

Towards Linkographs for Reflective Revisitation

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Linkography has served as an analytical method for HCI, design, and creativity researchers to quantify and visualize the creative process. However, these activity traces remain largely researcher-centric, serving as a lens for external analysis rather than a mirror for the creator’s own reflection. This position paper argues for creator-centric linkography, treating the visualization not as a static research artifact but as a dynamic creativity support tool (CST). Drawing on visualization education frameworks, we propose a research agenda to evaluate linkograph legibility across three hierarchical levels: reading the data, reading between the data, and reading beyond the data. By investigating the barriers creators may face and learning their interpretations and reflections of visualizations, we aim to define a design space that empowers creators to use their own activity traces for reflective revisitation and practice improvement.

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1 Introduction

Linkographs capture the creative process through design moves, using creative activity traces such as collaborative ideation during the design process [2, 7, 11] and user prompts in text-to-image generative AI tools [15]. By linking together related moves across time, researchers are able to analyze the patterns that form in the linkograph to understand which how ideas develop. For example, a move that connects to many previous moves can suggest that a convergent process is taking place, as multiple ideas are synthesized [7]. Fuzzy linkographs, which use computationally modeled semantic similarities between moves, can be created much more quickly compared to traditional methods and allow for implementation into creativity support tools (CSTs) across different creative domains [15].

Linkographs are a valuable analysis tool for creativity researchers— but how might linkographs be useful for the creative user? Creators may desire to reflect upon their creative processes either to improve their craft or to engage in reflection as an inherently valuable practice [12]. Reflective revisitation is a reflective design pattern where the CST allows users to “re-engage with or re-evaluate decisions made in the past” [12], which linkographs may support [15]. Linkographs lay out the individual ideas that arose as the process unfolded, allowing for a clear understanding of past ideas both developed and undeveloped. Data visualizations such as linkographs support human-centered decision-making tasks, as visualizations aid human users in interpreting large-scale data [13]. Linkography analyses are revealed through visual inspection, such as structural motifs in the webs and chunks of interconnected links [15] or peaks in the linkograph’s dynamic entropy graph [2].

However, data visualizations such as linkographs may not be understood by or accessible to everyone [14]. Visualization literacy—the ability for an individual to comprehend and use information from graphs—is higher in those who have formal education [5, 6]. The vast majority of linkographs have been used solely in research settings, with

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the researcher as the primary user in mind [7]. Considering that a third of the population may have low visualization literacy [5] and that linkographs are a niche form of data visualization that the majority of creative users may not have seen before. To our knowledge, there are no studies where the result linkograph has been shown to the individuals who carry out the creative process. To this end, we propose the study of **creator-centric linkography** in parallel to traditional researcher-centric linkography.

2 Related Work

2.1 Linkograph Characteristics

Linkographs reveal connection between ideas which arise in a creative process, in patterns of design moves and links. **Nodes** are individual design moves that occur throughout the creative process, as suggesting an idea, drawing an object, or writing a prompt. **Links** connect the nodes across time. Links can be separated into backlinks and forelinks: **Backlinks** for any particular node connects it to previous nodes which suggests idea convergence [7], while **Forelinks** connect a node to future moves, which suggests idea divergence [7]. Nodes with many links are called **Critical Moves**, suggesting that the move is influential in combining existing ideas and generating new ones. Patterns present in linkographs include **webs, clusters, and sawtooths** [7]. Other descriptions and visual patterns seen in linkographs are found in existing papers (e.g. dynamic entropy graphs [2, 10], zigzags [15]).

Visually, nodes are arranged on a horizontal axis in temporal order from left to right. Links are drawn between nodes on diagonal axes, creating a triangular connection. Fuzzy linkographs use hue variation in links to signify the strength of the computer modeled semantic similarity measure Smith et al. [15]. Smith et al. [15] has touched on how linkographs can be “visually overwhelming” after a certain threshold of trace activity is visualized.

2.2 Visualization Literacy

Visualizations serve as a bridge between raw data and human insight by externalizing information in a format that leverages the human visual processing system. As noted by Munzner [13], this externalization allows users to generate complex inferences based on perceptual qualities—such as spatial location and arrangement—rather than relying solely on internal memory. In the context of creative work, personal data visualization can be particularly impactful, as it facilitates a change in cognition and a deeper understanding of one’s own material and process [9].

However, the efficacy of these tools is often limited by varying levels of data and visualization literacy. Users bring diverse mental models to a graph based on their formal and informal education [6], leading to significant differences in how novices and experts approach the same data [8]. Furthermore, the unique needs and specialized language of a specific discipline (e.g., creative writing vs. text-to-image prompting) can pose barriers to effective task abstraction [13]. These cross-cultural and educational differences directly affect a user’s ability to accurately interpret data [5]. To support creators, we must evaluate their comprehension through hierarchical tiers of understanding—ranging from basic data extraction to making predictions beyond the data [3, 4]. Methodologies such as think-aloud protocols and verbal protocol analysis are essential for identifying exactly where these mental models break down or where users succumb to misinterpretations driven by perceptual biases [1].

3 Research Directions and Questions

Formal user studies centered on the creator provide a unique opportunity for individuals to generate their own linkographs and subsequently reflect on their structural characteristics, offering insight into how these traces behave in

real-world creative contexts. By presenting these visualizations to both creators and researchers, we can empirically contrast how novices interpret graph-based activity traces compared to seasoned experts [8]. To support with data interpretation, we can provide a graphical legend with concrete examples to assist users in identifying foundational components of from individual nodes and links to structural patterns. Ultimately, user comprehension should be evaluated through three levels derived from visualization education studies: the ability to read the graph (data extraction), read between the graph (pattern recognition), and read beyond the graph (inference and reflection) [3].

Reading the Linkograph. This targets how users perceive the visual characteristics of the graph.

- **How accurate are creators in identifying formal structural properties of linkographs?** In other words, are creators able to recognize the nodes, links, and other characteristics of the graph to the same extent as researchers?
- **How might users misinterpret or fail to interpret the graph?** For example, users may interpret more transparent “fuzzy” links as “less important” compared to other links due to existing concepts surrounding color and importance [13].

Reading between the Linkograph. This targets how users make sense of relationship patterns and compare between the characteristics of the graph.

- **How do creators isolate the patterns of the linkograph?** Are they able to identify the segments of linkographs which correspond to patterns, and do they match expert analyses? Are researchers also able to identify the same types of patterns, or are some patterns more easily distinguishable than others?

Reading beyond the Linkograph. This targets how users can integrate their understanding of the visualization into their existing creative processes.

- **How do creators perceive these visualizations as having a transformative impact on their future creative experiences?** By understanding how creators understand linkographs, we can come to an understanding of which types of support may benefit certain creators in certain archetypes. For example, creators who make very large and interconnected webs (members of cluster 4 in [15]) may prefer linkographs displayed in-situ during their creative process to better synthesize their existing ideas, while other creators might like to see a linkograph post-hoc after a completed work to find enjoyment in experiencing their past ideas.

To understand how linkographs may serve as a meaningful source of reflective revisitation, we must identify how creators navigate these graphs and which specific moves, links, or patterns trigger retrospective insight. We take the position that a study grounded in established visualization literacy frameworks is essential for evaluating linkography from a creator-centric perspective. By investigating the cognitive and perceptual hurdles identified in general visualization literature, we can determine the requirements for a truly legible activity trace. Ultimately, this work seeks to contribute to the design space by demonstrating how the visualization of creative activity traces can function as a CST for the creator directly.

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