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***How Does AI Interact with Human Creativity?***  
(Come l'IA interagisce con la creatività umana)

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***I volti della creatività.***  
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## Defining Creativity as a Dynamic Process

Humanity is endowed with the necessary intelligence and creativity to reflect and act upon itself and upon the universe in which we are immersed. Through language, memory, imagination, and action we have developed a creative process that produced social systems with shared cultures and myriad technologies, greatly expanding our natural individual characteristics. As a result, whereas all species have culture (Boyd & Richerson, 1996), we are the only ones who have seen the exponential evolution of our cumulative culture (Lehman, 1947), and this can be explained by our social exploitation of creativity (Enquist et al., 2008; Glăveanu, 2011).

But how can creativity be defined? According to Runco & Jaeger (2012), the 'standard definition' requires the recognition of both *originality* and *effectiveness* in order for creativity to exist. In the creativity studies literature, originality is often reduced to novelty, whereas effectiveness is frequently intended as appropriateness, or utility, or meaningfulness. I identify this standard definition as *static*, as it corresponds to a snapshot event of success or achievement, in which the two fundamental attributes of originality and effectiveness are indeed agreed upon for a specific product by a determined group of people at a defined time (Stein, 1953). In other words, this definition covers instances of creative achievement, and it is product oriented.

But this static definition is far from sufficient: the creativity phenomenon is not a collection of disjoint snapshots, but a continuous dynamic process. Before any form of success can emerge, the process must undergo extensive periods of what I identify as *creative inconclusiveness* (Corazza, 2020), which from the point of view of determining the characteristics of the creative person is arguably even more important, for example in terms of tolerance of ambiguity (Zenasni et al., 2008) and self-regulation (Ivcevic & Nusbaum, 2017; Zielińska et al., 2023). In the history of science, arts, or technology, there are uncountable instances in which ideas or artifacts were not understood, ridiculed, discarded, only to be rediscovered later in time (sometimes much later), to become seminal milestones in the development of our civilization. This constitutes definitive proof of the fact that the creative process is dynamic. Further, there are instances in which the outcomes of a creative process are totally unimportant: this is for example the case of creativity used as therapy (Bertman, 2018; Chiang et al., 2019).

For all the above reasons, in order to understand the multifaceted creativity phenomenon (Lubart, 2017) it is necessary to focus on the creative *process* and not on the creative product, by adopting the dynamic definition of creativity, that covers both creative achievement and creative inconclusiveness: *creativity requires potential originality and effectiveness* (Corazza, 2016). The added word "potential" yields the wanted extension from a static to a dynamic view, from a product-oriented to a process-oriented perspective. The adoption of this definition brings as a consequence the possibility to study the phenomenon under the light of the dynamic creativity framework (Beghetto & Corazza, 2019; Corazza et al., 2022; Corazza & Glăveanu, 2020), with both theoretical and empirical implications.

For the purposes of this seminar, the most relevant consequence is that the dynamic definition of creativity opens the way to the introduction of the *Dynamic Universal Creative Process* (DUCP). Creativity episodes do not start *ex-nihilo*: they use extant reality and information as a starting point, and they can become ingredients for future episodes; hence, they are connected to the past and

projected into possible futures, in ways that can range from very straightforward to very complex. Even considering creativity episodes that appear to be completely unrelated, by going back in time it is always possible to find a common root. This is particularly evident in the history of ideas (Betti & van den Berg, 2014). Extending the consequences of this observation to the entire history of our universe, I posit the hypothesis that throughout cosmic evolution all creativity episodes are interconnected, thus forming a single macroscopic process which I identify as the *Dynamic Universal Creative Process* or DUCP (Corazza, 2019; Corazza & Lubart, 2020). The DUCP is defined as: “The active ensemble of all creativity episodes in the course of cosmic evolution”. The existence of the DUCP is identified here as the DUCP hypothesis.

