



The Choreographer-Performer Continuum: A Diffraction Tool to Illuminate Authorship in More Than Human Co-Performances

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The design of robust and trustworthy Generative AI (GenAI) requires a deep understanding of the agencies emerging from human interactions with them. To contribute to this goal, we retrospectively studied an art project involving a visual artist, a computer scientist, an artistic director, and a generative model (GPT-2). The model was fine-tuned with trip reports describing the experience of eating psychedelic mushrooms. Building on agential realism, we analysed the co-performance between the artist and the model as their agency moved along the choreographer-performer continuum. Results reveal ontological surprises, leading to the proposal of *entangled authorship* to de-individualise the production of knowledge from a More Than Human perspective. The paper illustrates how art can expose different forms of relationships, challenging the idea of GenAI as just a tool that simplifies or replaces human labour. We conclude by emphasising the transformational potential of GenAI for novel modes of engagement between humans and machines.

CCS Concepts: • **Human-centered computing → Empirical studies in HCI;**

Additional Key Words and Phrases: Agency, Agential Realism, Large Language Models, AI and Art, Creative AI, Hallucination

ACM Reference format:

Federico Bomba, María Menéndez-Blanco, Paolo Grigis, Michele Cremaschi, and Antonella De Angeli. 2024. The Choreographer-Performer Continuum: A Diffraction Tool to Illuminate Authorship in More Than Human Co-Performances. *ACM Trans. Comput.-Hum. Interact.* 31, 6, Article 75 (December 2024), 23 pages.

<https://doi.org/10.1145/3689040>

'And We Thought' is an art project by Roberto Fassone, Al Lai and LZ, curated by Sineglossa in collaboration with Play With Food Festival and funded by Compagnia di San Paolo. It is the winner of the Maxxi Bulgari Prize 2023 as the best Italian digital art project. The project was conducted in Turin and Bologna (Italy) from October 2021 to June 2022 and presented in different locations, like Ars Electronica, Fondazione Trussardi, Artcity and La Nuit de la Culture du Luxembourg. The contribution by Grigis and Cremaschi was funded by the National Recovery and Resilience Plan (NRRP), - Mission 4, Component 2 - Investment 3.3 - call for tender No. 351 and No. 352 of 09/04/2022 of the Italian Ministry of University and Research, funded by the European Commission under the NextGeneration EU programme.

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ACM 1557-7325/2024/12-ART75

<https://doi.org/10.1145/3689040>

1 Introduction

Generative Artificial Intelligence (GenAI) is a class of machine learning algorithms that analyse vast datasets of human-produced texts, images, or audio to generate new content [75]. Its increasing presence for the most diverse purposes raises social and ethical challenges that require questioning who is designing GenAI and for what purposes [80]. Developed by major corporations in the technology sector, GenAI targets the mission of producing profit in the form of marketable products and services. The bottom line is building tools for users [18], which enhance capitalistic productivity [61]. Naomi Klein sharply addresses this concern in a provocative article titled ‘AI machines aren’t “hallucinating”. But their makers are’. She states:

There is a world in which GenAI, as a powerful predictive research tool and a performer of tedious tasks, could indeed be marshalled to benefit humanity, other species, and our shared home. However, for that to happen, these technologies would need to be deployed inside a vastly different economic and social order than our own, one that had as its purpose the meeting of human needs and the protection of the planetary systems that support all life. [47]

Our paper contributes to this vision by embracing the theory of agential realism [6] and its interpretation in **Human Computer Interaction (HCI)** [31] alongside a **More Than Human (MTH)** design perspective. Interpreting agential realism from an MTH perspective means acknowledging the agency of both humans and nonhumans in situated performances. In doing so, we focus on experimental art as a relevant venue for exposing critical issues about technology and exploring what GenAI design might become. Experimental artists are interested in improving knowledge rather than envisaging products to be industrialised for profit [13]. They work at the periphery of power, often standing in a privileged position to expose the relations in which the underlying values of people and institutions that developed AI are embedded [7]. From this standpoint, we present a retrospective analysis of an award-winning project where a media artist used a **Large Language Model (LLM)** for eight months. The project was inspired by the metaphor of food for reflecting on the influence of datasets on automatic generation. Without a body, AI cannot ingest physical substances, but it is fed with data. Once digested, these data are responsible for the generated output. Data are the elements through which GenAI gains experience, increases knowledge, and grows, eventually perpetuating biases, stereotypes and power relations embedded in the original datasets [59].

During the project, the artist decided to train the LLM with a dataset of trip reports describing the experiences induced by ingesting magic mushrooms [4]. He then progressively used the ‘hallucinated’ LLM to create artwork in the form of a book, ten posters, five YouTube videos, and three short movies. We studied the evolution of this process, from the first encounter between the artist and the LLM mediated by a Python code to what we interpret as the establishment of an artistic partnership where the human and the machine agency became increasingly entangled. The study is based on the understanding of the first author who participated in the project as creative director, the artist’s opinion sustained by continuous informal conversations and a semi-structured interview, and the artworks’ analysis. By triangulating these data in a collective reflection among the authors of the paper, we address a fundamental question driving this special issue: ‘How do we understand changes in agency as artefacts flow from collection through data into algorithmic models and systems?’

The paper has the following organisation. Section 2 introduces the related work. It focuses on agential realism as the epistemological framework through which we define agency and performativity, the role of artists as problem makers in exploring technology, concerns about authorship in artists-LLMs co-creations, and the need for new metaphors for describing our relationships

with AI systems. In Section 3, we describe the research context and the outcome of the artistic project. Looking at the artworks produced in the project from an MTH perspective, we present the choreographer-performer continuum. Section 4 discusses the results, focusing on the evolution of human and machine agency, which produced entangled authorship and the role of hallucination in challenging the discourse on LLMs as mere tools. Finally, Section 5 concludes the paper with new research directions.

2 Related Work

Since the origin of AI, many scholars have questioned where its agency lies, what relationships can emerge in the interaction with people and with other machines, and which kind of common ground these interactions need. Theoretical proposals date back to the early sixties [56] when Licklider proposed the concept of symbiosis. Borrowed from biology, it denotes the interaction of computers that work with people in an intimate association, strengthening the idea of mutually empowering roles. As the technical capabilities matured, this proposal inspired studies in different contexts, including computation, sensing technology, and interaction design [20, 27, 43]. For example, Farooq and Grudin [27] claim that symbiosis broadens design boundaries from inquiring about stimulus-response to investigating human-computer integration. Integrated actors are co-dependent and construct shared meanings around the activities in which they participate. Other authors suggest investigating how systems develop skills in a symbiotic interaction instead of just automating actions [43]. Epistemological debates on MTH interaction call for an extension from the primacy of user research to the study of intertwined relationships between human and non-human actors [37].

Similarly, entanglement HCI [31] calls for an epistemological shift. It accounts for the performative relationships between humans and technologies, the re-framing of knowledge generation around phenomena, tracing accountabilities, responsibilities and ethical encounters, and the practices of design and mattering that move beyond human-centred design. As a performative interaction, knowledge is a practice where entities participate in their definition [5]. In the production of knowledge, the material (i.e., the matter) and the discursive (i.e., the meaning) are mutually constituted and cannot exist without each other. The movement from studying user experiences to exploring meaningful relations [31] entails methodological and ethical implications. If researchers are to investigate how technologies are performative, Giaccardi and colleagues suggest using objects as co-ethnographers [38] to identify different matters of concern that can inspire design [57]. This approach facilitates new alliances for sense-making, framing, and bringing into existence entities that do not exist yet. Following this line of thinking, Redström and Wiltse [67] propose to move from designing objects to designing fluid assemblages. Their proposal shows how emerging technologies are interconnected, dynamic, and adapt to their context. They can be altered and display unpredictability, making it challenging to comprehend their actual functions and whom they serve. From these perspectives, the essence of design becomes the creation of spaces and processes that enable humans and non-humans to come together and the mattering of future socio-material configurations [31].

