Designing for Playfulness in Human-AI Authoring Tools

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ABSTRACT

Many human-AI authoring tools are used in a playful way, while being primarily designed for task-achievement—not playfulness. We argue that playfulness is an important yet overlooked factor of user behaviour and experience when interacting with such tools. Motivating and rewarding playfulness as an exploratory, task-agnostic, open, and subversive attitude can support the satisfaction of more diverse user goals, and have a strong, positive effect on the user experience, the emerging human-AI interaction, and the resulting artefact. In this paper, we motivate the importance of playfulness as user experience in human-AI authoring tools, and propose concrete strategies to design for playfulness in the human user through UI design, in the AI through algorithms, or through interventions to their dialog. We conclude with an outlook of the research agenda.

CCS CONCEPTS

• **Human-centered computing** → **Interaction paradigms**; *Graphical user interfaces*; *Collaborative interaction.*

KEYWORDS

play, playfulness, creativity support, mixed-initiative co-creativity

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1 INTRODUCTION

Computers have been leveraged to assist human creators throughout the history of computing. Recent advances in deep learning have allowed Artificial Intelligence (AI) to produce artefacts of high quality in creative domains such as language [32], visual art [30], and music [40]. Most of these models are now either open-sourced or available online for everyone to experiment with. This has spurred the creativity of millions of users of all types [21] who strive to interact with the models, use their outputs, test their limits, and, of particular importance here, engage with them *playfully* [39].

We distinguish two types of Human-AI authoring tools: creativity support tools (CST) are designed for the system to support human initiative, while mixed-initiative co-creativity (MICC) tools endow both the human user and the AI with creative responsibility [19, 41]. We argue that neither CSTs nor MICC tools are always used as intended by their end-users—and that it is a good thing. Specifically, these tools are often designed for improving efficiency in task-achievement, e.g. through faster turnaround times, or by offloading arguably tedious tasks to the AI; however, we often observe users spending more time interacting with the tool when they engage with the AI initiative than when they do not [10]. Recent studies on text-to-image generators such as Midjourney [30] highlight that even professional creatives use these tools especially for *inspiration* [21, 39], a goal that arguably runs against most common conceptualisations of task-achievement. These model-based generators and their interfaces seem designed for professional, efficient interactions: e.g. via a single user input and static produced outputs. However, we often observe that users tend to interact with CSTs and MICC tools in a task-agnostic, open and subversive fashion, i.e., a *playful* attitude—also confirmed through empirical study [39].

In this paper, we envision and motivate playfulness as an important design aspect of CSTs and MICC tools to unlock their true potential. As discussed earlier, end-users already interact playfully with most of these tools. Crucially though, this is *despite* the task-focused design of the tool itself, rather than supported by it. This interaction is similar to the Montessori child-centred method of education [29], insofar as the available models, tools and software (like the toys within reach in the Montessori method) are easily

available to all to interact with in a hands-on fashion as the users' will. We project that designing interaction paradigms and AI methods that not only allow for playfulness, but invite and foster it, can support the satisfaction of more diverse user goals, and have a strong, positive effect on the user experience, the emerging human-AI interaction, and consequentially the resulting artefact.

In this paper we distinguish different notions of playfulness, discuss its relation to creativity, identify its requirements, and discuss how it could be actively supported in CSTs and MICC tools.

2 CONCEPTUALISING PLAYFULNESS

Csikszentmihalyi remarks that playfulness is "not an expendable luxury. It is the stuff of life, it is what gives us the experience of freedom, of transcendence, of growth" [7]. Playfulness has been conceptualised as an *experience* [e.g. 15, 27], a *trait* [e.g. 35, 36], and, most importantly in this context, as a *state* or attitude [e.g. 14].

Högberg et al. define playfulness as a dimension of gameful *experience*: the "experience of being involved in voluntary and pleasurable behaviors that are driven by imagination or exploration while being free from or being under spontaneously created rules" [15]. Building on previous theoretical work on pleasurable game experiences, emotions and play, Lucero et al. [27] define 22 categories of playful user experience in their Playful Experiences framework (PLEX). A subset, e.g. experiences of *captivation*, *control*, *discovery*, *exploration* and *subversion*, overlaps with Högberg et al.'s findings.

In contrast, Proyer et al. [36] conceive playfulness as a *trait*; an "individual differences variable that allows people to frame or reframe everyday situations in a way such that they experience them as entertaining, and/or intellectually stimulating, and/or personally interesting". Proyer [35] proposes a model with four distinct facets of adult playfulness; the most relevant facets here are: *lighthearted*, i.e. "seeing life as a game and not worrying too much about the future consequences of one's own behavior; liking to improvise" [35], *intellectual*, i.e. "liking playing with ideas and thoughts; liking thinking about and solving problems" [35] and *whimsical*, i.e. "finding amusement in grotesque and strange situations" [35].

