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Introduction

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Introduction

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Since when creativity became a problem for computers?

In all its multifaceted forms, creativity has long been (and often still is) regarded as a species-specific human capacity. AI has tried to challenge that; and whether we think of it in terms of symbolic AI or of connectionism, both of these lineages have equally contributed to a new idea of creative behavior.

The history of symbolic AI, however, saw possibly the first instance in which creativity was addressed within this field as a proper issue. John McCarthy, Marvin Minsky, Nathaniel Rochester, and Claude Shannon – the four scientists who inaugurated the Dartmouth Summer Research Project of 1955 – had decided to include creativity among the central "aspects of the artificial intelligence problem". Although rudimental and incomplete, by their own admission, the epistemological relevance of this moment can hardly be overstated. According to them, creativity had something to do with randomness and its role in reasoning: "A fairly attractive and yet clearly incomplete conjecture is that the difference between creative thinking and unimaginative competent thinking lies in the injection of some randomness" (McCarthy *et al.* 1955, 2). Could a computer replicate this creative thinking, they wondered, if programmed in the right manner? What *type* of computer – meaning what hardware – was then needed so that a creative behavior emerged? The proposal did not reach a solution, but, nonetheless, some common assumptions were still being challenged: creativity was no longer a prerogative of human agents, and researchers started speculating that even machines were capable of it – or, at least, that, one day, they would have been.

But McCarthy and his colleagues only constitute a small fraction of the larger discourse around AI and creativity. In order to realize this, one only needs to consider the importance held today by connectionism, the paradigm introduced by the first artificial neural network architecture, the perceptron (Rosenblatt 1958). Its approach to creativity, chiefly focused on pattern recognition and prediction–on *statistics*, rather than *semantics*–went on to foster the rise of machine learning starting from the 1980s, becoming the dominant approach to AI. So, if

we follow the history of AI and track its discontinuous development, we may notice that the same problem, now, crowds the field.

The year 2023 has been particularly filled with novelties and worries, starting with the enthusiasm surrounding OpenAI's ChatGPT, probably the AI model that has most stimulated the scientific and popular discourse on the social effects of AI. By the end of the year, Google released Gemini, a multi-modal model that, they claim in their promotional blog post, will "[have] the potential to create opportunities [, to] bring new waves of innovation, economic progress and drive knowledge, learning, creativity and productivity on a scale we haven't seen before".[1] One may then be tempted to ask: why did that blog post include creativity between learning and productivity? What does creativity mean in that context, and, most importantly, *whose* creativity are we referring to? Is it the humans', or the machines'? The presence of that term, by itself, would seem unimportant, or akin in value to a catchphrase, just another term to better commercialize a product, Google's AI model. One might easily decide to gloss over its use. But we should be wary of how creativity is thrown around by companies that wish to describe the potentialities of their products: in fact, creativity is never a neutral noun, as it responds to scientific, technical, social, and commercial stakes; therefore, it should be taken not at face value, but always through a critical lens.

In connection to this, 2023 saw an increase of opinions which have voiced the possible risks posed by AI technologies, whether contingent or even existential—and, on the other hand, the contrary view that most of these opinions and universal worries are actually too generic, and often convenient, as they fail to account for any labor implications of AI. The risk would then be to overshadow the exploitation of low wage workers that are employed to optimize the outputs of artificial models, as well as ignoring the sometimes illicit acquisition and management of data that power these technologies. As the current historical background shows, many attempts have been made to regulate this evolving scenario and the actors that populate it, which is why the coming to fruition of the EU AI Act might be regarded as a step for-

1. «Introducing Gemini: our largest and most capable AI model » [en ligne], Google, 2023, URL: https://blog.google/technology/ai/google-gemini-ai/ ,consultéle10décembre2023.

ward, not as a bridle to progress (or, rather, to profitability), but as an opportunity to assess what the undesired consequences of AI driven economies and lives might be. Ultimately, the industrial, the political, and the legal dimensions all impact the way in which the discourse on AI creativity is reshaping how we think of and live by these technical and digital objects.

