

Gamification of Control in Co-Creativity through Design Cards

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Abstract

Co-creative systems are rapidly entering the public domain, yet users often lack a clear understanding of how these systems behave and how control is negotiated within collaboration. Despite its central role, control in human–AI co-creativity remains underexplored in practice, with existing frameworks offering limited accessibility beyond academic contexts. In this work, we present a set of design cards that translate a recent theoretical framework on control to bridge the gap between formal co-creativity theory and practice. We construct the cards to educate users about control in co-creative systems. In doing so, we operationalize key concepts of control into individual cards and include game-design elements to make the dissemination more engaging to practitioners and users. Our approach presents how design-oriented creative outlets, such as design cards, can bridge the gap between theory and practice, enabling playful engagement with complex research concepts and supporting more informed interaction with co-creative AI systems.

Introduction

In the field of Computational Creativity (CC), Human-AI co-creativity is defined as a distinct process where humans and AI contribute to generating creative artifacts or ideas in a partner-like manner (Kantosalo et al. 2014). Recent work has characterized the potential for this process as human–AI synergy, an interaction where the human–AI group performs better than both the human alone and the AI alone (analogous to strong synergy in human groups) (Vaccaro, Almaatouq, and Malone 2024).

In recent years, there has been a vast increase in the development of co-creative systems for commercial purposes (Mozaic 2024). Central to this rise has been the contention of control between users and co-creative systems (Moruzzi and Margarido 2024). Research highlights that practitioners using co-creative systems find the AI to limit controllability, eliciting the co-creation process to “feel like a more random [one] than a creative one” (Tchemeube et al. 2023). These concerns are heightened as the shift toward more agentic AI systems raises critical questions about maintaining human control while leveraging AI capabilities (Shneiderman 2020).

In response, researchers have proposed that understanding and properly designing for control can help strike an appropriate balance and generate a harmonious co-creative process between users and co-creative systems (Issak*, Rezwana*, and Hartevelde 2025). However, as the identification is nascent, finding this balance remains underexplored in practice, with users being unable to translate these insights to alleviate their control struggles with co-creative systems. Consequently, the limited accessibility to user contexts becomes a central bottleneck in order to extend the theory on control towards practice (Dalsgaard and Dindler 2014).

As a result, in this paper, we examine how the balance of control can be **practically** integrated into the design of co-creative systems so that they address the contentions experienced by practitioners. We present our research question as follows:

How can we bridge the gap between theory and practice to actualize the balance of control in human-AI co-creativity?

To answer this question, we use a theoretical framework developed by Issak, Rezwana, and Hartevelde (2026) as a dissemination tool for balanced control dynamics in co-creativity. We found the theoretical framework after reading through the ACM and ACC databases for scholarship on control (works published in the past 5 years), and found the framework to be the most comprehensive and up-to-date theoretical framework for control in co-creation. The identified framework builds off of the **MOSAIC** framework that formulated control as a composite term of *autonomy*, *initiative*, and *authority*, such that the shared distribution of the three dimensions leads to balanced co-creative dynamics (Issak*, Rezwana*, and Hartevelde 2025). In the updated framework (henceforth **MOSAIC 2.0**), the authors posit a multi-level analytical framework comprised of Micro, Meso, and Macro levels to map the trajectory of control in Human-AI Co-creativity.

Upon identifying MOSAIC 2.0, we transform its components into a set of design cards. We use design cards as they are a widely-used, flexible, and adaptable method of design ideation and collaboration (Peters, Loke, and Ahmadpour 2021). We then incorporate game design mechanics in the card play to foster enjoyment and engagement among

practitioners. Overall, our work contributes a design-based tool to aid thinking about, engaging with, and accounting for the balance of control in co-creative systems.