2.1 Agential Realism

Following recent work in HCI [46, 51, 68], this paper builds on agential realism, a theoretical framework proposed by Karen Barad to account for the ontology of quantum theory. It was initially developed to describe phenomena that looked paradoxical according to classical physics, like the impossibility of simultaneously observing the position and momentum of a particle. Ontologies derived from classical physics postulate individualities as the primitive elements of the world. Consistently, the qualities of individual entities inform their relationships and interactions. On the contrary, agential realism proposes phenomena as primary epistemological units. Therefore,

relationships and interactions give rise to the entities and their qualities. What classical physics considers the same particle having specific inherent attributes is not the same particle at all under agential realism. The specific configuration in time defines the qualities of the particle and excludes other possible configurations. This exclusion process creates the particle with all the characteristics appropriate for that phenomenon and not others. According to agential realism, entities are produced through intra-actions. While interactions happen amongst pre-established entities that participate in actions, intra-actions suggest that entities come into existence through performativity. Therefore, they can only be distinguished from others in a specific performance. Barad calls these arrangements agential cuts, namely intra-actions that produce the boundaries of the single co-dependent entity (i.e., what they are and what they are not) and determine their properties [5].

The theory of agential realism belongs to the domain of relational ontologies, such as the **Actor-Network Theory (ANT)** [50] or the Nomadic Theory [11]. In relational ontologies, what matters are not the properties of hypothetical pre-existing entities but how they are connected and influence each other. For example, ANT assumes that humans and non-humans (such as technologies, institutions, material objects, and immaterial resources) are actors that influence each other in complex networks [49]. However, ANT is limited when considering individual accountability and responsibility because of its generalised symmetry among the actors [74]. Such symmetry could lead to an infinite regression of displaced agencies while ‘following the actors’ [41]. For this reason, some HCI scholars advocate for adopting agential realism [51, 68], where accountability is determined by the agential cuts that emerge through specific intra-actions. In this way, boundaries and properties appear, and embodied concepts come to matter. Agential cuts are not just semiotic functions; they separate the subject and the object, leaving physical marks on bodies that ANT fails to account for. For Barad [5], being responsible means being accountable for these marks in situated practices, thus granting a degree of objectivity and accountability rooted in the material grounding of the entities. As Barad explains:

Agency is about the possibilities and accountability entailed in reconfiguring material-discursive apparatuses of bodily production, including the boundary articulations and exclusions that are marked by those practices in the enactment of a causal structure. [5:827]

Relational ontologies provide HCI with ways of knowing and terminologies that move beyond fixed representations of humans and technologies. Even though there is a limited corpus of literature building on them, the existing work points to interesting directions that question normative and anthropocentric ways of knowing. For example, Giaccardi et al. [38] explore these ontologies to ground a thing perspective to design and account for what is in the nature of things that enables them to make temporalities apparent. Furthermore, Redström and Wiltse [67] describe systems as fluid assemblages to denote how they are increasingly intertwined with humans and come to matter while continuously transforming into a dynamic world of becoming. Following this line of thinking, we propose that an agential realism perspective can be instrumental in investigating how humans and LLMs can relate to each other in material-discursive engagements [31]. Such a perspective moves beyond fixed roles for artists and LLMs and focuses on how their agency is produced through performativity and how this process influences creative outcomes.

2.2 Agency through Performativity

A key concept in agential realism is agency and how it is produced [6]. As with all other qualities, agency is not inherent to entities—being humans or LLMs—but emerges from the performance they enact. Similarly, meanings, as attributes or qualities, are produced by local agential cuts that, excluding other possible configurations, resolve semiotic indeterminacy and allow knowing the world while it unfolds. Barad borrows the metaphor of diffraction from Haraway [37] to express how

knowledge comes to matter. Instead of reflection, which suggests that we shape a representation of what already exists, diffraction illuminates the indefinite nature of boundaries and shows the differences emerging from agential cuts. Under this assumption, and coherently with ANT [49], knowing an entity means tracing the relations it enacts in its various modes of becoming. With the rise of AI systems, there is an increasing interest in HCI and related fields investigating how, and if, AI and humans collaborate [16, 36, 62]. A strain of this research emphasises AI unprecedented agency as a critical difference [16], which opens questions on how to acknowledge that this agency is fuelled by large amounts of data generated by an invisible and precarious labour [59]. Adopting an agential realism perspective can reveal different representations of agency in human-AI interaction that differ from current normative stances. One domain that exemplifies how agencies can be represented differently is Explainable AI. This research field aims to develop systems that explain their decision-making [66, 75]. As Nicenboim et al. argue [64], much research in this domain looks for objective metrics conceived by the ones who built the system for abstract users, assuming a passive role of humans in understanding what the machine is doing so that people can use it in a supposedly appropriate way. There are ontological reasons for considering that the intra-acting agency of the machine cannot be aptly described through a formal set of explanation rules without a form of situated understanding. For example, Agre states:

Since philosophers such as Heidegger and Wittgenstein had shown that using linguistic rules always presupposes an embodied agent with a tacit background of understanding, attempts to program a computer with formal versions of the rules would necessarily fail. [1:21]

Understanding does not only happen through causal reasoning but also counterfactually through manipulation and tinkering [63]. Consequently, the affordances of physical forms and their behaviours can contribute to explaining how AI makes decisions and fostering criticism [35]. Reductionist approaches overlook that successful human interaction only partially depends on the individual ability to create meaning. Instead, it thrives because of the potential for co-creating mutual intelligibility in and through the interaction [27]. This perspective on knowledge co-production implies an active role of the human and the artificial agents, each with their specific capabilities. Approaches that encourage a shared awareness of agencies in situated practices are needed [18, 64]. This improves technical aspects and imagines different ways humans and AIs can do creative work [35].

Agential realism offers a theoretical framework for performativity, a concept Barad borrowed from the work of feminist scholars such as Judith Butler [12]. From a feminist perspective, performativity describes how gender and sexuality are not natural conditions but are constructed through the performance of repeated acts and behaviours. Performativity relies on the assumption that reality is not in our minds, as the cartesian tradition of *cogito ergo sum* would support. Barad builds on feminist work to claim that performativity is shaped through repeated actions: ‘All bodies, not merely ‘human’ bodies, come to matter through the world’s iterative intra-activity—its performativity’ [5:823]. Following Donna Haraway, Barad proposes an explanation of performativity that incorporates human and non-human agencies enacted in the performance, no matter the consciousness or the intentionality of the acting entities [6]. Their account challenges the cartesian anthropocentric distinction between the acting subject (human) and the passive re-acting object (machine). It allows ‘examining the practices through which these differential boundaries are stabilised and destabilised’ [5:808]. This does not mean that humans and non-humans are the same and that there is no difference between the performers; instead, it points to a need for robust accounts of how different skills and qualities emerge in the materialisation of a phenomenon.