Playfulness as a *state* or attitude can be best understood in contrast to play. Heljakka notes that, "whereas play is a process that may develop the capacities of the player (…), playfulness remains a way of thinking that does not refer to [the] manipulation of materials" [14, p. 212]. Crucially, "playfulness (…) may not equal play" [14, p. 214]. In design, for instance, playfulness "may be regarded as an attitude or a state of mind that helps us to see things differently or achieve unexpected results" [14, p. 211]. Similarly, Pichlmair highlights playfulness as an "accompanying attitude, a mental state of openness towards a situation" [33]. Adopting the definition of play as "the free space of movement within a more rigid structure" [44], Pichlmair notes that playfulness only emerges within structures that limit freedom: "Playfulness is an attitude manifesting in the experience of approaching these limits, of exploring them" [33].

While a user's playfulness as a *trait* is out of our control, we argue for designing for playfulness as both a *state* and an *experience*.

3 PLAYFULNESS AND CREATIVITY

Since we aim to support playfulness in CSTs or MICC systems, we must distinguish playfulness from creativity. Bateson and Nettle [1] found empirically that people who consider themselves playful also believe that they come up with new ideas. They conclude that "there is a conceptual overlap, but it is probably best seeing play and playfulness as a facilitator of creativity without them being redundant". Proyer et al. [36] similarly support a robust association between the concepts but note that "these relations do not indicate redundancy", and that "there is good evidence for arguing that playfulness is a facilitator of creativity and creative responses" [36]. While the latter consider playfulness a trait, Bateson and Nettle hold that playfulness as a state/attitude can be encouraged "and, in so doing, creativity and hence innovation can be enhanced" [1]. These findings support that playfulness is distinct from creativity, and both concepts should thus be considered separately in the design of CSTs or MICC systems. Moreover, they highlight that designing for playfulness as a *state* not only has the potential for fostering the user's desired mode of interaction, but could also strengthen creativity as a potential goal. The latter overlaps with the use of AI systems for inspiration as highlighted in Section 1.

4 DESIGNING FOR PLAYFULNESS

Based on the previous findings, we argue that designing for playfulness in the interaction with CSTs or MICC systems is a worthy and natural goal, with first support coming from research on casual creators [6]. While playfulness may serendipitously occur in all types of creative process, we expect that a consequence-free scenario would allow playfulness to thrive. Therefore, we envision playful CSTs and MICC tools to be intended for novice and amateur users wishing to explore the technology and/or the problem space, as well as for professional creatives (such as artists or game developers) during conceptualisation stages, far from deadlines, or freed from a task-oriented mindset. Moreover, playful co-creative tools can elucidate the affordances and constraints of current AI algorithms by providing low-effort challenges that motivate users to engage with specific aspects of an AI, such as playfully exploring prompt engineering in text-to-image generators [39].

Identifying *where* playfulness lies in such tools forms interesting directions for future empirical and theoretical exploration. We consider means to support playfulness either in the human (Sec. 4.1) through UI design, in the AI (Sec. 4.2) through algorithms, or through interventions to their dialog (Sec. 4.3).

4.1 Playfulness in Human-Computer Interfaces

First, we see the opportunity for human-AI authoring tools to be explicitly designed to encourage user playfulness as a state and experience. User interfaces (UI) in current MICC and CST tools are visually simple and unappealing, possessing only the absolutely necessary UI elements to complete the task. This is often due to the fact that such tools are developed by researchers with limited resources for refining the user experience design or too narrowly focused on task-oriented productivity. Perhaps the most playful interaction paradigm in AI-assisted interaction is in *Quick, Draw!*[1] where the user draws a quick doodle while the AI vocalises the predicted object (see Fig. 1). The AI in this case could be considered de facto playful as it emulates voices of team members in the *Pictionary* game (Angel Games, 1985). Looking at more specific

[1] https://quickdraw.withgoogle.com/, retrieved 20 March 2023.

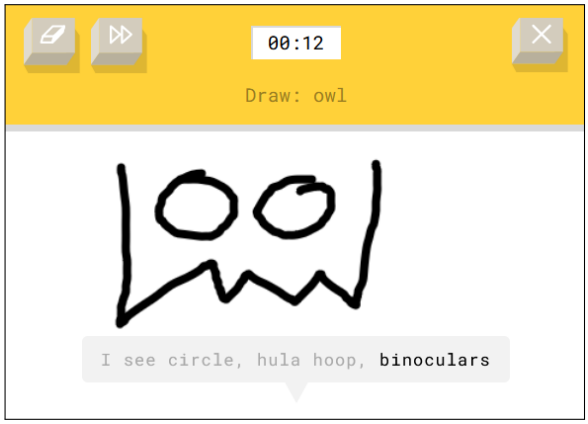

Figure 1: Playful interaction paradigms instantiated in *Quick, Draw!* The in-game screenshot shows the game-provided prompt and timer (top), the in-progress user drawing and the AI vocalized guesses (bottom).

patterns that enhance playfulness is the constant in-progress feedback, the alternate modality (voice) that does not distract the user from their task, and the ad-hoc short time constraint for drawing (20 seconds) that enhances the challenge while signalling to the user not to take the task too seriously. It is worth noting that in *Quick, Draw!*, the AI acts more as a critic than a co-creator, as it does not produce its own drawings; however, its vocalised guesses may influence the player to refine their drawing and thus influences the creative process. While operating on similar sketches as *Quick, Draw!*, the experiment by Karimi et al. [20] (where both AI and human produce sketches in parallel) has a much more task-oriented and barebone interface; however, the goals of that project is to foster creativity rather than playfulness. Other AI-assisted sketching tools that focus on AI and human taking turns contributing to a common canvas [8, 16] embrace the exploratory, low-effort, and casual nature of sketching [3] but do not explicitly foster or reward it in terms of either the AI or the interface. While many MICC systems target improvisation, e.g. a user changing their work based on an AI's suggestion [8, 20, 24], the medium also impacts how playful a task is perceived: for instance, full-body interaction inspired by improvisational theatre [34] or dance [17] can foster playfulness merely due to the physical activity itself.