Background

This work sits at the intersection of **co-creativity**, **gamification**, and **design cards**, and is concerned with addressing the balance of control in co-creativity. Control has recently been derived as a composite term of *autonomy* (an agent's ability to choose its own creative actions), *initiative* (the capacity to proactively drive the creative process), and *authority* (decision-making power in the creative process) (Issak*, Rezwana*, and Harteveld 2025). However, translating this theoretical formalization into practice remains an open question in co-creativity research. In this work, we employ design cards and gamification to bridge the gap between theory and practice. Below, we describe the two design elements, how they are combined, and how they enable the practical incorporation of control into co-creativity.

Design Cards

Design cards, or card-based design tools, are tools designed to support ideation in the design process (Dalsgaard 2017). These cards support designers across various design stages of the design process, with an emphasis on the early stage of design (e.g., ideation). They are intended to assist and provide structure to design processes and have actively been used to translate academic insights, such as frameworks, theories, and research findings, into design practice (Hsieh et al. 2023). As varied design elements, design cards range from general-purpose to customizable, and context-specific cards (Wölfel and Merritt 2013), where they are often deployed in user-facing settings, such as workshops, that bring users, experts, and designers in conversation to co-design together. In this work, we expand on this use of design cards as an elicitor of perspectives to bridge theory and practice. We then employ gamification in the card play to make their reception more playful and engaging. We describe the concept of gamification in the next sub-section.

Gamification

Gamification is defined as the use of game design elements in non-game contexts (Deterding et al. 2011). The concept is used to make non-game products or processes more enjoyable, motivating, and engaging to users. Gamification has been deployed in a range of application areas including education, health and wellness, and training (Seaborn and Fels 2015). For instance, United Airlines (a US airline company headquartered in Chicago) depicts its passenger training module as a Rube Goldberg Machine, where different parts of the safety protocol are part of the machine. The training ends with the crew completing the game (the training) and celebrating the training as a team sport¹. Likewise, in this work, we incorporate gamification into the design of control in co-creativity to make the topic more engaging to participants. The formalization of control is a burgeoning

concern in co-creativity, whereas displaying the contentions in an engaging manner is critical to the reception and informed use by co-creative practitioners.

Translating Control in Co-Creativity into Practice

We present the **MOSAAIC 2.0 design cards** developed to operationalize control in co-creative systems. The cards were designed under the theme of *the balance of control* to capture the unsaid and often friction-induced elements of co-creative interaction (Kosmyrna et al. 2025). An example of such encounters includes users feeling that “they do not own the creative product”, “have lost their authentic voice”, and “feel disconnected to the creative product” while interacting with co-creative systems. As these examples show inner dialogues that underlie the contentions and friction for control, we design the cards to create a bridge between theoretical co-creativity research and the struggles of users and practitioners of co-creative AI. In the following section, we describe the card design and card play that incorporates the instructions for the game.

Card Design

The design card deck consists of 20 cards, categorized into three types of cards:

1. **Attribute Cards:** cards presenting control dimensions based on the MOSAAIC 2.0 framework (13 in total).
2. **Joker Cards:** empty cards for players to brainstorm their own attributes (2 in total).
3. **Scene Cards:** scenario cards in which the players will be contextualizing their skits (5 in total).

We describe each set of cards below:

Attribute Cards We construct the attribute cards based on the MOSAAIC 2.0 design framework formulated by Issak, Rezwana, and Harteveld. The MOSAAIC 2.0 design framework devises a conceptualization of control in co-creativity that is scaffolded among 3 layers and 13 attributes (Figure 1). We describe each level as follows:

- **Micro level of control:** captures the moment-to-moment capabilities of human and AI agents. This level comprises autonomy, initiative, and authority.
- **Meso level of control:** captures the ongoing relational dynamics between human and AI throughout the creative exchange. This level comprises friction, partner-like AI, evaluation, and adaptability.
- **Macro level of control:** captures the broader temporal and ethical circumstances that shape how control should evolve. This level comprises time, creative phase, trust, context, purpose, and ethical AI.