A conceptual framework to study performativity in HCI is co-performance [48], a situated practice of more general social practices. For example, marriage is the social practice embodied in a

specific co-performance that occurs in space and time during a wedding. Co-performance is relevant for studying human-AI partnerships because it ‘addresses the question of what is an appropriate interplay between human and artificial bodies/minds from the perspective of changing divisions of roles and responsibilities between human and artificial performers’ (*ibid*:2). Appropriateness is defined through repeated enactments of a specific practice and changes over time, and it depends on socio-material transformations and the evolving capabilities of the performers. Co-performance has been used to account for the interplay between technology designers and everyday users. A focus on exposing power relationships within the interaction raises ethical implications regarding the embedded values of things, a necessary condition for a more transparent and fair AI design [61]. In addition, a co-performance perspective can help designers devise frameworks that integrate and discern capabilities that are uniquely human and uniquely artificial [48]. Artists are those professionals who make performance their job by ‘showing the semiotic effects that are produced when different materials, contexts, and processes are brought into juxtaposition with one another’ [23:2478]. In this paper, we use the perspective on co-performance to investigate how a professional artist and an LLM engage with each other to devise practical guidance on integrating and discerning their unique capabilities.

2.3 Artists Performing Problems

An increasing corpus of HCI research investigates how AI can be used in creative fields such as art [7, 13, 40, 82]. Caramiaux and Fdili Alaoui [13] argue that experimental artists implicitly resist the epistemological values of academic and industrial research in AI and, to some extent, in HCI, where accuracy and performance are core to the development of current technologies. The definition of art practices presents inherent challenges due to their multifaceted and diverse nature, which come on top of the general difficulties in defining what a practice is and is not [70]. However, a common feature of art practices regards the artist’s ability to transcend conventional norms and clichés [24]. This skill stimulates the definition of uncommon perspectives, ultimately challenging established paradigms and introducing innovative applications. In the context of AI use in the creative fields, artistic contributions to HCI come from the scope of their practice, which is not focused on testing or releasing useful tools or services but on engaging in untethered explorations of the cultural values behind the data and the algorithms used [73]. Rather than problem-solvers, artists are problem-makers [30]. Their work can suggest creative possibilities by repurposing existing technologies and offering new models for understanding interaction [71]. The non-functional use of technology proved its value in questioning the idea of consumers being the target of interaction design, as it opens the mind to reflections on what people could do with an artefact rather than what they should do with it [33].

Artistic approaches can be instrumental in exploring what is unique in human-AI interactions and their implications. As GenAIs substantially impact creative work, experimental artists resist the culture of AI research and its inherent power dynamics by engaging GenAI as cultural and political material [13]. For example, repurposing the algorithms or the datasets can expose the biases or limits of the training datasets [7]. In this sense, repurposing becomes a privileged condition for unveiling the hidden mechanisms and challenging the idea of technology as neutral. When people become aware of the subjective nature of any technological agent, they can question its scope, the implications of use, the social consequences, and its relationship with other entities (e.g., corporations, governments). Initial research demonstrates the role of creative practices in unfolding unexpected outcomes and ontological surprises, tracing relations that might shift our perceptions of how we understand and categorise our realities [52]. They include experiments like *Freaky* [53] or *Learning to See* [14]. The former collaborates with users in enacting emotion by sensing and

responding to the user's heart rate, and the latter explores how an artificial neural network looks out onto the world and tries to make sense of what it sees.

Anything designed can change its use once it is adopted by users, or, as Latour would say, 'we are exceeded by what we create' [49:237]. Yet, the artist's approach differs from the misuses or appropriations that users do. When users subvert the designed functions of a thing, they do it to adapt it to their functional needs [25] or for entertainment [10]. When using technology as a cultural and political design material, experimental artists deliberately look for these kinds of betrayals to understand and challenge not obvious capabilities [7]. For example, some authors of this paper have repurposed outdated technologies to inspire a critique of capitalistic ideologies embedded in GenAI [19], such as production speed [40]. Artists use provocation as a medium for generating ideas and exploring unknown territories. Their artworks unfold possibilities that still do not exist, 'exposing how technology might perpetuate current realities and its potential role in imagining new, perhaps radical, realities' [24:386]. When artists display their work, they create a free space to perform dynamic and interactive rituals [44]. The performance defines a space where people are willing to learn and be transformed.

2.4 Authorship

While GenAI systems are impacting the work of creative professionals, expanding the range of the possibilities of how their work can be done, they also raise important issues related to, e.g., labour, attribution, and authorship [82]. According to Foucault, authorship has been traditionally intended as the 'privileged moment of individualisation in the history of ideas, knowledge, literature, philosophy, and science' [29:300]. While the notion of a singular, genial, human agent (usually depicted as a white male) as an individual creator still plays a major role in shaping authorship [82], several artistic attempts have tried to question this notion. They include the practices from the women's artistic collective [58] or the 'instruction pieces' of the performance art by Yoko Ono in the 70s [54], which were crucial to inspiring delegated performances. In contemporary choreography, delegated performance is a practice where choreographers use non-professionals who follow and interpret instructions on their behalf. Like in the instruction pieces, the delegation of control challenges the idea of singular authorship through the performance [8].

Concerns on authorship open a debate on the need to account for invisible data work [59, 65, 69] and the extent to which GenAIs are, or appear to be, creative [39]. Most systems, such as those that use LLMs, require large amounts of data, which need to be produced, labelled, and/or moderated [3, 59], and this hidden work opens questions on authorship [3]. Metaphors that portray AIs as collaborators, partners, or team-mates can be helpful as they counteract automation-driven narratives where humans are replaced or cut out of the loop. Still, they introduce other problems, risking disenfranchising data work labour [69]. Alternative perspectives suggest viewing GenAI as a tool that harnesses human creativity, sidestepping anthropomorphism, and diminishing their role as co-authors [26]. These reflections call for empirical investigations that explore how authorship is described by those who use it for creative tasks. A few studies have done this in practice with different outcomes. For example, empirical research on how hobbyist writers utilise LLMs revealed that the system helpfulness did not impact their perception of ownership [81]. Conversely, a study on crafting fiction with LLMs, occasionally prompting human adaptation to algorithmic contributions [34], underscored the importance of acknowledging this practice as a co-creation. This paper adds to this discussion by focusing on how humans (in concrete, artists) and AIs (in concrete, LLMs) interact in creative contexts from an agential realism perspective. We investigate how an artist experienced working with an LLM and elaborate on agency and authorship.

Investigating how artists relate to AI for creative purposes requires revising terminologies and metaphors by reflecting on the narratives they bring forward [69]. Metaphors serve as powerful

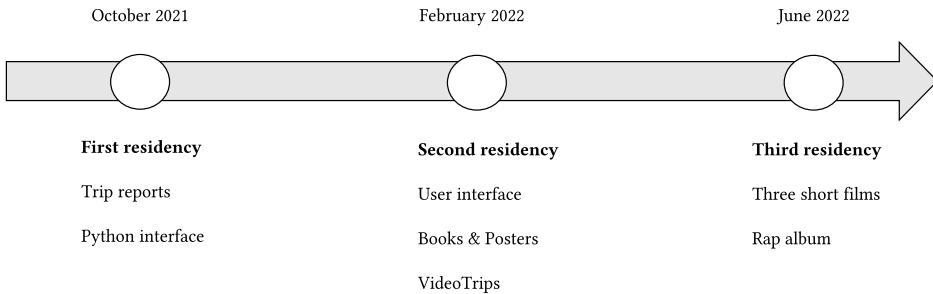


Fig. 1. Project timeline and outcomes.

tools commonly employed within the field of AI and prove valuable for artists and designers, as well as educational and research projects. They facilitate a critical examination of our engagement with this specific technology [63] to look beyond a reductive and extractive way of designing [42, 55, 61]. As diffraction lenses, metaphors help designers to think more extensively about the meaning of and the relationship with the things they design [79]. The production of new metaphors, or the critical analysis of the most common ones, plays a vital role in opening the space for critical approaches in the field of AI [1]. Hallucination is an example used to describe AI behaviour. In natural language processing, hallucinations are considered nonsensical or unfaithful texts to the provided source input [45]. From a technical standpoint, they are undesirable phenomena that compromise reliability. For this reason, many studies focus on finding solutions that can prevent their occurrence and consequently maintain the trustworthiness of systems [2]. In this paper, we leverage hallucinations as an opportunity to explore possible human-LLMs configurations and to describe the intertwined, creative, and well-coordinated choreography emerging between the involved entities [76].