After all, apart from the market and business interests, aside from the political and legal struggles, creativity as applied to computation and computer-generated content has managed to establish a whole domain of research: what several scholars now refer to as *computational creativity* (CC)—whereas others prefer speaking of *artificial*, or even *generative*. Spanning many lines of research, this number of *Epekeina* tries to deal with at least some of the central aspects of CC, which in the work curated by Tony Veale and F. Amílcar Cardoso (2019) has defined as follows: "Computational creativity is an emerging field of research within AI that focuses on the capacity of machines to both generate and evaluate new outputs that, if produced by a human, would be considered creative". Certainly, between this definition by Veale and the foundational examples that we find in the Dartmouth school and the invention of the perceptron, there is more. CC has been structured by many contributions and perspectives, not least those that were advanced by the likes of Douglas Hofstadter, Margaret Boden, or Marcus du Sautoy. CC has never ceased posing profound philosophical questions regarding the relation between computation and intelligence, computation and creativity, or intelligence and creativity, a triad of dualisms that revolve on a central matter: whether an artificial agent can be ever considered or become creative.

Such questions were, for instance, explored in the 1990s in Hofstadter's *Fluid Concepts and Creative Analogies*, where the author evidenced the difficulty to tell novel ideas apart from "clever plagiarism" (Hofstadter 1996, 480-1), or to adequately find a way to credit either humans or machines in their respective contributions to a given product–acknowledging the added difficulty related to the lack of access to the process that led to the output under evaluation. This actually leads us back to another aspect of the socio-political impact of computer-generated content. Indeed, one of the main arguments resorted to in the legitimation of AI public and private investment is that the development of AI tools could help laypeople create visual

or written art: anyone would then have access to the same creative tools, the argument often goes, framing AI as a democratizing technology, which broadens the possibility for each and everyone to tap into and develop their own creative skills. But this view, as others have noted, is accompanied by the threat of seeing the replacement of artists' work with AI-supported productions, perceived as either bland or as the result of data misappropriation, to the detriment of working artists. A threat that appears all too real – and foreshadowed by Hofstadter's "clever plagiarism" –, as is reported by a class action taken on by the Joseph Saveri Law Firm earlier this year (Saveri *et al.* 2023). The class action targets Stable Diffusion and Midjourney, whose generative models were trained using LAION, a dataset which contains vast amounts of copyrighted material, the contention being that the material is exploited without consent nor any financial retribution for those it was taken from. Similar recent events, such as the WGA and SAG-AFTRA strikes that lasted throughout the central months of 2023, brought public attention to the challenges that AI poses to the notion of authorship, to how we deal with copyrighted material, to the extent to which we deem "creative" the use of generative technologies.

Given all of this, this issue was conceived as a critical and analytical response to this domain, as well as to the complex scenario in which it is immersed. The overall aim is to engage, adopting a cross-disciplinary approach—philosophical, sociological, linguistic, semiotic, etc.—the issue of computational creativity, and all its consequences for our general idea of creativity. This has resulted in three directions in which the articles gathered here may be articulated.

First, the papers by Cecile Malaspina, Edan O'Riordan and Michele Pavan develop a critical approach by dealing directly with some of the key elements of CC, mostly remaining within the bounds of its technical field. M. Pavan's article interrogates the construction of the concept of creativity as applied to computation. In particular, he develops a critical analysis of the definition of creativity that was proposed by Boden, as "the ability to generate ideas or artifacts that are new, surprising, and valuable" (Boden 1990), a definition that has proven cardinal for the field. Pavan proceeds to oppose similar subjectivist construals of creativity to objectivist ones, so as to criticize the former, insofar as they reinforce a view that risks becoming independent from the technical objects it is supposed to characterize. Pavan, then,

proposes an objectivist definition of creativity, based on the notion of *impossible results*, which he draws from the works of mathematician Alan Turing. Meanwhile, E. O'Riordan investigates two different but mutually implicated issues: first, the metaphysical realism that is supposed by the claims of creativity in the field of CC. Second, how the normative aspect of creativity is often (conveniently) eluded ; a normative aspect which O'Riordan builds on the hegelian-marxian concept of humans as species beings. And, finally, the article by Cecile Malaspina, which is the Italian translation of her article on "Pure information: on infinity and human nature in the technical object", originally published in *Culture, Theory and Critique* in 2019, tackles the concept of *information*, quintessential to the definition of what is considered creative in CC, and even before that in cybernetics. Without shying away from some of the paradoxes that are central to the relation of humans with technical objects, Malaspina's article inquires how the latter are capable of giving shape—through the information they carry—to the transindividual, collective, existence of the former.