In translating the theoretical framework into design cards, we transformed each element of a level into an individual card. The card for each attribute listed the **(1) corresponding attribute, (2) attribute definition, (3) the importance, (4) an example, (5) an icon, (6) the task of the role-play, and (7) the level of control according to the framework.**

¹<https://www.youtube.com/watch?v=Jep3RR2yEXA>

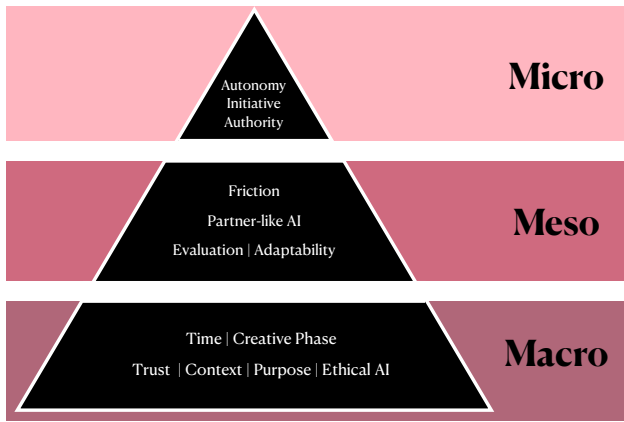


Figure 1: The MOSAAIC 2.0 Control Framework (Issak, Rezwana, and Hartevelde 2026)

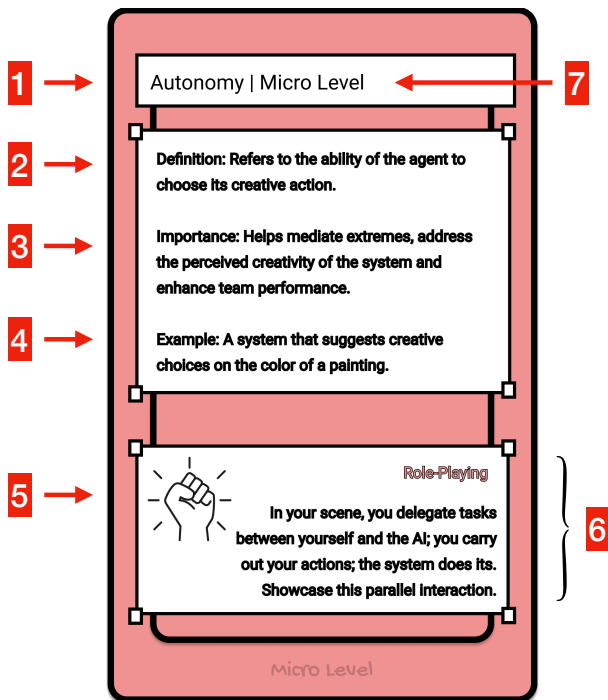


Figure 2: Autonomy card shown as an example card from the deck and annotated for visual elements

We describe the task of the role-play in the next section of card play. We showcase an example of the autonomy card in Figure 2, mapped to each numerical description (see Appendix Figure 5 - Figure 10 for the complete set of attribute cards).

Joker Cards We added two joker cards in our card deck to provide **participatory** engagement from the players. MOSAAIC 2.0 is constructed with the opinions and engagement of co-creative systems designers. However, one of its limitations is its lack of breadth, as it does not include artists and other stakeholders in its research methodology (Issak,

Rezwana, and Hartevelde 2026). As such, we open up discussion to participants with these joker cards and allow them to contribute emergent properties of control dynamics that stem from their embodied experiences in co-creative contexts. We posit that this set of cards will increase retention of the conceptualization of control and be generative towards other formalizations of control. In Figure 3, we provide the layout of the Joker cards. The card has the same annotated layout as attribute cards.