We moreover argue that playfulness as a *state* can be fostered by freeing the user from a task-oriented mindset and framing the activity appropriately as a task-agnostic, exploratory endeavour. This could be accomplished through an on-boarding activity for more complex or more task-specific human-AI interactions. For instance, the intricacies of prompt engineering for text-to-image generation could be demonstrated through a playful interface that pushes a user to add or remove some of the words of their prompt and visualise the result in opposition to the image produced by the original prompt. Beyond the framing of the tools' goals, design patters from games and gamification [15, 38] can structure the interaction flow, similar to the time constrained micro-tasks in *Quick, Draw!*. Points, badges, or leaderboards can be used as rewards and achievements to motivate especially novice and amateur users to learn the different possibilities of CSTs or MICC systems playfully. Specifically designed Easter Eggs can also reward and surprise users who explore the systems and find them by trying different features.

4.2 Playfulness in AI Co-creators

Second, we envision new ways to impart playfulness as a *trait* of the AI by integrating algorithms for playfulness which operate separately from the system's authoring functionalities, and steer its interactions both with the UI system and with the human user. As a starting point to this very challenging endeavour, we propose to formalise central aspects of a playful state (such as curiosity, an attraction to the unexpected, and a tendency to subvert) in the agent's policy, i.e. the basis of its behaviour. To this end, we advocate to embrace intrinsic motivation [13] such as artificial curiosity [37] and models of competence allowing for autonomous goal-discovery and skill acquisition [4, 5], as well as variants of novelty [22], surprise [12], and quality-diversity search [11] to support goal-free or goal-directed exploration. While we explicitly advocate AI that is playful in a different way than its user, thus having the ability to complement the latter, some common ground is likely needed. In particular, we expect pure exploration by the AI to be insufficient for inspiring and maintaining playfulness in its user. To support and defy the user's expectations through more directed behaviour, e.g. defined as quality in quality-diversity search, the AI must perform efficient inference on the goals of their interaction partner. To this end, approximate Bayesian methods for goal inference [18, 42] promise to be of value. Next to engineering for playfulness, we highlight the ability of a tool to *explain* [43] its AI's (shifting) process and to verbalise its playfulness as equally important.

4.3 Playfulness in Human-AI Dialog

Third, we propose means to encourage user playfulness as a *state* and *experience* by intervening in the dialog between the user and the system. Human-computer interaction within MICC tools is often likened to dialog [31], and playfulness can be injected in that layer through humour and misunderstanding. This type of playfulness hinges as much on the interface as on the AI itself, but here we focus on how the AI can interpret human input and provide feedback playfully. We envision that the *openness* often associated with playfulness [28, 33] is to be achieved by an AI that *playfully (mis)interprets* the human co-creator's work or intent. This can be approached in many ways, indicatively:

- An AI considers only parts of the user's creation (e.g. the last few strokes in a sketching tool or the top half of a user-drawn canvas) and attempts to auto-complete the rest, similar to the exquisite corpse method [2].
- An AI that can model the user's design goal implicitly [23] or based on explicit user input (e.g. a prompt in a text-to-image tool) but deliberately chooses a different goal as its criterion for providing feedback. The goal chosen can be idiosyncratic to the AI (if emulating a stereotypical "personality", see below), random but orthogonal to the designer's goal, or explicitly opposed to the designer's goal in order to act as a disruption mechanism [9].
- An AI that interprets the user input through models trained in datasets from a very different domain, such as using a

model trained on data from children's books to interpret data in an engineering task.

After perceiving the user's input, the format of the AI response can also be playful. Here, we borrow from the *whimsical* facet [35] and "lack of self-importance" (regarding both human and AI) [28] within playfulness and envision an AI that role-plays (e.g., through chat) an idiosychratic personality. Examples of such "personalities" could be a taunting AI that prods users to be more original, or one that expresses a specific historical era or style in terms of its aesthetics and its vocalization via natural language filters [25] and text-to-speech voices or profiles [26].

5 CONCLUSION

As noted in Section 2, playfulness has received extensive attention in terms of what it is and how it emerges. However, in light of current authoring tools built around human-AI interaction, the playfulness of the human user, the AI, or their interaction is overlooked—treating such tools instead as professional, sombre, task-focused interfaces. Future research should identify how different types of users become playful with existing tools, explore methods for imparting playful properties to the AI itself or to its interaction with the user, and develop robust methods for evaluating playfulness via e.g. interaction data and questionnaires.

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