

Exploring How People Use and Experience Co-Creative Systems: A Study Using Silk Application

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Abstract

Computational creativity, a facet of Artificial Intelligence (AI), explores systems displaying human-like creative behavior, notably in tasks like painting and music composition. The evolving field of computational co-creativity connects to user-centered studies in design, human-computer interaction, and AI. Co-creativity, involving collaboration between computers and humans for creative outputs, has shifted to emphasize activities with at least one computational participant. While literature often assesses creativity or collaborative impacts, less attention has been given to the usage and experiences of individuals interacting with co-creative systems, particularly as a recreational activity. To address this, semi-structured interviews were conducted with two participants using the Silk application, leading to findings that highlight a desire for authenticity, originality, and engagement. Participants suggested improvements in the graphical user interface, user-friendliness, additional features, and AI-to-human communication for a more enriching experience.

Introduction

Computational creativity, a subdivision of Artificial Intelligence (AI), involves exploring systems that demonstrate behavior considered creative in humans. These computational creativity systems have applications in independent creative tasks, such as generating paintings and composing music (Feldman 2017).

Computational co-creativity is a developing field within co-creativity research, linking to user-centered investigations in design, human-computer interaction, and artificial intelligence (Koch, Ravikumar, and Calegario 2021).

Co-creativity occurs when computers and humans work together to develop joint creative creations (Davis et al. 2015; Wen et al. 2015). Initially encompassing any collaborative creative endeavor, the term has evolved to specifically denote activities involving at least one computational participant, representing a contraction of "computational co-creativity" (Karimi et al. 2018).

Examining computational creativity systems provides insights into the human creative process. It also empowers the development of systems tailored for creative individuals, where the software transforms into a creative collabora-

tor rather than just a tool for the artist's creativity (Feldman 2017).

While in most of the literature the focus is either on assessment of creativity in collaborative creative systems or studying its (collaborative) impacts on human design, there is less research on the usage and experience of people interacting with co-creative systems, particularly as a recreational activity.

To answer the question: *How do people use and experience co-creative systems?*, semi-structured interviews, following Kvale's typology (Kvale 1996), of two participants on their experience of creating art using the Silk application, an interactive generative art system, were conducted and a thematic analysis of the interview data using Braun and Clarke's six-phase guidelines (Braun and Clarke 2006) was carried out.

We identified that participants didn't find the Silk application authentic, original and engaging. However, their responses point that better GUI, ease of use and more features along with incorporation of a feedback mechanism, that is, AI communicating back meaningfully, is the way forward.

Paper Contributions

This study provides fresh perspectives on the design of successful computational co-creative systems and establishes a groundwork for subsequent research endeavors. Moreover, the findings from this research can be applied to various domains involving human interaction and collaboration with AI, including ed-tech, professional as well as recreational tasks.

Related Work

Co-creative systems, a subset within computational creativity, involves cooperative endeavors where humans and AI collaborate to produce a collective creative result (Davis 2021). This area of investigation holds significance as AI becomes more prevalent in collaborative domains, such as collaborative music creation, design endeavors, and even in roles like a virtual nurse in healthcare settings (Rezwana and Maher 2022a).

"Davis et al. (2015) establishes synchronous collaboration as a requirement, defining co-creativity as a process where users and computers can collaboratively

improvise on a shared artifact during the creative process.”

(Karimi et al. 2018; Davis et al. 2015)

The examination of co-creativity also enables the development of systems tailored for creative individuals, transforming software into a creative partner rather than a mere tool for the artist’s creativity (Feldman 2017).

Most of the existing literature primarily focuses either on assessment of creativity in collaborative creative systems or studying its (collaborative) impacts on human design.

Assessing creativity in collaborative creative systems

Kantosalo employed Interaction Design to assess the *Poetry Machine*, a collaborative poetry writing system, and determined While the system wasn’t universally acknowledged ‘as a co-author in the writing process’, it did make some contribution in some manner (Kantosalo and Riihiaho 2019).

In the similar vein, a study conducted by Zacharakis et al on the *CHAMELEON*, a computational assistant for melodic harmonization, revealed that the system’s appreciation varied based on users’ expertise (i.e., novices expressed more appreciation for the computational support than professionals). Simultaneously, users appeared to adopt more exploratory approaches due to their interaction with *CHAMELEON*, resulting in harmonisations that were more intricate, varied, and unexpected compared to those of the control group (Zacharakis et al. 2021).

However, Jordanous in her thesis proposed *SPECS (Standardised Procedure for Evaluating Creative Systems)*, a comprehensive framework for assessing the creative capabilities of a system within the domain of computational creativity (Jordanous 2012).