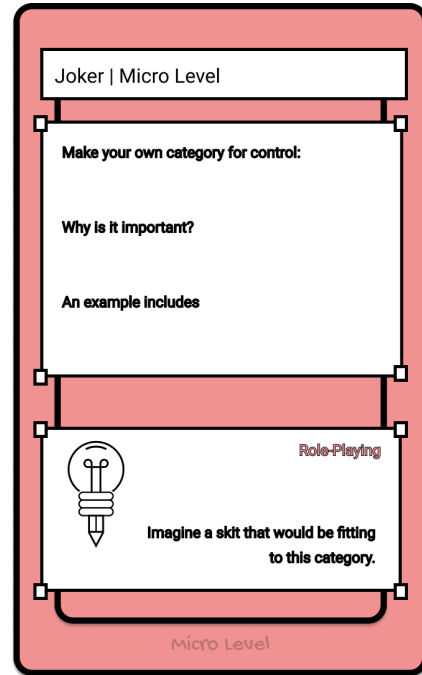


Figure 3: An example joker card from the deck. The card contains similar components to the attribute card with empty spots for players to write their own ideas of control.

Scene Cards We provided scene cards to give participants structure in the co-creative scenarios during the role-play. We found that the supplementary **guidance** of scenarios would provide players with an understanding of the tensions that emerge in co-creation. In Figure 4, we present *Scene 1* as an example scene from the deck of cards. The card contains (1) **the scene label**, (2) **description of the scene**, and (3) **an invitation to act**. In the card deck, we provide five scenes and outline the remaining four scenes below. The points below correspond to #2 (description of the scene) as each scene ends with the same invitation to act (#3).

- **Scene 2:** You are a creative professional in fashion design. You attune to color, style, texture, pattern, and all the nuances of your creative discipline to make clothing that is unique to your style and intended wear.
- **Scene 3:** You are a chef at a New American cafe (cuisine characterized by fresh, local, and seasonal ingredients with global fusion). You take pride in showcasing the cuisine of your hometown and techniques that bolster these ingredients.

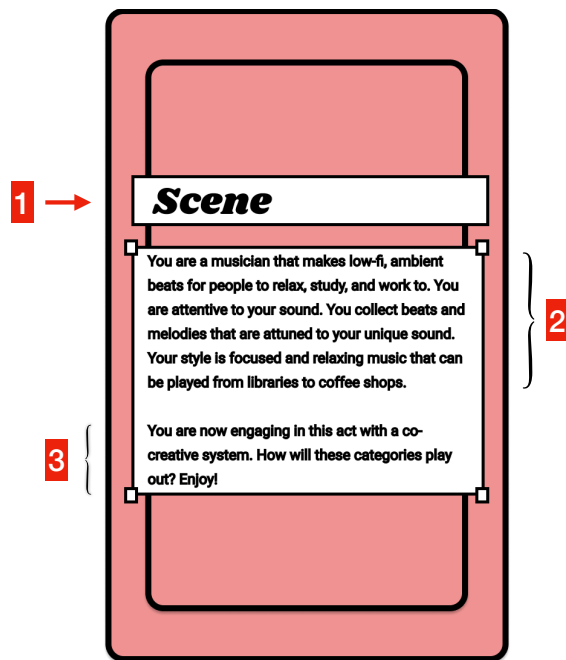


Figure 4: Scene 1 shown as an example scene card from the deck annotated for visual elements.

- **Scene 4:** You are a person who has made a name for themselves as an AI artist. You enjoy experimenting with the new tools and techniques and allowing yourself to express your creativity with varied media. Previously, you were trained in a separate creative domain.
- **Scene 5:** You are an animator for a kids' television series. You are trained in illustration, animation, and graphic design. You chose to work on content for kids because it is a nuanced field of your industry that warrants care, compassion, and responsibility.

