Tracing the Unwritten: Toward Sensemaking-Aware Analysis of Creative Activity Traces in Narrative Writing

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Abstract

Creative activity traces—logs of keystrokes, edits, cursor movements, and version histories captured by creativity support tools (CSTs)—offer a window into the writing process. Yet existing trace analysis methods largely operationalize creativity as a sequence of observable behaviours, sidestepping the inner sensemaking work that drives narrative decisions. In this position paper, I argue that the most consequential moments in narrative writing are episodes of uncertainty and reorientation: moments when a writer pauses not to type, but to think. I propose enriching behavioural traces with lightweight phenomenological anchors — brief, writer-supplied annotations that mark felt shifts in understanding — and discuss the implications for the design of both CSTs and trace analysis methods.

CCS Concepts

• **Human-centered computing** → **Interactive systems and tools**; *User studies.*

Keywords

creative activity traces; sensemaking; narrative writing; phenomenological anchors; creativity support tools; trace analysis

1 Introduction

When a novelist stares at an unfinished sentence for three minutes before deleting it, a keystroke log records only silence followed by a burst of deletions. When a screenwriter realizes midway through act two that her protagonist's motivation is wrong, interaction logs may capture an abrupt shift in editing pattern—but not the cognitive rupture that preceded it. This gap between behavioural trace and inner process is not a minor calibration problem; it is a structural limitation of current creative activity trace (CAT) analysis.

The HCI and creativity research communities have made real progress in capturing and interpreting traces of creative work. Sterman et al. [9] studied how creative practitioners use version histories not merely as checkpoints but as palettes of materials, safety nets for exploration, and reflective records. Smith et al. [8] introduced fuzzy linkography, using embedding-based semantic similarity to automatically construct graphical summaries of CATs at scale. Alvarez et al. [1] showed that clustering intermediate design states across sessions reveals archetypical design trajectories through a data-driven style space. And Davis et al. [3] proposed creative sensemaking, coding each moment of a co-creative interaction as *clamped* (fluid, low free-energy action) or *unclamped* (hesitation or restructuring), producing continuous sense-making curves that quantify how collaborators navigate uncertainty.

Each of these methods illuminates a different facet of the creative process. Yet they share a common epistemic commitment: they treat the trace—whether a sequence of prompts, a series of tile placements, or a stream of drawing strokes—as a sufficient proxy for the process. For questions about how writers navigate uncertainty, this assumption deserves scrutiny.

Uncertainty is not a residue of writing—it is its engine. Flower and Hayes [4] established that skilled writers continually set goals, generate content, and evaluate it against evolving criteria; the process is recursive precisely because writers do not know what they mean until they have begun to say it. Insight, reframing, and conceptual restructuring—what I will call *sensemaking episodes*—are among the most generative moments in creative work [7], yet they rarely leave clean behavioural signatures. This position paper argues for a complementary approach that treats writers' own sensemaking reports as data and proposes a framework for integrating phenomenological anchors into trace analysis workflows.

2 The Sensemaking Gap in Narrative Writing Traces

I use the term *sensemaking gap* to describe the systematic absence, in behavioural CATs, of the meaning-making work writers perform between observable actions. The gap has two components.

The first is *interpretive underdetermination.* A 90-second pause followed by deletion of 400 words is consistent with distraction, frustration, insight, fatigue, or deliberate incubation. Behavioural traces are produced by cognitive processes, but the mapping from process to behaviour is many-to-many.

Consider the traces that current methods analyze well. Fuzzy linkography [8] works powerfully on text-to-image prompting traces because each design move—a submitted prompt—is a discrete, semantically rich artifact. Smith et al. identify recurring motifs such as "refinement webs" (clusters of tightly related prompts) and "curiosity zigzags" (alternation between a central theme and tangents). These patterns are legible because prompting externalizes intention: every shift in thinking produces a new artifact that can be embedded and compared. Narrative writing is different. A writer re-conceiving a chapter's structure before touching the keyboard produces no prompt, no edit, and no design move—only silence.

Creative sensemaking [3] similarly succeeds in collaborative drawing and pretend play because those domains produce dense behavioural signals. Davis et al.'s coding relies on observable markers — fluid strokes for clamped cognition, hesitation for unclamped cognition — sampled every 250 milliseconds. Their "creative trajectory" analysis reveals when collaborators achieve coupled flow rather than mutual waiting. But coding reliability depends on marker density. Narrative writing, with its long silences, is a harder case: the behavioural signal is sparse precisely where cognitive activity may be richest.