Studying (collaborative) impacts of co-creative systems on human creativity

Jingoo and Mary, in their exploratory examination of the *Collaborative Ideation Partner (CIP)*, a co-creative design system offering inspirational sketches aligned with a designer’s drawings, discovered the significance of image quality in AI-driven creativity. Their findings indicated that

“inspirations based on conceptual similarity to the target design have more impact on ideation than inspirations based on visual similarity to sketches drawn by a designer.”

(Kim and Maher 2023)

Rezwana and Maher conducted a comparative study examining the effect of two co-creative systems, *Collabdraw* (a collaborative sketching environment) and *Creative PenPal* (a system presenting sketches to inspire users), with and without AI communicating back to human. Their investigation focused on collaborative experience, user involvement, and user perspective of the co-creative applications. The findings indicated that incorporating

“AI-to-human communication along with human-to-AI communication improves the collaborative experience and user engagement as the co-creative AI is perceived as a collaborative partner.”

(Rezwana and Maher 2022b).

However, there is still a perceivable gap in studies when it comes to usage and experience and to ascertain how individuals utilize and encounter co-creative systems, particularly as a recreational activity, further research including interviews should be conducted.

Interview

Semi-structured interviews were conducted to address the following research question: *How do people use and experience co-creative systems?*

Participants

- Participant I(P1): 35, Female, student, Asia
- Participant II(P2): 36, Female, student, Africa

As an incentive in exchange of their participation in the study, the author agreed to be a participant in their respective experiments.

Materials

Interviews were recorded on a mobile. And later, otter.ai was used to translate audio to text.

Method

An interview guide was prepared following Kvale’s typology (Kvale 1996). For instance,

- Can you tell me about any experience or interest you have in the arts? (Introducing questions)
- When you used silkweave for the study, did you have a goal in mind? (What was the goal? Did you achieve it?) (Follow up questions)
- Did your experience with Silkweave change your understanding or appreciation of generative art? How? (Probing questions)
- Was it easy/fun/useful/. . . to use? (Direct questions)

At the beginning of the study, we requested participants to explore the Silk application and generate few art works. Throughout the interviews, we posed additional questions to delve further and provide clarification on intriguing topics that emerged during the discussions. We recorded interviews on mobile and later used an AI tool to get the transcription. Which was sent to participants for verification. Participants were not mandated to possess any drawing proficiency for the study.

Analysis

We carried out a thematic analysis on the interview data following the six-phase guidelines outlined by Braun and Clarke (Braun and Clarke 2006).

1. Familiarizing yourself with your data: Transcribing the data, thoroughly reviewing and re-assessing the data, and recording preliminary thoughts.

2. Generating initial codes: Methodically coding significant characteristics within the entire dataset and organizing data relevant to each code.

3. Searching for themes: Organizing codes into prospective themes and collecting all data linked with each potential theme.

4. Reviewing themes: Evaluating the efficacy of themes in relation to coded extracts and the entire dataset and constructing a thematic 'map' for the analysis.

5. Defining and naming themes: Continuing analysis to fine-tune the particulars of each theme and the overarching narrative, establishing distinct definitions and names for each theme.

6. Producing the report: The concluding stage includes choosing distinct and compelling instances, thoroughly analyzing selected excerpts, linking the analysis to the research question and pertinent literature, and generating a scholarly report that summarizes the analysis.

Results

This section explores the outcomes of the thematic analysis, focusing on qualitative results and identified themes. Two types of themes were observed: those that directly surfaced from interview inquiries (with high frequency) and those that emerged from unanticipated comments and remarks made by participants (with low frequency) (Rezwana and Maher 2022b). The themes (Figure 2) are described in the following subsections.

Experience with co-creativity

While the P1 evaluated the application on its own merit and was more concerned with its immersive experience,

"...But it could be more satisfying."

The P2 was experiencing the application in comparison with the human creativity.

"The authenticity, the originality cannot be compared, doing art with AI is just enhancement."

However, both the participants admitted, in words of P1, that,

"...co creative field has a future."

And both had also appreciated the generated art with the P1 describing them as

"interesting designs."

Sentiments regarding generated art

Both the participants had categorically termed the application

"boring"

, with the P1 being apprehensive of the curtailment of human creativity.

"It is constrained to a structure... With some space for my creativity."

P2 felt the process of art generation was enjoying.

"It was beautiful to see how the spectrum develops colourful webs..."

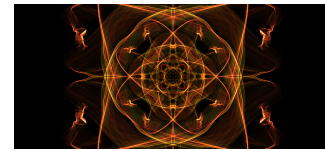


Figure 1: An AI art generated by P1 using the Silk application

Impact on user autonomy

The P2 felt that the application has

"... more control on the design outcome ..."

and more often than not

"... you end up with a design you didn't imagine before using the app..."

The P1 was of opinion that even though the application is not impactful, it is fast and more suitable for abstract drawings. Refer to Figure 1.

User Engagement

Both the participants did not find it much engaging. However, interestingly, the P2 got

"inspired"

to explore it more when she

"noticed how responsive it was to every click."