Card Play

The card play is designed to incorporate role-play dynamics into the game mechanics. This form of participatory interaction emerges from literature on *data embodiment*, where participant understanding of the data is not an abstract idea on paper, but rather as a lived experience (Bhargava et al. 2025). Embodiment (e.g., physical movement and experience) is also characterized as an emerging design tool for card-based systems (Peters, Loke, and Ahmadpour 2021), that encourages social interaction, entertainment, and learning (Issitt 2022). Given these takeaways that we aim to emulate in our design, we outline our **instructions** for our role-based card game as follows:

1. Players are made familiar with all 13 attributes from the MOSAIC 2.0 framework by reading the instructions scroll (see Figures 12 and 11 in Appendix for scroll).
2. Players will then put all 15 attribute cards (13 plus 2 joker cards) and scene cards face down and on a table.
3. Players will self-organize into groups of three (at most).

The deck can accommodate 15 players. Players are free to self-organize into groups.

4. One player from each team will pick a scene card. Groups will then spend time devising how they would like to act out the scene.
5. The same player will then pick a maximum of 3 attribute cards from the card deck. Groups will then choose which cards they would like to embody, as each round will consist of one role-playing scenario.
6. All groups will be given 5 minutes to devise and rehearse their skit, i.e., an attribute card role-played in their chosen scene (e.g., Autonomy of a New-American chef).
7. Groups will be invited to perform their scene, in which players from the opposite team will try to guess their attribute. If the scene has not been guessed upon an exhaustive number of rounds, the performing team will disclose the attribute and describe their scene. While the goal is to enact all 15 attribute cards, participants can opt for a point score to choose the winning team.
8. Rounds will proceed until all 15 attributes have been performed. Players can choose to repeat the game by choosing a different set of scene cards, if those have not been chosen already (i.e., playing in groups of fewer than 5).

Discussion and Future Work

We contribute this work to the CC community to bridge the gap between co-creativity research and practice. Co-creative systems no longer remain in academic discourse, but are largely in conversation with their practical implementation in the creative workflow of practitioners and users. As such, translating theory on the balance of control into practice requires a deliberate solicitation of practitioners' lived experiences through participatory design mechanisms to bring practical knowledge into theory. This bidirectional interaction was a key feature of our card play and design.

Likewise, we use design cards as a participatory design methodology, with a special emphasis on Joker cards, to include users in the conversations that entail the future of these systems. Embodied experiences reveal real-time contentions that can spark experiences that may not surface unless prompted or put in scenarios that unearth those interactions. The Joker card holds special significance in this case as it actively solicits these perspectives through its' open-ended card design. Moreover, by gamifying this process, we compound the effects of embodied experiences (increased learning) with playful game-based scenarios (increased enjoyment) to heighten participatory engagement.

In future work, we aim to run workshops to better understand how these cards can serve participants' understandings of control in co-creativity. We first plan to engage with co-creativity researchers to validate the design cards, whereas, in the long-term, we aim to create a game for the broader public so that these ideas leave the walls of the research community and enter the hands of those using these systems. We also plan to incorporate a variety of alterations, such as joker scene cards, to broaden the participatory opportunities for users.