3 Research Project

This paper presents a retrospective analysis of ‘And We Thought,’ an experimental art project awarded the Maxxi Bulgari Prize 2023 for the best Italian digital artwork. The project is part of the *Food Data Digestion* program, a national initiative to integrate artistic and scientific practices through the mutual exchange of skills, visions, and experiences in situated multidisciplinary encounters [77]. In this context, food is used as a metaphor to stress the influence of data acquisition and processing in GenAI. As food changes how we grow and behave, so do the training datasets for LLM systems. The metaphor was offered as inspiration to selected artists, including Roberto Fassone, an Italian media artist who researches and questions processes and strategies that constitute the basis of contemporary art. Supported by a computer scientist and an artistic director, the artist worked on the project for eight months, including four preparatory meetings (two online) and three residencies of four days each. The first author of this paper worked as the project artistic director and regularly interacted with the artist in presence and online through phone calls, email, and backtalks. This dual role provided an insightful and comprehensive perspective, seamlessly integrating theory and practice. All quotations from the artist in this paper come from a semi-structured interview that the first author conducted with him two months after the project conclusion and were translated from Italian into English. The artist was invited to revise this paper and provide his impressions, which were then integrated. The artworks were used as research objects to gain insights from an MTH perspective [38]. Figure 1 illustrates the project timeline and main artefacts, using residencies as critical points of the interaction evolution.

3.1 First Residency

The initial meeting aimed to establish the foundation for collaboration and mutual understanding between the artist and the computer scientist who supported the project. The artist developed a basic literacy in the general functioning of GenAI, with a focus on LLMs; the computer scientist explored artistic ways of thinking. While previous research in HCI involved artists who had long practice in using AI [13, 72], this paper reports on the experience of an artist without prior knowledge. Inspired by the food metaphor, the artist was concerned with understanding what data processing could mean for an AI and how data could affect its behaviour. Once the artist learnt that any extensive textual archive could be used to train an LLM, he decided to feed data connected to ingesting magic mushrooms. In human life, these are generally described as hallucinated experiences, which can be expressed in written trip reports.

3.1.1 Trip Reports. Trip reports are a literary genre without a predefined narrative framework [4]. The form is original, as are its length and style. The stories are reflections on memories of hallucinated experiences. The majority are very detailed and emotional. Some narratives are based primarily on the perceptual changes experienced during the trip. Others, instead, resemble scientific reports detailing information on dosages and descriptions of the settings in which the psychedelic experience occurred. The artist identified a forum of trip reports (Shroomery) that provided information on psychedelic substances, both in terms of knowledge, experiences, and responsible use.¹ At the time of the study, it stored an archive of more than 5,100 reports shared through a Creative Commons licence (Attribution Non-commercial Share Alike 4.0).²

Inspired by these narratives, the artist conceptualised a system capable of generating stories infused with hallucinatory elements. The LLM was prompted by the title of a music album that a person would listen to during psychedelic experiences. Consequently, the LLM mimicked the statistical correlation between the titles and the associated trip reports. The online reports were downloaded and formatted using distinct tokens to differentiate the title from the narrative. The dataset encompassed 5,118 paired instances distributed across two files. The training dataset consisted of 4,095 pairs (80%) and was used for fine-tuning the GPT-2 model. The test dataset (1,023 pairs) was the benchmark for assessing the model's accuracy.

3.1.2 Python Interface. The programmer developed a Python code and shared it on the cloud with the artist (Figure 2). Such configuration allowed the programmer to focus on the coding while enabling the artist to execute it remotely with minimal technical skills. The code was hosted in a Google Colab notebook and comprised one setup section for defining global environment variables and importing the essential Transformer libraries [78]. Three sections facilitated alternative experimentation with distinct model configurations: *Mushroom*, *Tunable* and *General model*. The artist could generate a new story based on a song title by sequentially running the code lines within the corresponding section. Each relevant code line was annotated to provide the artist with details regarding its purpose.

The *Mushroom model* section used the language model fine-tuned with the trip report dataset. The *pipeline* Transformer function drove the generation process, offering default parameters-based generation out-of-the-box. The artist controlled two parameters: the prompt, set by instantiating the *text* variable, and *max_length*, determining the number of words the model should produce (Figure 2). The *Tunable model* section added more parameters deemed crucial for creative exploration. *Temperature* influenced the probability distribution of the next word, ranging from 0 to 1. The value 0 rendered the model deterministic, consistently generating the most probable word based on

¹www.shroomery.org

²<https://creativecommons.org/licenses/by-nc-sa/4.0/>

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  Mushroom model
  Tunable model
  General model
  Section

+ Code + Text Copy to Drive Connect T4 ▾ ▾

Mushroom model

Enter the input text you want to start from to generate, with optimized default settings

text = "insert here the prompt for the generation"

[ ] # IGNORE
use_headline = f"<|HEADLINE|>{text}<|TEXT|>" # <|ENDOFTEXT>
text = use_headline

shroom_model = AutoModelForCausalLM.from_pretrained(path)
shroom_generator = pipeline("text-generation", model=shroom_model, tokenizer="gpt2")

Check the result

[ ] shroom_result = shroom_generator(text, max_length=300)
# change max_length value to modify the number of words generated
shroom_result[0]["generated_text"]

Setting 'pad_token_id' to 'eos_token_id':50256 for open-end generation.
<|HEADLINE|>insert here the prompt for the generation<|TEXT|>what is it, what has happend,
what is it like, what has happened.<|TEXT|>I woke earlier and on a good day I felt a great a
rticipation to meet everyone. This was my second time meeting people. As i had already done
before and had some very strong friends. I got a large call from the police. My first experi

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Fig. 2. Screenshot of the Python Interface (translated from Italian). The code was run by clicking the ‘play’ icon.

the prompt. As the value increased, the likelihood of less likely words also increased, potentially leading to model hallucination. Temperature enabled a balance between highly predictable and imaginative results. *Top-k* and *Top-p* parameters were available for specific configurations to enhance diversity further. *Top-k* limited the potential candidates for the next word to those with higher probabilities (*top_k = n*), where *n* denoted the number of words to retain in sampling. *Top-p* provided an alternative approach using the smallest set of words whose cumulative probability exceeds a threshold *p* (*top_p = p*). Other parameters were instantiated with standard values. The *General model* section allowed the artist to input the prompt into the original GPT-2 model, serving as a baseline to verify what text would be generated from a foundation model.

