how the practitioner is understanding and approaching the task, since “a particular tool may represent not only an action but also an approach” [10]. Further, Li et al. [9] argue that CSTs should support “horizontal movement” between tools, enabling practitioners to compose their own workflows from smaller, modular systems. In contrast to all-in-one CSTs, which implicitly impose normative assumptions about creative practice, such tool composition allows creators to establish their own normative ground. These perspectives thus position tool selection itself as a meaningful site of creative agency.

Despite this, CAT analyses typically examine tools in isolation. Many studies compare their CAT analyses across multiple tools or creative workflows, but either have a one-to-one mapping between task and tool so that the effects of tool selection cannot be isolated from the effects of performing an entirely different task, or only compare an experimental (e.g. CST-assisted) condition to a control (e.g. no CST) [7, 14, 15].

Taken together, this highlights an untapped opportunity to treat tool selection as an explicit variable in creative activity trace frameworks, expanding the technique design space for analyzing creative practice in a direction well motivated by CST literature.

2.2 Creativity as conversation with tools

Further, craft theories of creativity describe creative work as a dialogue with tools and materials, in which ideas emerge through skilled practice and playful exploration of the media rather than prior planning [2]. From this perspective, creativity unfolds through cycles of action, feedback, and adjustment mediated by tools. Tools actively shape attention, judgment, and imagination rather than functioning as neutral instruments [10].

Qualitative, empirical studies on the processes of craftspeople validate these theories. Practitioners “think through” their tools, developing idiosyncratic, evolving relationships to them that shape creative trajectories [1, 6]. These accounts reinforce the view that tool selection is inseparable from creative reasoning, and thus a meaningful site for trace analysis.

3 Position

We argue that tool selection is a crucial, understudied axis for CATs because it directly reflects practitioners’ understandings and approaches to the task, and because relationships to tools are learned and dynamic in a way which is inextricable from the creative process.

This position has direct implications for CST research and design. Prior work already validates the importance of understanding tool choice in creative processes: Palani et al. analyze when creators select generative AI versus non-AI CSTs within workflows to inform the design of GenAI CSTs [12]. Li et al. [8] study hybrid physical-digital workflows among visual artists and identify design principles for CSTs that preserve agency and support flexible, interoperable tool use. Analyzing tool switching can clarify which subtasks demand fine-grained control and how CSTs might enable flexible abstractions (“sketches”) that remain open to further precision.

Beyond CST design, treating tool selection as an activity trace also informs general-purpose theories of creativity. Just as other CAT metrics have made qualitative patterns of creative cognition analytically visible [4], analyzing tool selection can surface detailed patterns of preference, learning, and adaptation that have thus far been accessible primarily through qualitative accounts.

We therefore argue that there is an urgent need to better understand how and when practitioners choose tools and how these patterns evolve over time. We propose live figure drawing as a tractable empirical site for studying tool selection as a creative activity trace.

4 Live figure drawing as research site

Live figure drawing (commonly referred to as “figure drawing” or “life drawing”) is a well-established creative tradition—beginning in prehistoric times, refined through classical and Renaissance traditions, and formalized in European art academies in the 17th-19th centuries [13]—in which participants draw a live, typically nude model holding a sequence of timed poses. Today, sessions are widely available in major cities, operate on a drop-in basis, and usually require participants to bring their own materials. For the first author, figure drawing has been a regular practice for over six years. To them, it serves as both an ongoing benchmark of their artistic progress over time and a shared site of engagement with a diverse community of creative practitioners who also view it as foundational to their broader creative work. Despite its prevalence, figure drawing has not received attention in HCI research: for example keyword searches for “life drawing” and “figure drawing” on the ACM Digital Library returned no results, at the time of writing.

As a research site, figure drawing combines constancy and variation in a way that is well-suited to tool selection trace analysis. Most commonly, poses are short and repeated (e.g., a 3 hour session comprised of many 1–20 minute poses). Because of this, intermediate artifacts are produced by default, which facilitates trace analysis. Also, a figure drawing session combines a controlled task—drawing the same subject under shared temporal constraints—with substantial freedom in tool choice, medium, and technique. It is common for practitioners who are regulars at figure drawing to bring multiple media—for example balancing a familiar tool with a “wildcard”—and to switch tools between poses in response to time pressure, perceived affordances, or exploratory intent (as evidenced in Figure 1). Whereas many CST and CAT studies fix the tool and examine creative variation in content—such as open-ended image generation with a single system—figure drawing presents the opposite structure. The subject and duration are fixed, but practitioners select among multiple tools and media. This inversion shifts creative freedom from *what* is made to *how* it is made, making tool selection especially salient and analytically tractable.