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Appendix

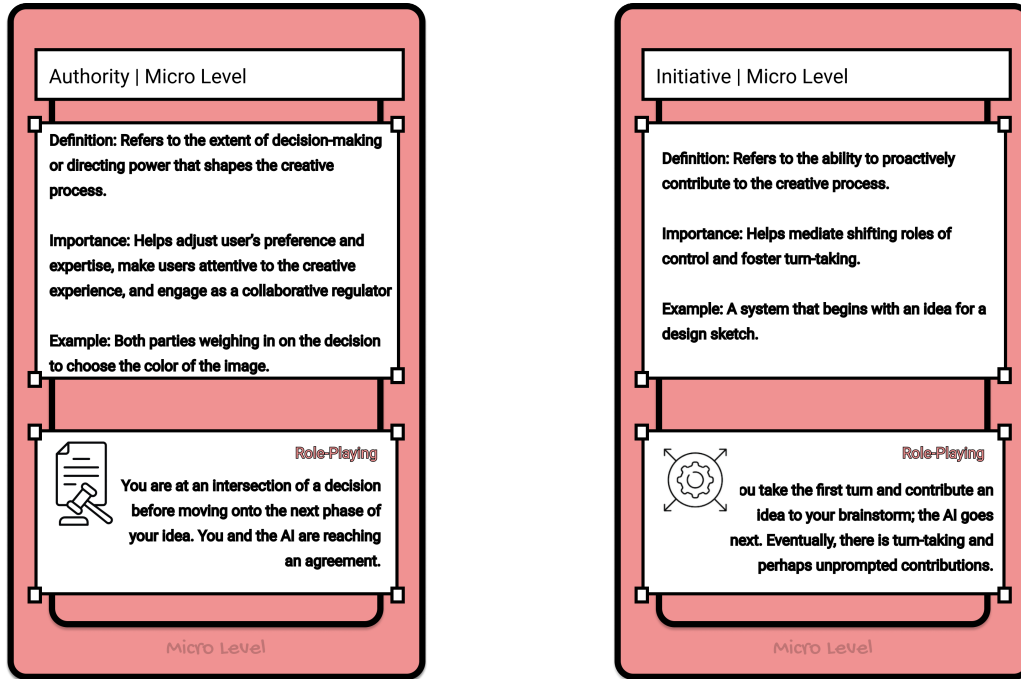


Figure 5: Attribute Card Design for **Authority** (left) and **Initiative** (right)

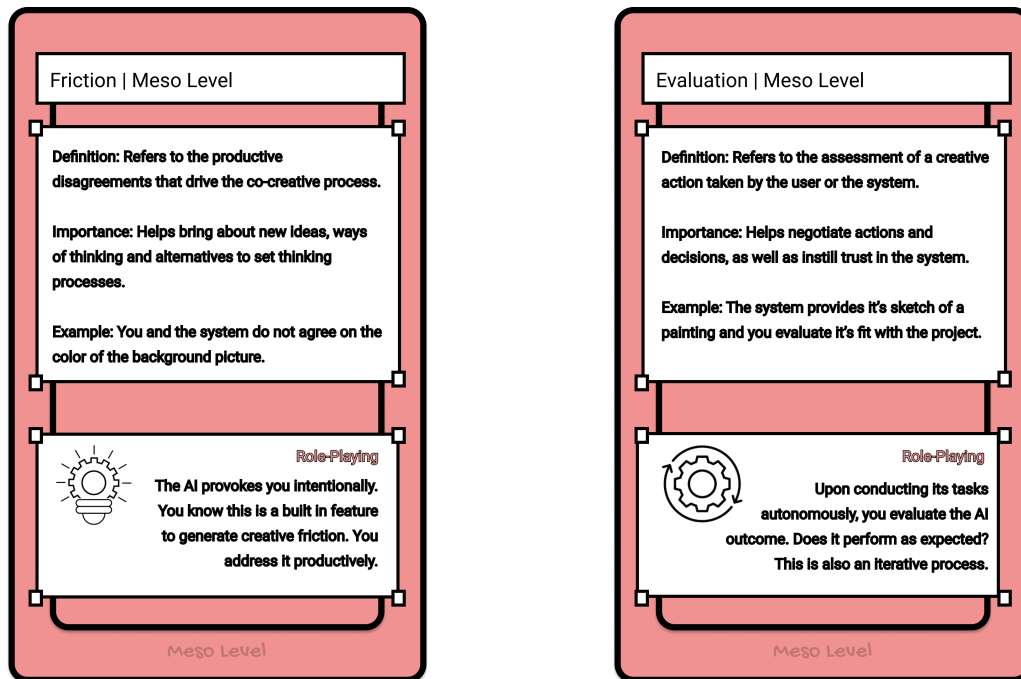


Figure 6: Attribute Card Design for **Friction** (left) and **Evaluation** (right)