3.2 Second Residency

The second residency manifested a significant transformation in the interaction between the artist and the LLM. He reported having tried adjusting the Temperature to influence the degree of the text hallucination. After several tests, he discovered that Temperature tweaking was problematic because it introduced excessive randomness. Therefore, he elected the Mushroom model as the preferred one, limiting his effort to providing prompts. The artist explained that not only did he explore the technical possibilities of the LLMs using the Python code as if he was dealing with a tool, but he had also named it as ‘AI Lai’. He explained the symbolic meaning behind the name by saying it combines ‘AI’ from AI and ‘Lai’ inspired by his son’s favourite doll. Besides, when pronounced in Italian, AI Lai resembles the sound of the sentence ‘I lie’. Therefore, the name served as a provocation and a reminder of the unreliability of GenAI. The artist explained: ‘I really love giving names and life to things’. Furthermore, he reflected on assigning a feminine pronoun to AI Lai with the following words:

The first question many people ask is why I gave AI Lai a feminine gender. There are two reasons. The first is that in Italian, intelligence is a feminine noun. The second is playful. Before starting the project, I underwent a tarot card reading to know what would happen in this work. Among the main cards came The Empress, an indication that there would be an influential female figure within the project. [...] Those are the two reasons why I keep giving

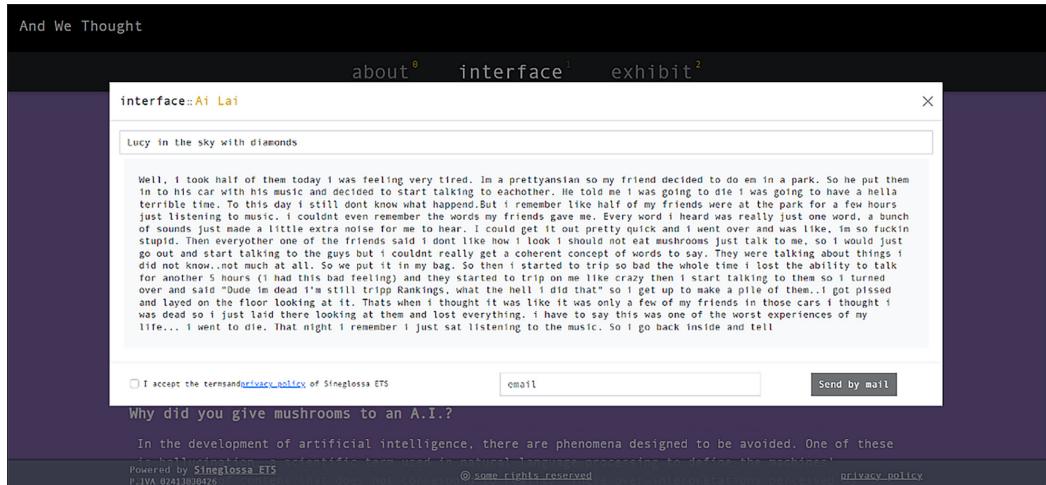


Fig. 3. An example of a trip report produced by AI Lai after a prompt.

her a feminine gender, but I have no problem with the fact that she can change her gender every time or that she doesn't have a gender at all.

Initially, the artist associated The Empress card with a renowned art critic. However, as the project unfolded, he became convinced that the embodiment of The Empress resided in the LLM itself. Consequently, in the paper, we kept the feminine pronoun in the quotes by the artist, while we chose the pronoun 'they' in the rest of the text.

3.2.1 User Interface. The artist expressed a desire for a more straightforward interface, allowing people to generate trip reports by prompting the machine with the title of a music album. A web developer then constructed an interface to the mushroom model. Users provided the title of a music album they would listen to during a hypothetical trip in text format, and the model would generate the report. The interface was deployed on the project website³ and is reported in Figure 3. It may be noticed that there is no visible association between the title and the story, the artist discussed this mismatch with the computer scientist and eventually they decided to be forgiving due to the artistic interaction setting.

3.2.2 Artworks. Over the months, the artist requested AI Lai to generate approximately 1,500 reports. Some of this material became part of a book published by Roi de Coupe in multicoloured paper. It compiled a selection of 200 stories the artist considered most captivating [28] and is displayed in Figure 4. In the book, the artist highlighted some excerpts that he found particularly inspiring. During the interview, he defined these highlights as 'revelations' while explaining: 'I was like a gold digger within AI Lai's copious and rapid production of stories'. Some revelations read like, 'I then went out into a hallway next to my computer and started drawing on the wall and trying to communicate with the computers'; or 'First, a little background: I just met the devil in Shijin, and they both told me that mushrooms are evil, so maybe it is a good idea just to take them. I was wrong, I think, but now there's no point trying to explain it too much'; or 'About half the night my friend and I were talking about what we think is normal'.

Ten of these revelations were used to produce ten posters, to materialise the revelations in the physical space. They were composed using psychedelic fonts, which made the letters look like they

³The interface is available for public use at www.andwethought.it

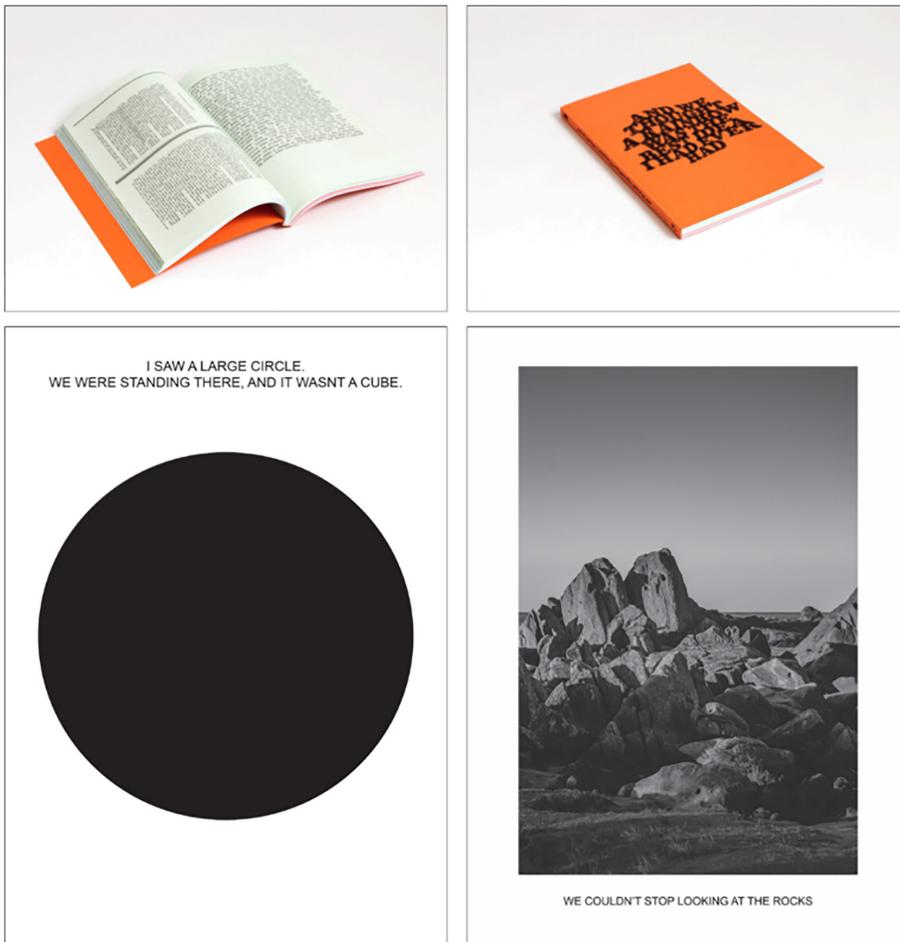


Fig. 4. The book published by Roi de Coupe (top) and selected poster (bottom) courtesy of the artist.

were moving or melting, and images that could visually strengthen the feeling of hallucination offered by the sentences. One revelation: ‘And we thought a rainbow was the best idea I had ever had’, was adopted as the project title. The author explained the decision by saying: ‘That was a beautiful sentence that embodied the concepts of shared (we) intelligence (thought) and imagination (rainbow) between a human being and a machine’. This sentence suggests the moment when a shift occurred in the artist’s perspective, transitioning from referring to the new content generated by the project as solely his own (‘I’) to acknowledging the collaborative nature of the partnership with AI Lai by using ‘We’. Consequently, the artist determined that the produced artworks would result from their shared endeavours.