Discussion

While both the participants agreed that the application has potential and can generate unique art, they were not impressed with its authenticity and originality. This was on expected lines since the Silk application doesn't employ any feedback mechanism. This finding is in consonance with the conclusion reached by Rezwana and Maher that incorporating AI-to-human communication also has a beneficial impact on how users perceive co-creative systems, with users viewing it as more perceptive and trustworthy (Rezwana and Maher 2022b).

Both the participants were of the opinion that the application restricts human creativity and many a time behave like it has an absolute mind of its own. But they thought that it can be used in specific cases such as drawing abstract art. These findings have a similarity in the study of the *Poetry Machine* (Kantosalo, Toivanen, and Toivonen 2015), in which authors concluded that some pupils

"worked very autonomously throughout the session"

, while some

"had been inspired by the tool to start poem writing as a hobby."

On analyzing the responses related to improvements and usage, we can infer that better GUI, easier controls and more features are needed to hold user engagement and make it more useful and enjoyable.

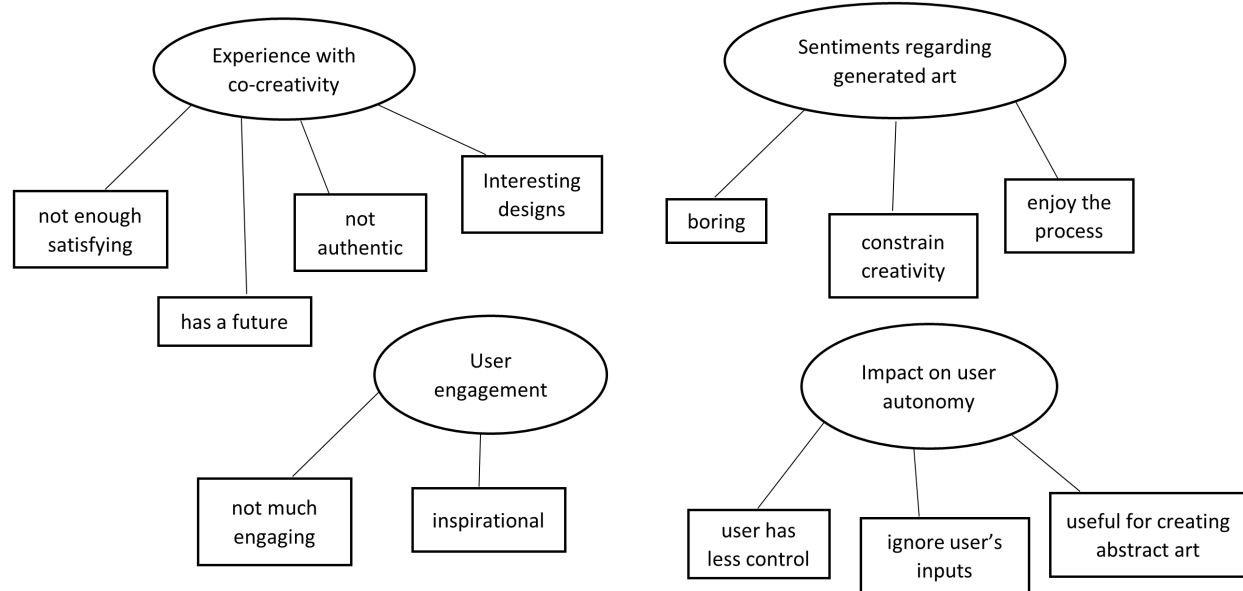


Figure 2: Final thematic map of four main themes : 1) Experience with co-creativity, 2) Sentiments regarding generated art, 3) Impact on user autonomy, and 4) User engagement.

Limitations

Only two participants were interviewed for this study, thus limiting the data. Also since both the participants were females, post grad students in their 30s, demographics group is too narrow to make far reaching conclusions.

Also, while one of the participants had no prior experience with co-creative systems, other had used an application only once or twice.

Future Work

More studies are needed to establish a causality between ease of use, better GUI and user engagement with co-creative systems. This will help developers to create systems which can motivate as well as engage users to create meaningful works.

Also, further studies are required to find out whether

“ including AI-to-human communication along with human-to-AI communication improves the collaborative experience and user engagement.”

(Rezwana and Maher 2022b)

Conclusion

In this paper, we investigate the question: *How do people use and experience co-creative systems?* We interviewed two participants on their experience of creating art using the Silk application and identified that participants didn't find the Silk application authentic, original and engaging. However, their responses point that better GUI, ease of use and

more features along with incorporation of a feedback mechanism, that is, AI communicating back meaningfully, is the way forward. This study provides fresh perspectives on the design of successful computational co-creative systems and establishes a groundwork for subsequent research endeavors. Moreover, the findings from this research can be applied to various domains involving human-AI interaction and collaboration, including education, entertainment, and professional tasks.

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