Review

Adaptive Behavior

# Creativity: An Individual or Collective Phenomenon? A Historical-Psychological Perspective

Adaptive Behavior
2025, Vol. 0(0) 1–21

DOI: 10.1177/10597123251343849
journals.sagepub.com/home/adb
Sage

**Leonardo Barón-Birchenall[1], Andrea Sánchez-Vallejo[2], Carlos Toro-Silva[3] and Andrea Folleco-Eraso[4]**

**Abstract**

This paper examines the concept of creativity from a historical-psychological perspective, exploring its evolution over time and its manifestation as both an individual and collective phenomenon. Through a narrative-theoretical review of the literature on creativity's conceptualization, nature, and valuation, we examine how social, cultural, and psychological factors have influenced the understanding of creativity throughout history. The discussion contrasts key aspects at the individual level, such as motivation, personality, intuition, exceptionality, and intelligence, with group dimensions like domain, field, collaboration, background, and the societal consequences of creative acts. The paper presents diverse psychological frameworks, including behaviorism, psychoanalysis, Gestalt psychology, humanistic psychology, and cognitive psychology, each offering unique insights into the mechanisms behind creativity. By tracing the historical phases of creativity—from its early association with divine creation to its modern applications in art, science, and technology, as well as its relationship with artificial intelligence—this paper highlights how creativity has been judged and valued across different eras. One of the conclusions drawn is that while the concept of artistic genius and originality cannot be disentangled from its broader social and cultural context, creativity is also an intensely personal psychological process, with the internalized sociocultural context acting as a proxy for external fields and domains.

**Keywords**

Creativity valuation, historical perspectives on creativity, psychological models of creativity, sociocultural context of creativity, artistic genius, intuition

Handling Editor: Luisa Damiano, IULM, Italy

> Ideas are like rabbits. You get a couple and learn how to handle them, and pretty soon you have a dozen. – J. Steinbeck

## 1. Introduction

Even though the creative phenomenon is a constant in human experience, creativity, its conceptualization, nature, process, and valuation have changed over the course of history and will likely continue to do so. To begin this paper, we will provisionally define creativity as *the ability to generate useful, novel, and relevant ideas or artifacts* (etymologically, the word *creativity* comes from the verb *create*, Latin *creare*, which means to make or produce in a physical sense [Götz, 1981]). For a general approximation, see for example, Sawyer and Henriksen (2024), Sternberg and Karami (2022), and Ward et al. (1995).

There are at least four phases in the history of the term *creativity* (Tatarkiewicz, 2001). The first refers to the

[1]Corporación Universitaria Minuto de Dios – UNIMINUTO, Bogotá, Colombia
[2]Pontificia Universidad Javeriana, Bogotá, Colombia
[3]Independent Researcher, Bogotá, Colombia
[4]Fundación Universitaria Los Libertadores, Bogotá, Colombia

**Corresponding author:**
Leonardo Barón-Birchenall, Corporación Universitaria Minuto de Dios – UNIMINUTO, Carrera 73a No. 81b-70, Bogotá, Colombia.
Email: laescaladesol@gmail.com

ancient world, where, particularly in the case of the Greeks, the term was not used in philosophy, theology, or art. The Romans, on the other hand, did know the term *creativity*, but they did not apply it to any of these three fields, where the term *ingenuity* was usually used, equivalent to the current conception of creativity. The second phase refers to Christianity, from which the term *creator* was popularized in theology as a synonym for God. The word continued to be used exclusively in this sense until the Enlightenment.

The third phase in the history of the term *creativity* corresponds to the nineteenth century, in which the term *creator* was incorporated into the language of art (Tatarkiewicz, 2001). The term *creator* then became synonymous with artist, while new expressions such as the adjective *creative* and the noun *creativity* were formed. Finally, in the twentieth century, the expression *creator* began to be applied to all aspects of human culture. People began to talk about creativity in science, creative politicians, creators of new technology, and so on.