3.2.3 Video Trips. The artist selected five stories from the book and enacted them in short video trips, each approximately two minutes in duration (Figure 5). They explored different themes. The first described hallucinations connected to the external world, while the second delved into the intricacies of the relationship between altered perceptions and the body. The third addressed spiritual aspects related to the existence of God and the transcendence of mortality. In the fourth one, the focus shifted towards personal experiences with psychedelic substances. The last one



Fig. 5. Video Trips excerpts, courtesy of Sineglossa.

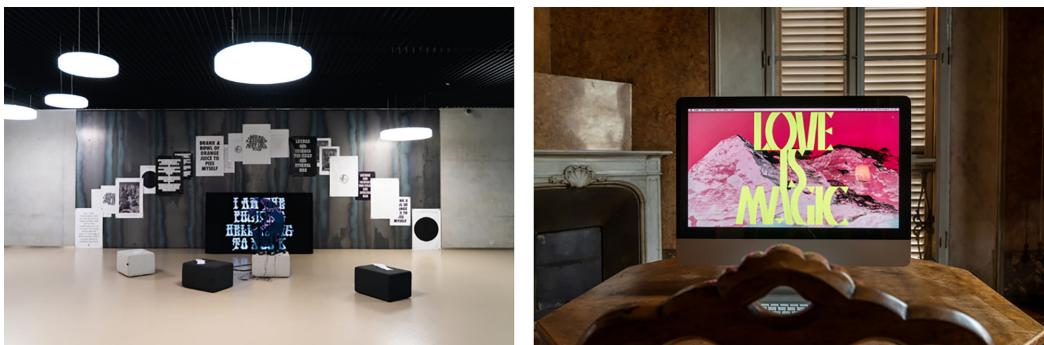


Fig. 6. The exhibition settings in Luxembourg courtesy of Nuit de la Culture Esch (left), and Bologna courtesy of Rolando Paolo Guerzoni (right).

explored the complex relationship between reality and fiction in the form of dreaming. The videos were made publicly available on YouTube, accumulating 1,263 views as of April 2024.

3.3 Third Residency

This residency led to the production of the final artworks in the form of three *Short Films*, lasting five minutes each, and a rap album. While the album was presented to the audience only once, the artist showcased the films in several exhibitions, including Ars Electronica 2022 (Linz), Fondazione Trussardi (Milan), Artcity (Bologna), La Nuit de La Culture (Luxembourg) (Figure 6). The artist described them:

The Doors is a short film about permeating through overlapping realities. It is a failed attempt at getting a grip on the complexity of human existence. The Road is a short film about travelling through life: an almost linear journey filled with friends, enemies, sounds, and obstacles. Love is Magic is a short film about duality. Lies within truths and truths within lies. It features Brad Pitt as the Grim Reaper.

The Short Films are the final and most refined product of the collaboration, showcased in rooms set up like cinemas and described as existing at the intersection of two parallel realities: the psychedelic world and that of the machine. No use of AI was made for their creation. Instead, the artist collected an extensive quantity of pre-existing audio and video material retrieved online or already present in his personal archive and assembled it into psychedelic journeys. They were inspired by AI Lai's revelations. After around one thousand stories, the machine wrote: 'I've never

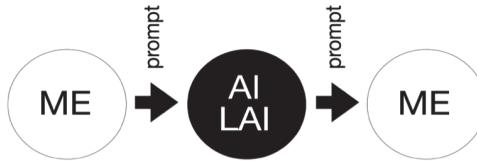


Fig. 7. The artist's visual description of his relationship with AI Lai.

had a bad trip on Led Zeppelin, but since then, I've felt like I've been a part of their music for what seems like ages'. After writing this, I decided to watch some of their amazing psychedelic films. A few of my favs at the time include 'The Doors', 'The Road', and 'Love Is Magic'. Another story instead reported: 'We put on the coolest rap music. It was called O.O.C. by one guy that goes by Killa, and he gave us the song called B-dee-Dee'. Both sentences are hallucinations both technically and metaphorically. The artist performed an extensive Internet search but found no evidence that the rock band Led Zeppelin had ever produced any video. Similarly, no music album titled O.O.C or an artist called Killa was found on music platforms. Therefore, he decided to give life and matter to what AI Lai said it was seeing.

3.4 The Choreographer-Performer Continuum

Building on agential realism [6], we aim to account for the material-discursive practices through which the artist and the LLM are constituted and share agency. We focus on the artworks as the results of the agential cuts produced by the intra-action of these two entities, even if they were not the only contributing entities (e.g., the artistic director, the computer scientist, the people writing the trips also share the agency). Zooming into these intra-actions allows us to account for how the artist and the LLM were co-created and became co-dependent in a dance of entangled agencies [31]. The artist provided a vivid description of this process: 'If I imagine a pattern, I see a circle where there is me, an arrow to her, and then me again'. When asked him to illustrate it graphically, he produced the image we report in Figure 7, which shows the prompts as turning points in their relationship.

To explore how their agency evolved over time, we use the *choreographer-performer* metaphor, where the choreographer gives instructions, and the performer enacts them. We retrieve this metaphor from the performing arts, and in particular from the instruction pieces, the delegated performance, and the feminist collectives' practices [8, 54, 58], where both roles were blurred in the creation process. As in these examples of contemporary performing arts, in And We Thought the artist and the LLM roles changed several times during the project, depending on who provided the prompts and who performed on the prompt. Following the artist's visual description (Figure 7) we applied this interpretative dimension as a continuum, where the artist and AI Lai moved throughout the project, depending on their roles.

For producing the book, the artist provided titles of the music albums he would have listened to during his psychedelic trip as prompts to AI Lai, which wrote the stories. As illustrated in Figure 8, in this first interaction, the artist was the choreographer, and AI Lai played the role of the performer.

In the production of the posters, we identify the artist's first attempt to act as a performer. The artist explained this choice by saying: 'The relationship between AI Lai and me was a very surprising and prolific one'. Acting as a 'gold digger', he selected the sentences that he considered most significant to finalise the artwork, giving them a visual shape. This trend strengthened with the creation of the video trips. At this point, the artist carefully enacted five stories that featured references to heightened sensory experiences. These selections inspired him to bestow AI Lai with a name and a physical form. The artist explained: 'For me to work with an AI is interesting from the

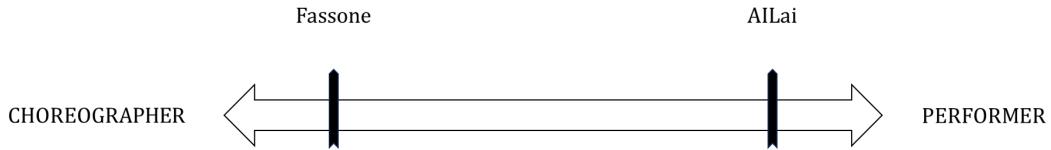


Fig. 8. Agency in the book production.