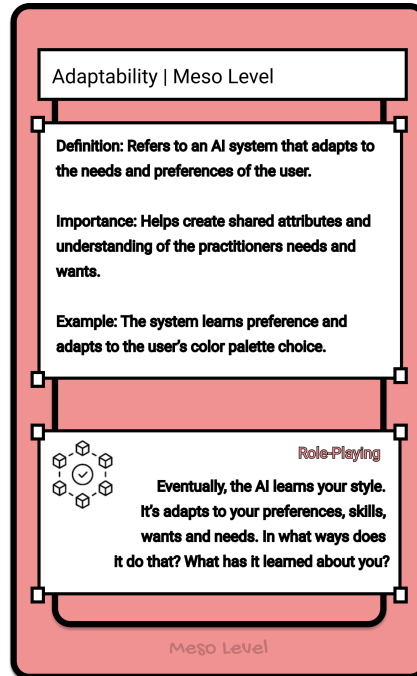
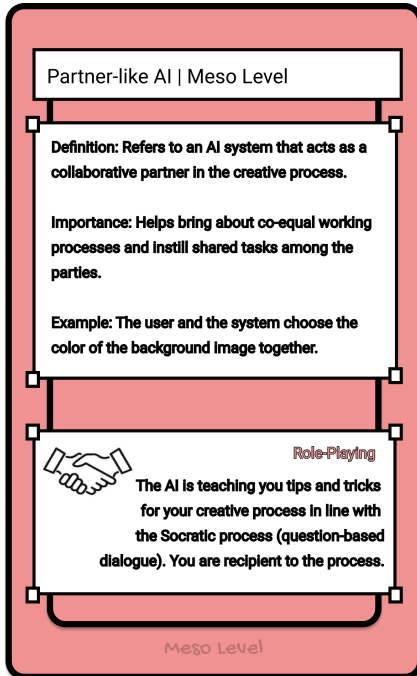


Figure 7: Attribute Card Design for **Partner-like AI** (left) and **Adaptability** (right)

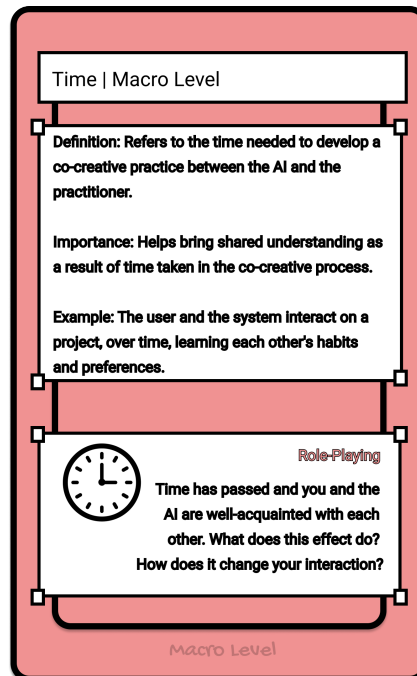
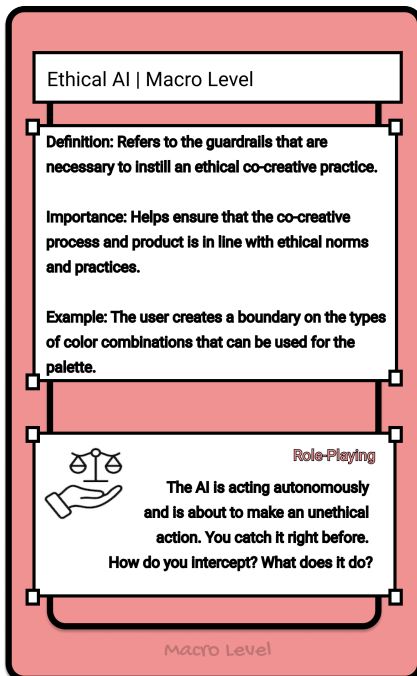


Figure 8: Attribute Card Design for **Ethical AI** (left) and **Time** (right)


Creative Phase | Macro Level

Definition: Refers to convergence and divergence creative phases that are present in the creative process.