### *Layers of complexity in the DUCP*

By accepting the DUCP hypothesis, creativity is not a reserved playground for humanity. Undoubtedly, humanity has shown to be capable of very high levels of creative achievement, both at individual and social levels (Glaveanu et al., 2020), forming a rich psycho-social layer of complexity in the DUCP. But the origin of the DUCP is posited to precede the advent of *Homo sapiens*, as we can recognize creative activities in hominids, the most prominent being the stone tool industry (Harmand et al., 2015). Further, the emergence of creative trajectories of evolution can be recognized also in non-human forms of life, in the biological layer of complexity, as well as in inanimate matter that is kept far from equilibrium (Loreto et al., 2016; Prigogine, 1961), forming a material layer of complexity in the DUCP. Furthermore, in the last decades humanity has been developing the necessary technology to imitate and extend human intelligence via artificial electronic circuits. This *artificial intelligence* (AI) is becoming capable of generating content with surprising efficiency, to the point that a Gen-AI layer of complexity can be recognized in the DUCP. As a consequence of this discussion, the DUCP is posited to contain four layers of complexity, as represented in Table 1.

<b>Layer of complexity</b>	<b>DUCP form</b>	<b>Creativity sense</b>	<b>Creativity form</b>
Material layer	Material Creativity Process	Wide-sense	Emergent and Energy-driven
Biological layer	Biological Creativity Process	Wide-sense	Emergent and Aptive
Psycho-Social layer	Psycho-Social Creativity Process	Strict-sense	Intelligent and Goal-Driven
Gen-AI layer	Artificial Creativity Process	Wide-sense	Cybernetic

*Table 1. DUCP layers of complexity and creativity forms (Corazza, 2019)*

# Modeling the Creative Process: DA VINCI

From now on, 'creative process' identifies the portion of the DUCP referring to a single creative episode, with implied interconnections into the past and implications for the future. The DA VINCI model was introduced (see Corazza & Agnoli, 2022) as an alternative to other existing models for the creative process occurring in an episode. Indeed, several models for the creative process have been proposed in the literature (e.g., Finke et al., 1996; Mumford et al., 1991; Wallas, 1926) and discussed by Lubart (2018). The model is clearly dedicated to Leonardo Da Vinci, but at the same time "DA VINCI" represents a five-part acronym (DAV+I+N+C+I) that identifies the key mental states in the creative process: DAV (Drive – Attention & Volition), I (Information), N (Novelty generation), C (Creativity estimation), I (Implementation). A graphical representation is provided in Figure 1.

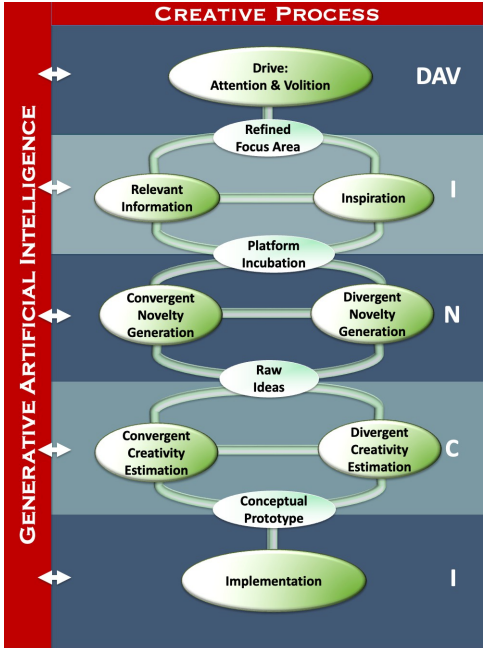


Figure 1 – The DA VINCI model for the creative process (modified from Corazza, 2019)

## Generative AI in the Cyber-Creative Process

The DA VINCI model (Corazza & Agnoli, 2022) was conceived as models for a creative episode at the psycho-social layer of the DUCP, i.e., one in which the creative agent is a human. However, the come of age of Gen-AI algorithms (Maltoni et al., 2025), and their ample diffusion through chat interfaces (such as ChatGPT; Fui-Hoon Nah et al., 2023), makes it imperative to consider if and how Gen-AI should be integrated in the creative process, in what can be identified as a cyber-creative process characterized by human-machine collaboration (Vinchon et al., 2023). The possible forms of collaboration (assistant, inspirational source, idea challenger, peer-to-peer collaborator, quality controller, manager) will be discussed in the seminar.

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