Exploring Embodiment's Role in Creativity with Live Artistic Performances

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Abstract

The paper engages with the role of embodiment in perceptions of creativity, by discussing the aims and motivations behind the workshop 'The Role of Embodiment in the Perception of Human & Artificial Creativity', organized by the authors in the context of the 13th International Conference on Computational Creativity, ICCC'22. This workshop pioneered a novel format for the Computational Creativity community in which artists are on hand to physically share and discuss their process with the research audience. We describe the structure of the workshop and the methodology followed in designing the audience survey conducted during the first day. Lastly, we argue for the relevance of more in-field studies aimed at testing the role played by the interaction with live artistic processes on evaluations of creativity.

Keywords

Embodiment, Creativity, Performance, Strokes, Robotic drawing, Survey

1. Creativity and Embodiment

In the last decades, many programs were designed with the aim to build systems that exhibit creativity in visual arts [1], music [2, 3, 4, 5], and poetry [6], among other fields [7, 8, 9]. The rapid technological development of Artificial Intelligence (AI) systems and the growing use of the latter in the creative sector asks for a more detailed and overarching analysis of the impact that the employment of technology in the arts can have on different aspects of the creative world: from the creative collaboration between humans and technology, to the embodied versus dis-embodied process of creating art, to the reception of works created and curated by AI [10, 11, 12]. The question whether, alongside humans and other animals, also artificial systems can be creative has been object of numerous publications since the 1990s, starting from the research on computational creativity by Margaret Boden [13]. Still, one aspect of creativity which has not been addressed in depth, with some exceptions [11, 7, 14, 15], is the role played by embodiment and physicality in perceptions of creativity [16].

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Yet, it can be argued that the perception of the embodiment of the agent performing the creative process is a key aspect of the observer's response to the final outcome and to the process itself [17]. Findings of the study described in Moruzzi (2022) highlight the relevance of embodiment for collaborative creative processes among humans and machines. In the study on perception of creativity in online environments, reported in Herman and Hwang (2022), artifacts that contained physical manifestations of process (e.g. visible brushstrokes, hand-drawn sketches) were deemed as more creative by creative professionals. These results are arguably due to a mimetic approach to judging creativity: professionals, having experienced the embodied process of making creative pieces, consider the artist's process via a quasi-embodied mimetic perception. Upon embodying processes that are more complex or challenging, they more highly rate the creativity of the resulting piece.

If embodiment is - as it seems from the results of the mentioned studies - a crucial component of creativity, this poses interesting challenges for AI systems attempting to generate creative art, as we are used to thinking about them as disembodied computer programs. There are two ways that artificial art may approach embodiment: (i) a physical machine may carry out the AI system's artistic intent, or (ii) the physicality of the humans interacting with the AI system can be highlighted, for instance by calling the attention to the embodied experience of coding the underlying algorithms, of selecting algorithmic outputs from the latent space, and so on.

This paper engages with the role of embodiment in perceptions of creativity, by discussing the aims and motivations behind the workshop 'The Role of Embodiment in the Perception of Human & Artificial Creativity', organized by the authors in the context of the 13th International Conference on Computational Creativity, ICCC'22. We describe the structure of the workshop and the methodology followed in designing the audience survey conducted during the first day, arguing for the relevance of more in-field studies aimed at testing the role played by the interaction with live artistic processes on evaluations of creativity.

2. Aims and Structure of the Workshop

The two-day workshop 'The Role of Embodiment in the Perception of Human & Artificial Creativity' took place on 27-28 June 2022 in Bolzano, Italy as part of the program of the 13th International Conference on Computational Creativity, ICCC'22.[1] The ICCC conference, an internationally renowned platform for research on computational creativity, offered an ideal venue for the workshop, as it allowed to have an audience of participants working in interdisciplinary fields and coming from different backgrounds: computer and natural sciences, humanities, art, and design.

The main aim of the workshop was to explore the impact that different kinds of embodiment, explicated in the collaboration between human and machine for the creation of artistic output, have on the evaluation of the creativity of the process behind its creation. The workshop is part of a wider project conducted by the authors and funded by Intersectoral Cooperation Programme of the Institute for Advanced Study for Junior Researchers, University of Konstanz. In this project, academic research and the creative technology industry join forces to attempt at answering the question of how the embodiment of artists affects the perception of creativity of

[1]Website of the workshop accessible at: https://lauramariahherman.wixsite.com/workshopiccc22.

the process that they perform. This research complements and expands the studies conducted by Chamberlain et al. (2018) on how observers' evaluation of art changes when viewers are given the opportunity to see robotic artists in action. However, while the latter focus on the perceived aesthetic value of computer-generated art, we address changes in perception of creativity. The assumption from which we start, thus, is that creativity and aesthetic value are two distinct and not necessarily inter-dependable variables.

The first day of the workshop was devoted to two performances by the artist, researcher, and illustrator Renaud Chabrier.[2] and Daniel Berio,[3] a researcher and artist working with generative methods for the procedural generation of graffiti and calligraphy, with applications in robotics. The two artists had one room each available where to display their performance. After having engaged with the performances, audience members were invited to fill out two online surveys, one per artist, aimed at testing how they evaluated creativity and other factors in relation to the artistic processes they experienced. In this paper we limit at providing details about the performances and the first impressions deriving from the interaction of the public with them, while more specific results of the surveys will be published in the near future.