Importance: Helps bring understanding of the inner workings of the creative process to the design of AI systems engaged in creativity.

Example: The system does not interject during convergence and the flow state.

Role-Playing

 You are either brainstorming or converging on an idea and the AI responds accordingly. Showcase these situations and the learned responses.

Macro Level


Trust | Macro Level

Definition: Refers to the trust that is required and emerges as a result of shared interaction between the user and the system.

Importance: Helps ensure the harmonious delegation of tasks or decisions towards a shared creative vision.

Example: The user trusts the system to choose an appropriate color for the background.

Role-Playing

 You and the AI are acquainted very well. You are beginning to develop trust in the system, perhaps there are some reservations in the back of your mind.

Macro Level

Figure 9: Attribute Card Design for **Creative Phase** (left) and **Trust** (right)


Context | Macro Level

Definition: Refers to the differences in creative domain that discern the type of co-creative interaction.

Importance: Helps bring about awareness on the different needs of the creative process per creative domain or expertise.

Example: The system acts differently when engaging in painting as opposed to the music.

Role-Playing

 Your creative domain is specific, niche and requires tailored understanding. The AI is responding to your domains accordingly. What are these specifications?

Macro Level


Purpose | Macro Level

Definition: Refers to the goal of the co-creative process.

Importance: Helps discern what is to be created and in what manner the user and AI are to engage.

Example: The user and the system choose the goal of making an abstract impressionist painting.

Role-Playing

 You are designing a creative product for a (1) client, (2) yourself, or (3) your boss. How do these situations change your interaction?

Macro Level

Figure 10: Attribute Card Design for **Context** (left) and **Purpose** (right)

Instructions (front)

Context: Control is a crucial yet under explored concept in Human-AI co creativity. Human-AI co creativity, or simply co-creativity, is a process where humans and an AI systems collaborate towards a creative artifact or goal.

About the game: This game invites players to enact the tensions and complexities of co-creativity that are embedded in co-creative systems. After playing this game, you'll be able to identify the 13 attributes that make up control in co-creative systems, demonstrate an understanding of Human-AI co-creation dynamics, and evaluate co-creative systems that are present in the wider world.

Instructions: Players make groups of 3 (at most) - the game can accommodate 15 players. Groups then chooses a scene card to embody for the game. Taking-turns, each group will then pick a category card and create a role-playing skit. Groups will then guess which attribute is represented in each skit. The discussions are open to generating collective synthesis and takeaways. A full list of each attribute can be found at the back of this scroll.

Figure 11: Instructions for the game provided to players (front)

Back of the scroll

Thirteen Attributes

1. **Autonomy** - the ability of the agent to choose its creative action.
2. **Initiative** - the ability to proactively contribute to the creative process.
3. **Authority** - the extent of decision-making or directing power that shapes the creative process.
4. **Friction** - the productive disagreements that drive the co-creative process.
5. **Evaluation** - the assessment of a creative action taken by the user or the system.
6. **Partner-like AI** - an AI system that acts as a collaborative partner in the creative process.
7. **Adaptability** - an AI system that adapts to the needs and preferences of the user.
8. **Ethical AI** - an AI system that adapts to the needs and preferences of the user.
9. **Time** - the time needed to develop a co-creative practice between the AI and the practitioner.
10. **Creative phase** - the convergence and divergence creative phases that are present in the creative process.
11. **Trust** - the trust that is required and emerges as a result of shared interaction between the user and the system.
12. **Context** - the differences in creative domain that discern the type of co-creative interaction.
13. **Purpose** - the goal of the co-creative process.

Figure 12: Instructions for the game provided to players (back)