Since the mid-twentieth century, the concept of creativity began to acquire increasingly defined characteristics, thanks to a veritable explosion of research in the field of psychology in the United States. One of the main assumptions of this research was that creativity can be measured (Franklin, 2023). In this favorable context for the study of creativity, the first scientific journal focused on the subject, the *Journal of Creative Behavior*, began to circulate in 1967.

During its different phases, the history of the understanding of creativity has been shaped by the prevailing values of the corresponding time, and has been influenced by social, cultural, economic, political, technological, and scientific factors. There have been myths such as that of the *genius* or the *mad creator*, as well as beliefs perpetuated to this day, such as that children are more creative than adults, that school annihilates creativity in children, or that creating requires absolute freedom. Ultimately, the questions of who creates, how they achieve it, and how society and the author judge the creation are configured in the historical and cultural context in which the study of the creative phenomenon is located (Glăveanu & Kaufman, 2019).

The present article provides a non-exhaustive narrative and theoretical review of the academic literature related to the individual and/or collective nature of creativity. Our aim is to identify, synthesize, and discuss works that allow for an analysis of how the individual and collective dimensions of creativity have been addressed by researchers. Although this distinction is mentioned in some studies, we believe that there is, to date, no review that compares the theoretical perspectives of works favoring an individual approach with those favoring a collective approach, as well as those that take both aspects of this distinction into account.

In the first section, titled *The Creative Individual*, we examine various aspects related to the individual facet of creativity. This includes the historical foundations of creativity, the behavioral and unconscious elements inherent in the creative act, and the incremental and intuitive nature of creative processes. Additionally, we analyze the personality traits and cognitive abilities associated with creative individuals, as well as the relationship between creativity and brain functioning. In the second section, titled *The Creative Individual in Context: Relationships and Influences*, we explore theoretical frameworks for analyzing creativity that incorporate group dynamics, extrinsic motivational factors influencing the creative process, and the role of social recognition and collaboration. Additionally, we examine the concept of inconclusive creativity, the influence of cultural contexts and social networks on creative expression, the phenomenon of distributed creativity, and various aspects of collective collaboration mediated by modern technologies. Throughout the text, we provide the reader with the nationality, occupation, birth date, and, when applicable, death date of the key historical figures we consider central to the study of creativity.

## 2. The Creative Individual

### *2.1. Historical roots of creativity: from divine inspiration to individual genius*

Early scientific research on creativity, particularly post-World War II, assumes an individual, intrapsychological origin of creativity. This was partly because such research perceived creativity as part of the historical process of progressive individualization that began in the Renaissance and reached its climax in contemporary capitalist societies, particularly in the United States (Glăveanu & Kaufman, 2019).

However, the question of the individualistic condition of creativity existed long before the scientific formalization of the concept in the United States. For example, although there was no specific term to refer to it, creativity was not unfamiliar to the thinking of the ancient Greeks. Among them, the imaginaries about the creative process itself aimed to see it as the result of divine inspiration or as a form of madness (Contini, 2001; Whitehead, 2017). The first of these visions is known as *inspirationism*, since in ancient Greece it was believed that the infusion of breath by the muses generated new ideas. This is also why we say that we feel *inspired* when we have an idea.

On the other hand, the imaginary of creativity as a form of madness is possibly due to the uniqueness of the ideas generated by individuals with psychological disorders (Romo, 1997; Whitehead, 2017). This has prompted speculation in modern times that mental illnesses such as schizophrenia or neurodevelopmental conditions such as autism may be linked to greater creativity due to the way they affect an individual's thinking and perception (see for example Jackson, 2015). In this regard, it is crucial to

understand that while it is true that some people with certain conditions may have unique cognitive and perceptual experiences that fuel their creativity, not all creative individuals suffer from mental disorders, nor are all people with mental disorders especially creative.

Over the years, there has also been the *romantic approach,* in which the creative individual is seen as a different, special, even privileged being, within a society that cannot aspire to such feats (Boden, 2004). A particular version of the romantic approach was developed during the Renaissance: the idea of the creative individual in art as an alienated individual, influenced by Saturn, and with a different type of life than most people (Romo, 1997).