The second component is *invisible progress*. Some of the most consequential work in narrative writing happens without any document change. Methods that operationalize creativity as document change will systematically undercount the creative labor of writers who think before they type—and may pathologize the very behaviors, like deliberate incubation [5], that experienced writers cultivate. Sterman et al. [9] found that practitioners treat version histories as materials and reflective records, yet even these interactions leave cognitive experience unrecorded. Alvarez et al. [1] model designer style as trajectories through a clustered style space, but these trajectories describe *what* was designed, not *why* the designer moved between clusters.

behavioural CATs, however richly analyzed, cannot fully support process-theoretic accounts of creative writing. They can tell us what happened; they cannot tell us what it meant to the writer.

3 Toward Sensemaking-Aware Trace Analysis

I propose designing trace analysis for narrative writing around *phenomenological anchors*: brief, writer-supplied markers that flag moments of subjective significance during the writing session. Anchors are not full think-aloud protocols—which interrupt the creative process [6]—nor post-session interviews subject to reconstruction bias. They are minimal intrusions: a single keystroke that says *this is a moment worth looking at*.

The anchor is an index that tells the analyst where to look — and which behavioural context (pause pattern, editing velocity, deletion-to-insertion ratio) to interpret as potentially sensemaking-relevant rather than noise. This borrows from experience sampling [2] but adapts it for writing sessions, where the relevant granularity is the episode rather than the time interval. It also extends the version-control paradigm of Sterman et al. [9]: just as practitioners use version saves as markers of meaningful states in a document's history, anchors mark meaningful states in the writer's cognitive history.

Fuzzy linkography [8] offers a promising downstream analysis method. Smith et al. showed that automatically constructed linkographs surface structural patterns at a glance. One could build fuzzy linkographs from sentence- or paragraph-level edits, then overlay anchor points. If certain linkographic patterns — refinement webs, long-range backlinks — reliably co-occur with writer-reported sensemaking moments, this would enable the retroactive identification of sensemaking episodes in unannotated traces.

The creative sensemaking framework [3] suggests a complementary path. Davis et al.'s distinction between *perceptual* sensemaking (internal model revision) and *physical* sensemaking (environmental restructuring) maps onto writing: the writer who pauses to rethink a plot point versus the writer who rearranges paragraphs to test a new structure. Anchors could encode this distinction—"I just realized something" versus "I'm trying something out"—enabling finer-grained analysis.

Key research questions follow. How can CSTs support low-friction anchoring without disrupting creative flow? What behavioural signatures co-occur with writer-flagged sensemaking episodes? How do such episodes vary across experience levels, genres, and writing modalities? And how should trace tools visualize the relationship between behavioural events and sensemaking episodes?

4 Implications and Open Questions

If sensemaking-aware trace analysis proves viable, it has implications beyond method design. For creativity theory, it offers empirically grounded accounts of how writers navigate uncertainty without relying on retrospective self-reports. For CST design, it suggests that tools could support not just production but writers' reflection on their own process. Smith et al. [8] note the possibility of reflective visualization: displaying incrementally constructed linkographs during a design episode. Anchored writing traces could serve a similar function, helping writers see where their thinking shifted.

Alvarez et al. [1] point toward a longer-term possibility. Their method identifies archetypal design trajectories — designer personas — as frequent paths through a clustered style space. If anchored writing traces can be collected at scale, an analogous approach could yield *writer personas*: archetypical sensemaking trajectories characterizing individual writing styles. One might identify writers who anchor predominantly during exploration versus evaluation, writers whose sensemaking clusters at structural boundaries, or writers who exhibit the "converging zigzag" pattern [8] at the level of cognitive experience rather than behavioural output.

Open questions remain. Is anchoring feasible in ecologically valid settings, or does any in-session self-report necessarily compromise the process it means to study? Are there alternative methods — physiological sensing, eye-tracking, cued recall — that could partially substitute? Davis et al. [3] suggest that machine learning could automate the coding of sense-making curves; a parallel ambition would be to learn anchor-predictive models from a smaller annotated corpus. And how do we handle the asymmetry between the richness of inner creative experience and the poverty of any trace we are likely to capture?

I do not think these questions have easy answers. But they are the right questions for a community that wants to make genuine progress on understanding creativity, rather than simply accumulating ever-richer logs of what people type.

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