Data Physicalization as Care: Expanding What Gets Traced Through Considering Materiality

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Abstract

In this position paper, I explore how data physicalization might be reframed as a practice of care, reciprocity, and material engagement. Drawing on my prior work with disabled artists, blind and low-vision live coders, and accessible synthesizer design, I've become increasingly interested in what counts as a creative activity trace. While many creativity support tools log keystrokes, revisions, and outputs, they often miss the slower, more embodied, and relational aspects of making—tool adaptations, pacing and fatigue, collaborative care work, scraps of material, worn knobs, annotated drafts. I describe ways in which we might expand how we define and design for creative traces, especially those that live off-platform or emerge as over time. By asking what is traced (and what is left out) I hope to open space for systems that better reflect the material, interdependent, and non-normative experiences of creative practice.

Keywords

creative activity traces, care, disability, materiality

1 About Me

Hi! My name is Izabella (Bella) Rodrigues, and I'm a first-semester PhD student at the National University of Singapore, advised by Jane L. E, in the Palette Lab. Before starting my PhD, I completed my bachelor's degree at NYU's Gallatin School of Individualized Study—a silly, wonderfully queer, and exploratory place where I got to design my own interdisciplinary major. Between degrees, I worked at the Billion Oyster Project, fabricating artificial reefs and doing hands-on estuary and marine conservation work, which continues to deeply shape how I think about care, labor, and material systems.

I'm very new to PhD life and have never attended CHI before, so I'm especially excited (and a little intimidated!) to potentially attend. I'm really drawn to the idea of a smaller workshop setting—CHI sounds huge and overwhelming, and the chance to learn, think, and talk in a more intimate group feels both grounding and generative (I've attended C&C and ASSETS before and loved being part of those much smaller conference communities). There also aren't many people at NUS working directly on CSTs, so I'm eager to learn more about what others are thinking about, what questions they're asking but haven't yet published on, and how they're approaching this space. Like I want to meet others and learn from others!!!

1.1 Prior Work and Research Interest

My work in Creativity Support Tools (CSTs) is still developing, but I'm excited about the directions it's opening up. My prior work has centered how creative technologies shape who gets to participate and how agency is negotiated through tools. These have also shaped how I think about what a creative activity trace might be.

Most relatedly, in Brody et al. [2], we examine how artists with disabilities adapt and "misuse" creative systems. Through understanding the breadth of tools that artists used to support their creativity, we surfaced many ways in which existing CSTs and concepts of what counts as a "CST" encode hidden expectations about bodies, perception, and creative process. Here, I'm interested in how those expectations become legible through the traces of adaptation, and also how these traces might vary across artists in tools, amount of physical versus digital tooling, amongst other contexts.

Another core thread of my work has looked at how tools influence live coding communities. In this space, we've formed a small laptop orchestra, FiLOrk, with five BLV teens to understand how blind and low-vision youth live code together in performance settings [14]. Building on this work, we also explored how live coding communities request and provide support online [13]. Across these, creative activity traces might largely center communication across musicians as traces of communal sense-making. These help reveal how expertise circulates and how norms are reproduced or challenged through these creativity support environments.

We've recently been exploring how synthesizers might be redesigned to better support blind musicians (in submission)—here I was especially excited by the physicality of the synth as a creative, musical device. I've become really drawn to the physical and sonic traces that build up during performance—the way knobs, presets, worn edges, or little tactile markings start to act like memory anchors and orientation cues over time.

Broadly, I'm interested in:

- **The embedded expertise of disabled people**. How can we as researchers genuinely embed the values of the Crip Technoscience Manifesto [6] into our methodologies, treating disability not as a constraint to accommodate but as a site of generative design knowledge and world-building?
- **Computational creativity practices**. How do computational systems participate in creative process, and how might we design them to scaffold experimentation, reinterpretation, and dissent rather than converge toward normative or optimized outputs?
- **Care, adaptation, and embodiment in creative work**. Care and reciprocity are my core research values [7]. How do material, sensory, and interdependent practices shape what creativity looks and feels like in practice, particularly when considering embodiment?
- **(And somewhat seemingly tangentially, but sincerely!) Marine and estuary conservation**. This interest may or may not relate in many different ways. In our fragile coastal

environments, the ideas of care, infrastructure, and interdependence are also deeply entangled. I'm also interested in sustainability and environmental considerations across both digital and physical creative mediums.

These interests often blur together for me—especially when thinking about material practices [3], interdependence [1], and how people creatively work with constraints rather than despite them [6, 10].

1.2 A Small Note on Building Continuity

I (somewhat reluctantly) reference my own prior work here—not out of self-citation enthusiasm, but because it helps situate how I'm building on ideas I've already been thinking about, now through the lens of CSTs and creative activity traces. I see this workshop as a chance to stretch those ideas, challenge them, and learn from others who are approaching similar questions from very different angles.

2 My Lens on Creative Activity Traces

Throughout my research trajectory, I've been interested in the power and agency differences embedded in physical versus digital "materials" and tools [11]. Physical objects often invite inspection, repair, modification, or even complete disassembly—there is always the possibility of opening something up and seeing how it works. Many digital tools, in contrast, remain opaque or difficult to reconfigure, even when they are marketed as creative [15, 16].