## 2.2. Creativity between conditioned behaviors and the unconscious mind

Returning to the early scientific research on creativity, the psychological school of behaviorism, prominent during the first part of the twentieth century, adopted a distinctly individualistic approach to creativity, although without necessarily conceding that there is a process of creation from scratch. According to John Watson [1878–1958], American psychologist and founder of behaviorism, if an individual is faced with a novel problematic situation, he generalizes responses previously given in similar situations, transferring to the present associations that worked successfully in the past (Weisberg, 1986). If the behaviors due to past associations are not enough to solve the novel problem, the individual gives random answers until an acceptable product is achieved.

Later, theorists of instrumental conditioning, a subsequent development of classical behaviorism, accepted the existence of creativity as an individual behavior that is mediated by external rewards. Unfortunately, in both cases the particularities of the creative process itself seem to have gone unnoticed (Gardner, 1994; further information on the early behavioral perspective on creativity can be found in Kubina et al., 2006).

In contrast to the initial behaviorist approaches, and around the same time, within the framework of classical psychoanalysis, creativity represents a mechanism for sublimating drives, a primary process in which associations are formed outside conscious awareness, as exemplified in dreams and slips of the tongue (Boden, 2004). In this context, sublimation is understood as the transformation of instinctual desires or impulses into socially acceptable behaviors, preventing their inappropriate or destructive expression.

Likewise, in accordance with the vision of creativity linked to psychological disorders, in his study of Leonardo Da Vinci, Sigmund Freud [1856–1939], Austrian neurologist and father of psychoanalysis, suggested considering intrapsychic disorder as a source of creative productivity (Romo, 1997). However, Freud's exploration extends to unconscious dynamics and psychic conflicts, which he argues can be sublimated into creativity, challenging the prevailing view of these elements as mere disorders.

For psychoanalysis, creativity processes represent a break in continuity, a fracture in a linear development, the fulfillment of a *lack* (absence that generates dissatisfaction or discomfort) that at the same time tries to cover it, granting a *different meaning* (*otro sentido*) but not an *again* (*otra vez*), and relating in dialectical and dynamic opposition to the process of repetition (Czernikowski, 1994; an overview of creativity from a psychoanalytic perspective can be found in Bollas, 2014).

Following this line of thought, and according to the American psychiatrist and psychoanalyst Lawrence Kubie [1896–1973], creative thinking is a predominantly unconscious, internal process that is controlled and even inhibited by the Ego and Superego (Adams, 2019). In this context, *Ego* refers to the part of the mind that deals with reality and fulfills wants and needs in a rational and socially acceptable manner. The *Superego*, on the other hand, represents the part of the mind that internalizes social and moral norms, serving as the conscience and ideal of individuals.

From Kubie's perspective, creative thinking arises from the deepest parts of the mind, those beyond conscious control, and can be restricted by the most critical and normative aspects of the personality (Adams, 2019). In this scenario, creative thinking is inherently human and potentially liberating, while also being subject to internalized social norms and constraints, which can lead individuals to face internal conflicts between creative impulses and social and ethical expectations.

## 2.3. Incubation, intuition, and the eureka moment

Following the line of psychoanalysis, and based on the observations of the French mathematician Henri Poincaré, the English social psychologist Graham Wallas [1858–1932] postulates four phases for the development of the creative process with respect to problem-solving (understanding *problem-solving* as the process of identifying, analyzing, and finding solutions to challenges or obstacles): *preparation*, *incubation*, *illumination,* and *verification* (Weisberg, 1986). During preparation, the individual consciously considers the problem, pre-activating possible combinations of ideas. During the incubation phase, while the individual moves his thinking away from the problem, there is an unconscious association of ideas from the pre-activation of the previous stage, which generates possible solutions. Such possible solutions are communicated to the conscious mind during the illumination phase and are evaluated by the creative individual during the verification

phase, where esthetic factors are considered to ultimately determine the idea's effectiveness in solving the problem.