We propose that a dataset drawn from live figure drawing sessions could capture rich traces of tool selection, learning, and adaptation. Such a dataset would include photographs or scans of drawings produced across poses (tagged with metadata such as the pose duration), interviews or brief reflections on tool choice, and contextual information about prior experience with each medium. Below we propose three potential directions for analysis of this data:

- (1) Studying how an individual’s tool choices shift within a single figure drawing session and across multiple sessions would reveal how the learned, personal relationships with tools that characterize creative practice are formed [1, 6, 11]. Such analysis could reveal how artists converge on heterogeneous workflows and when they deviate from habitual patterns to explore new tools.
- (2) This dataset could also be used to examine whether artists working in familiar media exhibit more or less stylistic variance in their produced artifacts—whether habit stabilizes style or fluency enables greater diversity. Relatedly, we could also assess whether familiar media are preferred more during clamped (refinement) or unclamped (exploratory) cognition [4].
- (3) We would be interested to see whether our results replicate the qualitative findings in [8]: that tool choice is not efficiency-driven, but based on aesthetic intentions, desire for higher or lower levels of control and abstraction, and emotional and tactile experience. Analysis of figure drawing data can extend these findings by offering a more granular view of how tool-related motivations vary over time and across individuals, revealing whether different practitioners consistently prioritize different factors—such as control, tactility, or emotional experience—and how these priorities manifest in distinct tool selection patterns.

As future work, we plan to collect and analyze this dataset to examine tool selection as a first-class creative activity trace and to explore how it interacts with existing CAT analyses and CST literature.

References

- [1] Shaowen Bardzell, Daniela K. Rosner, and Jeffrey Bardzell. 2012. Crafting quality in design: integrity, creativity, and public sensibility. In *Proceedings of the Designing Interactive Systems Conference (DIS '12)*. Association for Computing Machinery, New York, NY, USA, 11–20. doi:10.1145/2317956.2317959
- [2] Amy Cheatle and Steven Jackson. 2023. (Re)collecting Craft: Reviving Materials, Techniques, and Pedagogies of Craft for Computational Makers. *Proceedings of the ACM on Human-Computer Interaction* 7, CSCW2 (Sept. 2023), 1–23. doi:10.1145/3610041
- [3] John Joon Young Chung, Shiqing He, and Eytan Adar. 2021. The Intersection of Users, Roles, Interactions, and Technologies in Creativity Support Tools. In *Designing Interactive Systems Conference 2021*. ACM, Virtual Event USA, 1817–1833. doi:10.1145/3461778.3462050
- [4] Nicholas Davis, Chih-Pin Hsiao, Kunwar Yashraj Singh, Brenda Lin, and Brian Magerko. 2017. Creative Sense-Making: Quantifying Interaction Dynamics in Co-Creation. In *Proceedings of the 2017 ACM SIGCHI Conference on Creativity and Cognition (C&C '17)*. Association for Computing Machinery, New York, NY, USA, 356–366. doi:10.1145/3059454.3059478
- [5] Jonas Frich, Lindsay MacDonald Vermeulen, Christian Remy, Michael Mose Biskjaer, and Peter Dalsgaard. 2019. Mapping the Landscape of Creativity Support Tools in HCI. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems*. ACM, Glasgow Scotland Uk, 1–18. doi:10.1145/3290605.3300619
- [6] Laewoo Kang, Steven Jackson, and Trevor Pinch. 2022. The Electronicists: Techno-aesthetic Encounters for Nonlinear and Art-based Inquiry in HCI. In *CHI Conference on Human Factors in Computing Systems*. ACM, New Orleans LA USA, 1–17. doi:10.1145/3491102.3517506
- [7] Rebecca Leger and Daniel Buschek. 2025. Human-AI Interaction Patterns in Creative Domains and Their Time-Based Visualization. In *Proceedings of the Mensch und Computer 2025*. ACM, Chemnitz Germany, 422–433. doi:10.1145/3743049.3743081
- [8] Jingyi Li, Sonia Hashim, and Jennifer Jacobs. 2021. What We Can Learn From Visual Artists About Software Development. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems (CHI '21)*. Association for Computing Machinery, New York, NY, USA, 1–14. doi:10.1145/3411764.3445682
- [9] Jingyi Li, Eric Rawn, Jacob Ritchie, Jasper Tran O’Leary, and Sean Follmer. 2023. Beyond the Artifact: Power as a Lens for Creativity Support Tools. In *Proceedings of the 36th Annual ACM Symposium on User Interface Software and Technology (UIST '23)*. Association for Computing Machinery, New York, NY, USA, 1–15. doi:10.1145/3586183.3606831
- [10] Malcolm McCullough. 1996. *Abstracting craft: The practiced digital hand*. MIT Press, Cambridge, MA, USA.
- [11] Malcolm McCullough. 1998. *Abstracting Craft: The Practiced Digital Hand*. MIT Press, Cambridge, MA, USA.

- [12] Srishti Palani and Gonzalo Ramos. 2024. Evolving Roles and Workflows of Creative Practitioners in the Age of Generative AI. In *Creativity and Cognition*. ACM, Chicago IL USA, 170–184. doi:10.1145/3635636.3656190
- [13] Peter Steinhart. 2005. *The Undressed Art: Why We Draw*. Knopf Doubleday Publishing Group.
- [14] Amy Smith, Barrett R. Anderson, Jasmine Tan Otto, Isaac Karth, Yuqian Sun, John Joon Young Chung, Melissa Roemmele, and Max Kreminski. 2025. Fuzzy Linkography: Automatic Graphical Summarization of Creative Activity Traces. doi:10.48550/arXiv.2502.04599 arXiv:2502.04599 [cs].
- [15] Sarah Serman, Molly Jane Nicholas, and Eric Paulos. 2022. Towards Creative Version Control. *Proc. ACM Hum.-Comput. Interact.* 6, CSCW2 (Nov. 2022), 336:1–336:25. doi:10.1145/3555756

Received 12 February 2026