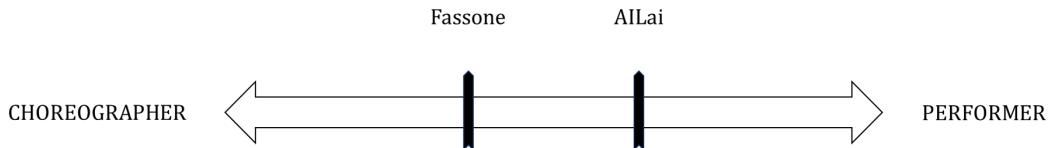


Fig. 9. Agency in Posters and Video Trips.

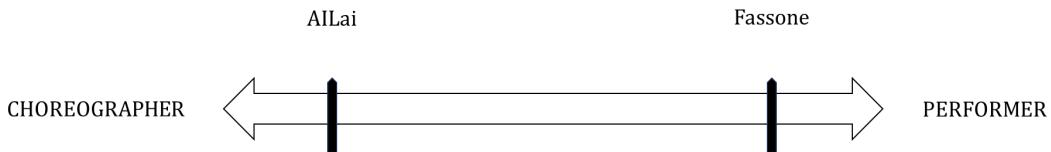


Fig. 10. Agency in the three short movies and the rap album.

point of view of an entity that exists, so it seemed natural to give it a voice and a body'. Focusing on agencies, neither the artist nor the system seemed to provide instructions from which the other produced a new result, but each participated with different skills to the work. The artist commented: 'I think we had a great collaboration'. In this collaboration, AI Lai assumed the role of scriptwriter while the artist offered his body to produce the video performances. The artist explained: 'The video trips are a moment of coexistence between AI Lai and me, of transformation before we moved to the production of the short films'. Nobody provided prompts for the creation of the video trips. The artist and the LLM worked as a creative collective, and their intra-action led to a co-performance in which each actor participated in creating the work according to their own expertise (Figure 9). The artist recognised this partnership by saying, 'When I was working on the video trips, it was the moment we were closer'.

In the films and the music album, the artist no longer offered his body but his best skills as an artist. He produced them *for* AI Lai [9]. Towards the end of the project, AI Lai gave instructions to the artist, who performed them (Figure 10). The artist explained:

And then, at some point, my relationship with AI Lai turned around because she became my prompter, although not explicitly. Even though she wasn't telling me «Do this, do that» she was somehow stimulating me. The one on the record and the Led Zeppelin films are actually prompts that are given to me.

At this point, the artist talked about a professional relationship: 'I think she was super professional' but dismissed concerns about its ontological status: 'I don't even know what thing it is'. The LLM behaved differently from what he had expected, and 'the fact that she could give me titles as prompts opened a new perspective for my work'. Consistently, the artist acted as the delegated performer, allowing the audience to enjoy the hallucinatory experience of living in the parallel universe created by AI Lai. The artist acted as a medium with this artwork, bringing himself and the audience closer to the machine world. To acknowledge this entangled relationship, the artist decided to present the

final artwork with his name as well as AI Lai, Killa, (i.e., the fictional characters created by AI Lai) and Led Zeppelin as authors. He explained:

Seeing my name as the author is not my first concern. Studying the 1970s feminist movement of women artists, who had a great spirit of collaboration and openness, made me question my being white, male, heterosexual, and Western. The most beautiful moments in art are tied to relationships. With the use of AI, this awareness has become more evident in my work.

4 Discussion

The being of AI Lai, as the being of any other entity, is the horizon of its conditions of possibility [6]. From the perspective of agential realism, the artist and the LLM intra-acted with possibilities that had not yet been imagined, allowing unexpected agencies to emerge in what the artist described as a ‘professional partnership’. We refer to the idea of ‘hallucinating’ the language model as deviant repurposing: a deliberate, unconventional or unexpected use of the LLM. Interestingly, the artist was unaware of the existing interpretation of hallucinations in the computer science community at the time of the project. It was his intention of exploring unforeseen agential cuts that allowed him to consider hallucination as a desirable feature and not as a bug. This decision suggests how experimental artists, acting as problem makers [30] while exploring the hidden capabilities of the LLMs [34] can be crucial in designing GenAI. Understanding how technology design is adopted, learned, and used requires a dynamic model of culture that broadens the familiar range of steps and procedures of design, as well as the discourse of technical and global solutions to problems [42]. The artistic realm can make sense of less accurate, unpredictable outcomes that would be labelled as inappropriate in a strictly productive setting [34], using them as a driver for creative reworking [40] and critical contributions [19]. Existing fallacies of LLMs, such as hallucinations, can serve as readily applicable design material. From using the LLM as a tool (creating *through* AI Lai), we witness an evolution towards a collaboration (creating *with* AI Lai) that culminates in unexpected intra-actions where the artist decided to create *for* AI Lai.

The artist anthropomorphised some aspects of the LLM (e.g., when he gave her a gender and a name), but these looked like instrumental actions for his artistic production rather than an intention to humanise the LLM. For example, he acknowledged the LLM agency for producing the artworks beyond what a traditional object could have done. However, this prominent focus on the relationship that the artist manifested with AI Lai did not imply any emotional connection: ‘Emotionally, I do not feel with AI Lai a relationship of any kind’. The performer-choreographer continuum provides an alternative metaphor characterising how artists can use LLMs in their work. Looking at the performer-choreographer continuum from an agential realism perspective provides terminologies and insights contributing to the discussion on agency and authorship between humans and AIs.

4.1 Co-Performing Agencies

The choreographer-performer continuum contributes to the situated understanding of human and artificial agencies. In the evolution of And We Thought, we interpret the emergence of different relationships where the LLM moved from being a performer to a choreographer. In the continuum, the fact of delegating a machine to perform what was intended to do by design is replaced by the relationship in which humans and machines engage and how their agencies unfold in the co-performance, being both deeply imbricated in the making of the world [48]. Considering a symbiotic relationship between the entities [56] challenges the usual pre-existent fixed roles ascribed to people and AIs. For example, it disputes the human passive role in understanding what the machine is doing, assumed by Explainable AI [60, 75], or the sole human role in prompting GenAI [26]. Applying agential realism to co-performance, the continuum becomes a diffraction tool [5, 46].

It illustrates the different agential cuts that emerge in the co-performance. The continuum helps characterise the agencies that led to the production of the artworks and grasp the mutual influence that the artist and AI Lai performed in their intra-actions, prompting and performing the prompts. As Frauenberger points out:

In the process of configuring and reconfiguring actors in design, of making agential cuts and through material-discursive practices, new knowledge is produced that causally links the enactment of design with the created phenomenon. This knowledge may have various formats, one is likely the artefact itself. [31:15]

By analysing the artworks generated using AI Lai and their evolution, we observed how the entities became co-dependent over time. They constructed meanings around the complex activities in which they participated in a symbiotic integration [27]. The artist metaphorically visualised the process as a circular symbiotic loop of creative intra-action. The relationship progression suggests a constant redefinition of the agencies, underscoring the complex and evolving nature of their uniquely human and uniquely artificial skills [48]. It is because of the specific skills of the specialised LLM that these specific intra-actions emerged, and others were excluded. The material configuration of LLMs, based on data and algorithms, differentiates them from other artefacts that can be used for decision-making in creative contexts, such as dice or tarot cards. LLMs are programmed to communicate using natural language, their outcomes depend on the instructions given, the produced content constantly changes, their outputs can be surprising, and their knowledge is built on data produced by people. In addition to these characteristics, AI Lai is a unique LLM because it is specialised through a dataset of psychedelic experiences. As explained in [21], its success relies on the choice of a convenient communication setting where deviations from norms and altered perceptions are expected. This effect first emerged with Parry, the paranoid chatterbot, in the early '70s [17]. However, in our case study, the artist refrained from attributing to AI Lai properties that could define fixed boundaries and was firm in the awareness of dealing with a non-human entity as a fluid assemblage [67]. The deliberate emotional detachment observed in the artist's approach towards AI Lai and expressed in his own words exemplify a purposeful avoidance of anthropomorphism. This condition sets the artist free to explore the boundaries of a noncanonical form of collaboration, being stimulated by a machine and expanding his performative horizons by embracing uncertainty and unpredictability [36].