Secondly, three more articles reconsider and deal with some specific assumptions about CC and creativity in general. Riccardo Tarantino's article questions the methodological and epistemological implications of refusing *de jure* the possibility of CC. Through a comparison of the computational models of living and non-living realities, he develops a criteriological approach to creativity, conceived as the control experience for an adequate modelization of agents in a computational environment, specifically focusing on the NetLogo software. Then, Luca Cardone's article handles the fundamental question of meaning and the relation between meaning and creation. He interrogates the processes by which meaning is produced out of its reception, introducing a dialogue and a proximity between Marc Richir's phenomenological approach to the schizophrenic creative process as disincarnated, and the generative process of Stable Diffusion. In accordance to this second direction of inquiry, we have also included Jim Schrub's article, which uses Simondonian philosophy to explore the difference between the notion of invention and Abraham Moles' notion of "creativité induite", with the purpose of questioning the anthropomorphic interpretative framework applied to computer generativity, a framework that tends to elude the normativity of human creativity that makes it specific.

Third, CC is explored with the purpose of dealing with an issue which relates the scope of AI with problems otherwise external to its field of research. Cerutti and Laterza questioned the theological roots of the creation–generation dualism that we often use either to talk about CC, or to name specific digital objects (i.e., a generative AI such as Chat-GPT), which they prompted and whose output they analyze. They propose the term "computational creative generativity", in order to insist that generative AIs do not properly create, although we may perceive their outputs as creative. Then, Sanfilippo's article, written during the months of the strike led by SAG-AFTRA, tackles the issue of (co-)authoriality in the age of AI, reprising the *topos* of the author's death, and considering the current struggle for the authors' recognition of their own work. The function and role of authorhood is transforming, Sanfilippo observes, because of computer-generated texts which call for new—and thus far incomplete—legislation. The third article in this group, by Vaccaro, developed an analysis of novelty and what novelty means for computational systems, in particular examining the case of AlphaZero, whose architecture is based on principles such as programming-free learning, a general and nonspecific algorithm, training through concrete observation, and the program's own activity in the training process. Drawing from postkantians—namely, from Simondon's *Imagination and Invention*, Merleau-Ponty's works on aesthetics and Nishida's work on the productive nature being—Vaccaro proposes to approach CC as another mode for *being productive* and *open*. Such productiveness and its existence in complex digital objects implies navigating the tensions between object and subject, or between the semantic and the technological. Finally, Gnoffo and Pirrone displace us a little bit and propose a reflection on creativity oriented towards the analysis of transmedial objects and the operations of transcreation they suppose for their production, an operation that navigates aesthetic, technical and socio-economic sets of constraints. This operation of transcreation appears like a fruitful track to explore and compare with, for instance, the interpolation process that enables creative compositions of images (in Stable Diffusion for instance).

Finally, the issue includes two reviews. Claudia Navarra's review of Gerd Gigerenzer's book, *Perché l'intelligenza umana batte ancora gli algoritmi* [*How to Stay Smart In a Smart World: Why Human Intelligence Still Beats Algorithms*] (2023), critically examines prevailing

narratives surrounding AI. Gigerenzer, a cognitive psychologist and director of the Max Planck Institute for Human Development in Berlin, aims to counter both catastrophic and messianic views of AI, challenging the notion of AI as a *Superintelligence* capable of surpassing human capabilities across various domains. The central theme is the debate over whether AI, with its increasing computational power, will eventually outperform humans in every aspect. Gigerenzer questions this narrative, asserting that human intelligence, evolved to navigate uncertainty, remains superior in situations characterized by instability and unpredictability. Examining specific cases, such as AI in dating platforms and healthcare systems, Gigerenzer reveals how algorithms designed by profit-driven companies may manipulate human behavior and compromise essential aspects of life. The review underscores the ethical implications of AI, pointing out that the negative consequences in areas like love and health are ultimately driven by corporate interests prioritizing data exploitation over problem-solving. The author critiques the misconception of equating computational power with intelligence, highlighting the absence of *common sense* in AI. The book is described as a perfect synthesis of accessibility and scientific rigor, offering readers essential strategies to navigate life consciously alongside AI.