This difference has shown up repeatedly in my prior work. In studying how artists with disabilities adapt and "misuse" creative systems [2], I saw how workarounds, hacks, and tool ecologies become powerful expressions of agency. In live coding with blind and low-vision youth [14], I saw how participants stretched tools beyond their assumed visual paradigms. Additionally with this work I saw that novice understandings of technical tools can allow for creativity otherwise inaccessible to experts. And in ongoing work redesigning synthesizers for blind musicians, I've become especially interested in how the physicality of knobs, presets, and tactile markings accumulate as memory anchors over time. Across these projects, I've come to see creative practice as something that leaves traces—material, sound, social—and that those traces often reveal tensions between normative tool design and lived creative practice.

2.1 What I'm Thinking About / What I Bring to the Table

Lately, I've been thinking a lot about expanded definitions of creative activity traces, especially beyond what is easily captured by digital systems. Instead, how might we account for some of the situatedness and tacit, embodied skill that are central to physical craft practices [5]. How do we make room for traces that are slow, nonlinear, or cross physical/digital boundaries?

In particular, I'm interested in traces such as:

- **Tool modifications and adaptations**. When users remap shortcuts, 3D-print extensions, or rewire hardware, they are leaving visible evidence of negotiation with a system's assumptions and defaults. These adaptations are not just fixes—they are creative assertions of agency [6, 9]. How might we expand the concept of tool modification beyond these more traditional "hacks"? What might it mean to treat these modifications as first-class creative traces rather than peripheral hacks?
- **Pauses, fatigue, pain management, and pacing**. Creative systems often trace productivity—keystrokes, commits, outputs—but rarely trace embodied rhythm. Slowness, breaks, rest, or changes in tempo can reflect care, sustainability, or deliberate experimentation [2]. How might we appreciate pacing as part of creative authorship rather than as friction or inefficiency?
- **Collaboration, care work, and interdependence**. Creative activity is often distributed across people, such as mentors answering questions, peers debugging together, partners offering feedback, technicians maintaining equipment [1, 13]. These relational contributions are frequently invisible in logs local to a single tool. How might we trace the reciprocal support that sustains creative practice? Additionally, might this be problematic to trace?
- **Off-platform, physical, and material traces of creative practice**. In physical crafts, we often have intentional traces—sketchbooks, rehearsal recordings, annotated drafts, studio notebooks—that help make sense of a process. Yet even these forms of documentation can be challenging, tedious, or sometimes impossible to capture fully, especially when much of the knowledge lives in gesture, timing, or material feel [3, 12]. Scraps of materials, test pieces, and partial prototypes also accumulate as part of this documentation-in-progress. Other times, traces appear more quietly as residue: worn knobs, taped-over buttons, handwritten patch notes, reef structures slowly taking shape. In both cases, they accumulate over time and hold memory. They reflect how creativity unfolds materially and relationally, often in ways that never enter a digital trace. How can we learn about a creative process through these intermediate artifacts or even through wear-and-tear?

This leads me to a core question I keep circling back to: *What is not traced—by necessity or by choice?* This might include questions like, what disappears when creative activity is translated into digital (or physical) logs? And conversely, what becomes newly visible?

I'm especially interested in how we might shift dominant notions of digital creative activity traces to include physical traces and non-normative workflows, highlighting other ways of making that are often invisible, unsupported, or actively excluded [3, 8, 12].

2.2 Novices, Expertise, and "Messing Up" as Creativity

Another thread I'm excited about is the role of novices in creative systems. I'm curious about how novices—precisely because they don't yet know the "rules"—sometimes demonstrate forms of creativity that experts can't access. How much does hacking, fumbling, and learning-as-you-go actually enable creativity? These might leave different kinds of traces including messy code, nonlinear workflows, questions that surface assumptions that experts have

stopped noticing. What can we learn from these creative activity traces?

This idea connects to findings from my prior work on live coding with blind and low vision youth [14]. One of our key insights was the unique expertise that brand-new novices bring when entering a creative technology domain. Not knowing invites exploration, play, and unexpected approaches—forms of engagement that may become harder to access as expertise solidifies.

This also resonates with E et al. [4]'s exploration on feedback timing for creative tasks. Early structure and correction can sometimes narrow exploration, nudging creators toward normative decisions and processes [11]. If we care about creative activity traces, we might ask: at what point does feedback start shaping which traces are possible?//

3 Conclusion

At its core, this position asks how the affordances of physical and digital materials shape what becomes traceable in creative work. Physical materials invite inspection, modification, and wear; they accumulate history through use. Digital systems, by contrast, often constrain tracing to what can be logged, stored, and replayed—sometimes obscuring the embodied and relational aspects of making.

I'm interested in what it would mean to design creative systems that are attentive to care, interdependence, and material reality. By reframing data physicalization as a practice of care, I hope to expand what we consider traceable, especially across physical and digital boundaries, we may begin to see creative work more fully and more fairly. Doing so may help us design creative systems that better honor material agency, adaptation, and reciprocity, rather than narrowing creativity to what is computationally convenient to capture.

I am excited for this workshop as a potential space to think collectively about how we trace creativity, what we choose to make visible, and how those decisions shape who feels supported in creative systems. I'm especially excited to learn from others' perspectives and to refine these ideas in conversation.

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