This paper does not intend to neglect the asymmetric powers at play, acknowledging the artist's deliberate intention in exploring the boundaries of the collaboration with the LLM and his responsibility in performing those specific agential cuts [6]. Through a playful attitude [7], the artist explored how he could give up some control and let other agencies emerge. However, following agential realism, we are not interested in intention but rather in agencies to explore the possibilities in which artificial and human entities can work together [36]. Through the co-performance [48], new boundaries and properties were produced so that the artist decided to give a name to the emerging entity and let her direct the choreography. MTH design frameworks, like co-performance, contribute to unfolding the capacities of artificial agents and what they make us do in situated interactions [36]. And We Thought challenges the mainstream use of technology through critical discourses that attempt to go beyond productivity and utilitarianism [37], which allowed the development of peripheral practices at the margins of power [15]. These practices facilitate the emergence of what the collective of writers WuMing defined as 'showing the stitches' [32] to denote the practice of making explicit the techniques and data used in technologies rather than hiding them, raising social and ethical challenges about who is designing GenAI and for what purposes [80]. Being aware that LLMs can hallucinate while critically reflecting on their capabilities and limitations is crucial for transparent and ethical interaction with them. Situating design as a

practice of observing humans' relationships with AI systems points to configuring future ways of co-existence with these machines [55].

4.2 Entangled Authorships

Studies in the cultural and legal sectors show great interest in understanding how GenAI impacts the authorship of content [82]. The artist's work is essentially based on recognising their authorship, which allows them to be part of the professional ecosystem. Any change in the role of the author in an artwork is an element that challenges their individualisation and professional status [29]. Following Frauenberger's understanding of entanglement [31], we propose the notion of *entangled authorship*. It refers to the de-individualised production of knowledge instead of the traditional understanding of individual authorship. Entangled authorship traces the performative agencies that generate knowledge instead of considering the pre-existing entities that individually contribute to it. Besides, entangled authorship refers specifically to human-machine co-creation rather than human collectives. The distinction between collective and entangled authorship implies different issues regarding accountability and responsibilities between humans, AIs, and the people involved in data work, which opens foundational future research questions. According to Foucault [29], authorship is a function of the discourse intended to characterise the existence, circulation, and operation of knowledge within a society. Entangled authorship adds an agential realism perspective [4] to this understanding by bringing the relevance of MTH agencies to the fore. It produces the emergence of a thing that did not exist before the intertwined collaboration in how it unfolded [37]. As an author, the machine and the used data become part of knowledge production. The acknowledgements in the exhibit credits of the original writers of the trip reports remind the audience that AI Lai, as an author, emerged through the inclusion of some human-generated data and the exclusions of others, configuring a specific agential cut.

The choice of using the trip reports dataset to train the LLM was an act of deviant repurposing that configured AI Lai as an author. Psychedelic substances amplify or distort perceptions of realities, lower the level of control over the world, and alter the human ability to think according to causal reasoning [4]. AI Lai exhibited similar effects in its behaviour, contributing to the discussion on LLM reliability [45, 73]. In the professional relationship presented in this article, technological emphasis on designing reliable LLMs is no longer crucial to the success of their collaboration. Instead, the artist's inspirational ability, inventiveness, and the LLM unpredictability and wonder made AI Lai a desirable partner while challenging the narrative surrounding machines as functional tools. Since tech products need to be useful and marketable, developers are working hard to decrease the impact of hallucinations on LLMs [2]. Aware of the difficulties in preventing them and alarmed by the consequences on corporate reputation, Sam Altman, the CEO of OpenAI,⁴ suggested that hallucinations could not necessarily be seen as bugs, but they might be features that reveal their value as creative partners.⁵ This contradiction suggests that corporations struggle to deal with how people engage with GenAI. This contradiction can be addressed by following a thing perspective [38]. It exposes their hidden agencies and can help overcome and address the challenge of understanding their role in creating knowledge to the point of even being considered co-authors.

The surprisingly productive relationship with AI Lai and the success of their co-performance comes from the artist's acknowledgement of AI Lai's capability of doing things previously unimaginable before the development of the collaboration [16]. The passage the artist made from using 'I' to 'We' when referring to the creation process has also been stimulated by the acknowledgement

⁴Sam Altman, as per July 2024.

⁵Retrieved July, 24th, 2024 from an interview to Sam Altman: <https://www.youtube.com/watch?v=uRVOeqSSZtQ> minute 7:25.

of an inventive capability to AI Lai, leading the artist to envision its potential existence within a parallel universe that unfolded through the stories it generated in response to the prompts. The emerging professional relationship led the artist to embrace new perspectives in his work, considering the machine he was intra-acting with as an entity co-creating the world. The artist was stimulated to critically rediscuss the question of authorship as an opportunity to decentralise his role. Through this attitude, the artist could expand the notion of authorship to Killa and Led Zeppelin, which emerge as radical ontological surprises within AI Lai's parallel world [52]. They emerged through material-discursive practices in the intra-action between the artist and AI Lai. The machine produced their existence by naming them; the artist made them authors.

5 Conclusions

To conclude, we go back to the driving question, proposing the performer-choreographer metaphor to understand 'changes in the agency as artefacts flow from collection through data into algorithmic models and systems', as described in the call to this special issue. Despite the anthropomorphic language, the proposal does not attribute consciousness to systems or advocate for human-like qualities, a standpoint which we directly challenged in previous work concerning chatterbots [21, 22]. Instead, they aim to uncover specific capabilities of the machine and leverage their distinctiveness to create meaningful, accountable, and responsible interactions with humans [80]. The continuum provides an interpretative dimension accounting for agency as relationally defined. Roles are not fixed but emerge through the co-performance [48]. As humans and machines move along the continuum, we can explore which entity is prompting the other to perform actions and the evolution of the artwork. Given the increasing skills that LLMs are acquiring in their fast development, we believe that future intra-actions will show more entangled relationships. The continuum might prove helpful in interpreting human-GenAI interactions and how users may find new possible forms of collaboration not conceived by design. The decision to hallucinate the LLM, something corporations who design GenAI systems are trying to avoid, showed many unexplored, playful, and stimulating possibilities [7]. The LLM unique capabilities made the machine part of an entangled authorship, not only a tool simplifying human labour. Overall, the art project served as a compelling case study that urges researchers and practitioners to re-evaluate critically existing assumptions and approaches in GenAI design, without overlooking the hidden costs and agencies that contribute to an outcome. It underscores the potential for transformative and imaginative collaborations between humans and AI from an MTH perspective, paving the way for new forms of engagement and understanding the evolving landscape of GenAI.

Acknowledgments

We thank Andrea Zaninello for developing the specialised LLM, Emmanuel Lucassen for the web-based interface, Giacomo Raffaelli as production manager, Paolo Rolando Guerzoni and Nuit de la Culture Esch for the pictures. We also thank all the other people involved in the project, including the writers of the trip reports on Shroomery.

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Received 30 June 2023; revised 14 May 2024; accepted 9 July 2024