The second day of the workshop consisted of presentations by six researchers interested in the role of embodiment in the judgment of the aesthetic value of an artifact and in the evaluation of the creativity of the process behind its creation. These papers are included in the present Proceedings volume, and they had been chosen through a peer-reviewed selection process from those submitted to the Call for Papers of the workshop. The workshop ended with a panel discussion between the speakers, followed by a keynote by Aaron Hertzmann (Adobe Research), shared with the ICCC'22 conference.

3. Survey on Audience Perceptions

Performance A: Daniel Berio The setup for Daniel Berio's performance was minimal: a single table with a laptop, connected to a projector on a tripod, a pen plotter (AxiDraw), and a sheet of white paper (Figure 1). The room was partially darkened to allow for the projected lights on the paper to be more visible.

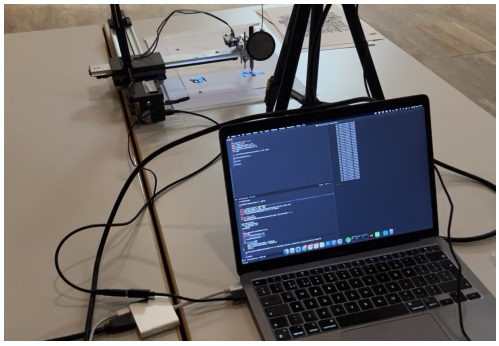

Figure 1. Setup for the performance by Daniel Berio: a laptop is connected to a projector on a tripod and to a plotter which draws in real-time on paper.

The system used for the performance, the Graffitizer 2, consists of a computer program which generates forms that are then drawn by the plotter on the sheet of paper with a pen. While the plotter draws abstract forms on the paper, the program gives in real-time the command of projecting colored lights over the drawing to a projector (Figure 2). The

[2]Website accessible at: http://www.renaudchabrier.com/en/home.
[3]Website accessible at: https://www.enist.org/post/.

drawing in black and white made by the plotter is permanent, while the coloring is temporary, and lasts only the time of the performance.[4]

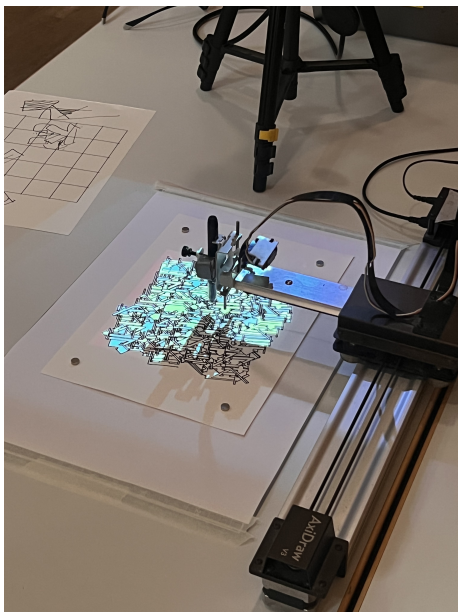

Figure 2. The Graffitizer 2 in action: drawings are permanent, while projected lights are temporary.

During the performance, the audience could observe the process from every angle. They could decide to focus on either the laptop screen with the details of the code of the program, or on the physical machine, watching abstract forms taking shape and the interaction of the lights from the projector with the movements of the pen and plotter on the paper.

More than one participant was confused by the source of the coloring on the paper, believing that it originated from the support below the paper instead. Only after interacting physically with the system, i.e. by placing a hand under the projector's lens, they understood that the light was projected on the paper from above. The interactions of the participants with Berio were numerous, as many of them showed interest in knowing more about the program behind the system and the concept from which the idea for the installation originated.

Performance B: Renaud Chabrier Renaud Chabrier started with a 30-minute introduction of two systems he developed, the combination of which was at the basis of the performance given during the workshop. The first system consists in a computational system which gives artists the possibility to animate sequences of hand-drawn strokes. This system was developed in the early 2000s by Chabrier with the aim of simplifying the task of developing movement in hand-drawn animations, a process which requires a lot of time and paper from practitioners working in the animation industry.[5]

The second system was developed in 2016 by Chabrier to create an animation sequence

Figure 3. Setup for the stroke animation system by Chabrier. The hand-drawn strokes are animated by the system and displayed on the screen.

[4]More information on the installation available at https://www.enist.org/post/drawing_machines/graffitizer-2/.
[5]Video of the system accessible at https://www.dailymotion.com/video/x21lww.

of sea waves for the musical 'Peter Pan' directed by Guy Grimberg. The system animates drawing patterns, in this case sea waves, allowing the artist to control the speed at which animations are displayed.

The performance given by Chabrier during the workshop, the "Dance of the Stroke", consisted in a combination of the stroke animator and the sea waves generator systems. The human (Chabrier or a member of the audience) starts by drawing a stroke on a piece of paper, and the projection of the actor's hands in the process of drawing is displayed on a screen (Figure 3). As soon as the artist adds more strokes to the paper, the computational systems animates the sequence of strokes. The animation movement is then displayed on the same screen.