The incubation phase is understood by the Hungarian-British writer and journalist Arthur Koestler [1905–1983], within the framework of his theory of *creativity by bisociation*, as an unconscious process in which apparently unrelated ideas are brought into contact and combined in an original and unexpected way (Koestler, 1964; Weisberg, 1986). During this process, matrices would be formed, consisting of mental structures in which fragments of information are organized and connected in novel ways, providing fertile ground in which ideas can be freely developed and mixed (a kind of *brainstorming*) until a possible solution to the problem at hand is reached.

When the newly incubated creative idea reaches consciousness, the phenomenon known as the *Aha!* or *Eureka! moment* occurs. Such an insight moment represents the culmination of the creative process, during which the matrix of thoughts formed during the incubation phase crystallizes into a concrete idea or solution. In this instant, the mind becomes aware of connections between previously disconnected ideas, generating a new and original understanding. This process is similar to what the American cognitive psychologist Jerome Bruner [1915–2016] called *efficient surprise*, which implies a kind of shock as a response to creation and the realization that something similar has not been seen before (Romo, 1997).

The incubation theory, sometimes also referred to as *creative concern*, explains why temporarily setting aside a problem can facilitate its solution. Numerous researchers have explored this phenomenon, linking it to various factors such as inhibiting restrictions, analogical thinking, adopting fresh perspectives, forgetting incorrect solutions, or simply resting (Contini, 2001). However, the idea of the *Aha! moment* marking the end of incubation implies a significant leap of intuition during problem-solving. But do these intuitive leaps really exist? While it is undeniable that certain problem elements bring us closer to a solution, their precise nature often eludes clear identification, especially when relying on self-reported data from case studies (Weisberg, 1986).

## 2.4. Incremental creativity: from iterative steps to lifelong development

A perspective contrasting with the incubation theory posits that creative problem-solving unfolds incrementally through a series of small, iterative steps. Rather than a sudden *Aha! moment*, solutions would be gradually refined through persistent effort, modifying, and building upon previous attempts. Consistent with this position, introspective studies indicate that problem-solving often involves a winding path marked by setbacks and obstacles before the final breakthrough (Romo, 1997; Weisberg, 1986, 2018).

The idea of the incremental development of creativity also aligns with what was proposed by the American cognitive psychologist Ronald Finke [1950–2015] in his *geneplore model* (Ward et al., 1995). The model highlights two fundamental phases in creative cognition: the *generative phase*, during which pre-inventive cognitive structures are formed and a mental model of the problem space is constructed, and the *exploratory phase*, where the emergent properties of these structures are exploited to arrive at a creative solution to the problem. This approach emphasizes the role of constraints in the creative act, as it is the constraint that triggers the generative processes which in turn shed light on how to evaluate the pre-inventive structures of the exploratory phase. From this perspective, specific knowledge of a particular field is understood as the foundation from which creative ideas emerge and what enables the recognition of their possibilities (Ward et al., 1995).

The recently discussed scenario is consistent with the idea of *primary* and *secondary creativity* (or *creativeness*), proposed by the American humanistic psychologist Abraham Maslow [1908–1970]. Primary creativity refers to a sudden inspiration coming from a deeper level of consciousness, an unfinished idea, the beginning of a process. It is characterized by being common and universal in children, although it tends to be blocked in adults. Secondary creativity refers to the subsequent development of the inspiration, project, or idea, and often relies on discoveries and advancements made by others, though it does not necessarily occur in tandem (López, 1995). All of this is understood by Maslow as part of a continuous quest for self-actualization within an optimistic and even healthy context of the individual.

A concept similar to primary and secondary creativity was later developed in the *multi-c framework of creativity* (Kaufman & Beghetto, 2009). Based on types of creative products, this model emphasizes the distinction between *mini-c*, *little-c*, *Pro-c*, and *Big-C* (with "c" standing for creativity). Depending on the level of development, the model spans from creativity typical of early cognitive development, which does not involve any special recognition by society, through everyday problem-solving and the creativity exhibited by professionals in fields such as music and science, to the creativity of the great geniuses of history, which has a lasting impact and is often widely recognized.