The review by Angelo Bellofiore of Marcus du Sautoy's book, *The Creativity Code: How Ai is Learning to Write, Paint and Think*, whose Italian translation was published as *Il codice della creatività. Il mistero del pensiero umano al tempo dell'intelligenza artificiale* (2019). Du Satoy's essay provides an in-depth analysis of themes related to AI and CC. Bellofiore especially highlights the concerns that had emerged in 2022 regarding the developments of artificial intelligence, with particular attention to the implications for writing and art. Du Sautoy, following a tripartition introduced by Boden, argues that AI excels in explorative and combinative creativity, but transformative creativity, which requires a complete departure from predefined rules, still poses a challenge for machines. The review examines du Sautoy's reflections on AI generated artistic production, ranging from several case studies, including visual outputs generated by algorithms, such as the *Mandelbrot set*. Despite the many advancements in AI, du Sautoy maintains that human creativity remains too complex for AI to fully replicate: as

the review remarks as well, machines have not yet fully grasped the *secret* of human creativity.

In conclusion, the scale at which AI is now deployed has changed and is changing our practices, be they the creative practices of artists whose work can be growingly assisted by AI tools (in design jobs with the use of Adobe Photoshop,[2] in the visual effect industry,[3] or in animation with Procreate Dreams,[4] or the full generation of content based on a prompt provided to the AI by its user (as in Midjourney, DALL·2, or Stable Diffusion).

These changes bring their own lines of questioning. One of them is society-centered, as we are witnessing a growing public debate over what can be done to manage and regulate this avalanche of AI developments, actively – and collectively – dealing with the environmental and human costs of these devices. The other line of questioning, also present throughout this issue, is more theoretical: human creativity, as a problem-solving operation (Shannon 1952; Moles 1956), or instead as the property of a novel, surprising, and valuable output (Boden 1990), undergoes new ways of being technicized – of being formed by techniques – to an unprecedented scale and entity. These technological changes are altering the socio-technical milieu of humans, and by extension the new associated milieu where computational and human creativity coexist (Simondon 2005; 2012), and how peaceful that coexistence is. When it comes to the labor market and the issue of intellectual property, as shown with the SAG-AFTRA's proposal document, or the Saveri Law Firm class action, peaceful is not the most adequate way to describe the situation. When it comes to human individuation and to the development of imagination, the new distribution of creative processes between AI and users will also transform the socio-material production of the symbolic and, with it, the structure of our social fabric – as well as our own imagination, which, if not

2. «Retouche photo optimisée par l'IA avec Adobe Photoshop» [en ligne], URL: https://www.adobe.com/fr/products/photoshop/ai.html, consulté le 10 décembre 2023.

3. «Issue 11 - AI and VFX» [en ligne], befores afters, 2023, URL: https://beforesandafters.com/product/issue-11/, consulté le 10 décembre 2023.

4. Ian Dean Published, «Procreate Dreams: everything you need to know» [en ligne], Creative Bloq, 2023, URL: https://www.creativebloq.com/features/procreate-dreams-everything-you-need-to-know, consulté le 10 décembre 2023.

proletarized altogether, is at least organologically transformed (Stiegler 2006; 2015).

The intricate interplay of human and computational creativity shapes our social and technological landscape, giving rise to complex challenges that demand subtle and refined solutions. As we navigate the dynamic interaction between artificial intelligence and human creativity, the blending of creative approaches profoundly influences how we depict and interpret the world. In this transformative exploration, a central question emerges, expressed throughout the articles included here: Does our imagination undergo a streamlining process, simplifying its essence, or does it embark on a fundamental structural transformation? This inquiry transcends the realm of technology, delving into the complexity of our shared human experience.

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