Figure 4. The strokes drawn on paper are elaborated by the second system to create patterns in movement.

The strokes generated during the first phase of the performance, are then elaborated by the second system, the sea waves generator, to create an animation that is displayed on a larger screen (Figure 4). In his introduction, Chabrier was explicit in saying that the performance had the aim of inducing movement in the audience. Participants were not forced to be mere external observers, rather they were encouraged to walk in front of the screens and see how the projections moved them. After the first demo, performed by Chabrier himself, participants to the workshop were also invited to be involved first-hand in the performance, by drawing on paper the initial strokes that were later animated by the system.

3.1. Survey Process and Methodology

After experiencing each live artist performance, the attendees were asked to fill out a brief survey, accessible via QR code. The survey was hosted on Qualtrics, and all participants completed and signed an Informed Consent form prior to entering the questionnaire. The survey included background questions on the attendee's demographics, education level and area of study, as well as their previous artistic, technical, and research experiences. The attendees were asked about their observation of the artist's process and their level of interaction with the artist.

The main portion of the survey was constructed primarily of 5-point Likert scale rating questions. The attendees were asked to rate the piece's overall creativity, originality, aesthetics, value, and surprisingness. Then, they were asked to rate the *process'* complexity, creativity, originality, embodiment, and humanity, as well as the *outcome's* aesthetics, surprisingness, originality, creativity, value, and humanity. Finally, they were asked to rate the level of embodiment of the piece, of the artist, and of the viewer. They were also asked about perceived agency, ownership, and authorship on behalf of the artist, their software, and their hardware.

We received 32 survey responses from the workshop attendees across the two art pieces. Here, we share some initial, directional findings that we hope to expand upon in future research.

For Daniel Berio's piece, the majority of participants said 'the creator' was the human

+ software + hardware, though some people said it was only the human. No one said the software and/or hardware alone was the artist. Though participants rated the experience as highly creative, it was not deemed very embodied. The outcome was perceived as far more 'creative' and 'original' than Renaud Chabrier's piece, but far less 'human'. Berio's process, in particular, was rated as highly creative and complex; however, it was not considered very human or embodied. The outcome, in particular, received its highest ratings for its aesthetics. Interestingly, those who reported more interaction with the artist gave higher ratings across the board. In terms of agency, some participants said only the human had agency, some said only the machine had agency, and a few said that both the human and the machine had agency.

As for Renaud Chabrier's piece, participants deemed it highly 'creative' and 'valuable'. They indicated that Chabrier's process was very 'human' and 'embodied', albeit less complex. Furthermore, the outcome was very aesthetically pleasing to the participants. Interestingly, nearly all participants said that the 'creator' was the human + software + hardware. In the ratings of the overall experience, participants said that it was both 'embodied' and 'creative'. Every participant indicated that Chabrier had exhibited human agency; a few said that the machine had also exhibited agency. Those who had more interaction with the artist gave higher ratings for the 'process', but interacting with the artist did not seem to impact overall ratings or outcome ratings.

Of course, the results of this survey are limited by both quantitative significance and the participant makeup. As opt-in attendees of a workshop on creativity and embodiment, it is likely that participants have unique and/or expert views on this topic that may not be representative of the broader population of art-viewers. Indeed, all but one respondent to our survey identified themselves as researchers in the field (the other respondent was a self-identified artist).

4. Conclusions

This workshop pioneered a novel format for the Computational Creativity community in which artists are on hand to physically share and discuss their process with the research audience. In the academic talks on the following day (which represented a broad range of disciplines, including philosophy, art, human-computer interaction, computer science, etc.), speakers often referenced the audiences' shared experience of the previous day's artistic performances. By situating the scholarly conversation within real artists' processes, the implications of the academic research became immediately apparent.

Furthermore, this workshop format enabled the authors to pilot a questionnaire on the relevant topic areas before sharing it with a broader audience. Initial survey results revealed that the piece physically drawn by a human was indeed perceived as more 'human' and 'embodied', validating initial assumptions. Furthermore, the 'outcome' of that piece was deemed significantly more creative. Though we can not infer a causal relationship, this initial finding indicates that it is worth further investigating the role of perceived embodiment in creative judgments. On the other hand, the piece that was created using a robot/plotter was perceived as having a more complex process; this also raises interesting questions regarding the role of technology in artistic processes. Finally, the audience perceived the artworks as being created by humans in conjunction with both software and hardware, giving authorship to both physical and virtual

technologies.

In the future, we plan to conduct a large-scale version of the same survey experience, targeting a wider array of participants through advertisements and compensation. In this public-facing survey, we will show our participants two videos: first, they will see a video of a digital illustrator physically drawing a hand-drawn illustration using a tablet. Then, they will see a video of Daniel Berio coding, calibrating, and running his robotic sketching artwork. After each video, participants will be asked to answer the same set of survey questions, covering their perceptions of the piece's creativity as well as the artist's embodiment. We plan for the questions to be nearly identical to the survey questions piloted in this workshop.

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