## 2.5. Creativity: between self-realization and inner conflict

Carl Rogers [1902–1987], another renowned American humanistic psychologist, shares Maslow's conception of the creative act as related to physical and mental well-being,

also understanding creativity as a process that participates in openness to experience (Adams, 2019). In this sense, the individual creates primarily because it satisfies him/her and contributes to the journey towards self-realization, which can manifest in various domains such as art, science, and even war (López, 1995).

But the creative process is not always framed within a context of satisfaction and self-knowledge. In contrast, an approach to creativity that diverges from the humanistic framework is that of the American psychologist and World War II veteran Frank Barron [1922–2002]. According to Barron, creativity arises from conflicting internal impulses that are not necessarily associated with a good state of mental health. The creative individual is rather an observer in a complex environment, often navigating a chaotic, even tortured life (Adams, 2019). This view emphasizes the connection between creativity and neurosis, recalling the earlier approaches linking creation and madness that we have discussed.

### 2.6. Creativity as a break from tradition: originality versus incremental development

Another reiterative theme developed within the framework of the individualistic vision of creativity is the notion of the rupture that a creative product implies with previous lines of thought. In this regard, Manuela Romo [?-], professor at the Autonomous University of Madrid, suggests that it is unlikely for a genuinely original and creative product to emerge merely from the application of certain generative rules to previous elements, as creation involves a break or radical change with respect to what previously existed (Romo, 1997). This perspective aligns with the proposal of the English cognitive psychologist Margaret Boden [1936-], who distinguishes between *novel* and *original ideas*: novel ideas arise from a set of generative rules applied to existing ideas (an approach likely influenced by Chomsky's generative grammar), while original ideas cannot emerge from such rules and represent a departure from what came before (Boden, 2004).

To substantiate her argument against the possibility of creative rupture, Romo (1997) uses Picasso's cubist style as an example. This style, characterized by painting the front and profile on the same plane, is widely recognized as a significant break from preceding painting styles. However, it is known that Picasso was familiar with the caves of Lascaux and Altamira, where precursors of the cubist technique can be found (Trendall, 2004). Thus, in Picasso, as in most artists, the technical and thematic influences shaping his artistic output can be traced—even if drawing on earlier pictorial traditions sometimes meant diverging from the prevailing artistic trends of his time (di Bella, 2005). Following this logic, it seems reasonable to support the incremental view of creativity proposed by the cognitive psychologist Robert Weisberg [?-] (1986, 2018), which minimizes the notion that the *Aha! moment* involves a fundamental intuitive leap during the creative process, challenging the romanticized view of creativity as a sudden, inexplicable flash of insight.

### 2.7. The role of serendipity and intuition in creativity

At the individual level, chance has also been considered an influential aspect of creativity. For example, the term *serendipity*, coined in 1989, refers to the fortuitous discovery of something when one is not actively searching for it (Romo, 1997). Such serendipitous discoveries often occur when an individual is well-prepared in a specific field. In these cases, an event that might otherwise go unnoticed can be given special significance, as it relates to a process that has been developing in the mind, potentially leading to a result that might not have occurred without the element of chance.

However, intuition also plays a role in the creative process, emerging from novel activations of cognitive schemas, triggered by the re-representation of the mental space associated with a given problem (Csikszentmihalyi, 2014; Minervino, 2005). These novel activations can make available to the mind new *operators* (methods or procedures for solving a problem), ideally those required for the situation. Consequently, the creative individual is not merely a passive recipient of inspiration but an active agent who cultivates a mental environment conducive to novel connections, which involves a balance of focused attention and open-mindedness.

### 2.8. Problem-solving, (re)productive, and divergent thinking

Another theoretical explanation of creativity that focuses on the creator's individual characteristics comes from the German Gestalt school, which particularly emphasized the relationship between creativity and problem-solving. It views the latter as issues that require unique and independent solutions, which transcend previous experience and can also be addressed without specific knowledge (Weisberg, 2018). From the Gestalt perspective, the primary difficulty in solving a problem lies in the fact that the elements necessary for the solution cannot be integrated as a cohesive whole within the perceptual field. Achieving this integration facilitates the visualization (in a broad sense) of novel relationships between the elements of the problem, which can lead to a solution.

Likewise, Max Wertheimer [1880–1943], a German psychologist born in Prague and one of the founders of Gestalt psychology, proposed a distinction between *reproductive thinking* and *productive thinking*. Reproductive

thinking involves applying existing procedures and knowledge to solve a novel problem, whereas productive thinking requires a comprehensive understanding of the specific problem's particularities, beyond previous experiences, and based on the reorganization and novel use of ideas (Weisberg, 1986). This distinction bears resemblance to the concepts of *assimilation* and *accommodation* later developed by the Swiss psychologist, biologist, and epistemologist Jean Piaget [1896–1980].

A little later, around 1950, the American cognitive psychologist Joy Paul Guilford [1897–1987] introduced his conception of creativity as a *divergent thinking* process to the psychological community (Plucker et al., 2024). This type of thinking involves fluency, flexibility, and originality in idea generation, as well as sensitivity to problem discovery and structuring. Divergent thinking generates multiple possibilities in response to a dilemma, in contrast to *convergent thinking*, which selects the most suitable solution from these options (de Bono proposes a very similar approach under the name of *lateral thinking* [Hendryx, 2024]).

Guilford's approach led to the development of tests designed to assess convergent and divergent thinking capacities as well as individuals' creative aptitudes, marking the introduction of the first instruments to measure creativity. In contrast, earlier attempts at measuring creativity include those made at the end of the nineteenth century by the French psychologist Alfred Binet [1857–1911], who, despite creating the first intelligence test, was unable to successfully incorporate an objective measure of creativity into it. For more details on the measurement of creativity, see Alencar et al. (2021) and Sternberg and O'Hara (1998).

### 2.9. Fixation and heuristics: insights from the water jug experiment

The Gestalt school also drew attention to the inconvenience of maintaining a strong dependence on the past when solving a problem, a phenomenon they called *fixation* (Minervino, 2005). This hypothesis seemed to be confirmed by the *water jug* (or *water jar*) *experiment*, conducted by the American second-generation Gestalt psychologist Abraham Luchins [1914–2005]. The experiment focuses on a specific type of fixation, known as *functional fixation*. In it, participants are presented with a series of problems that involve measuring a specific amount of water using three containers of different capacities. Initially, participants learn a specific pattern for solving the problems. Subsequently, when presented with new problems that can be solved more simply, participants tend to continue using the initially learned pattern, demonstrating a fixation on the previous method (Luchins, 1942).

Although some argue that the water jug experiment is not representative of everyday situations (Weisberg, 1986), which calls its generalizability into question, it did encourage further exploration of the role of expertise in problem-solving and its relationship with resolution modes such as heuristics and algorithms (generally, a *heuristic* is understood to be an operation that may or may not achieve the transition from point A to point B, whereas an *algorithm* is an operation that does guarantee such a transition). On the other hand, a specific heuristic that has been useful in solving one type of problem may not be useful for another type, even if both cases share essential characteristics, as demonstrated in the water jug experiment.

### 2.10. The nature of creative individuals: unique traits versus common attributes

Another important aspect in the development of the concept of creativity as an individual capacity is the debate between how unique and special versus how disciplined and generic a highly creative individual is. In this regard, the American cognitive psychologist David Perkins [1928-] proposes the *nothing special approach* (Perkins, 1981; see also Beltrán, 2005). This perspective, shared by authors such as Margaret Boden and the American cognitive psychologist Howard Gardner [1943-], author of one of the theories of multiple intelligences, suggests that creative work is not fundamentally different from ordinary cognitive processes but is essentially an extension of them. This viewpoint also has practical implications for creativity pedagogy, as it supports the implementation of specific teaching techniques to enhance creativity from an early age (see Colangelo & Davis, 2002). Interestingly, the nothing special approach can be taken to an extreme, suggesting that under the right conditions, individuals could potentially achieve the accomplishments of prominent figures like Darwin, Beethoven, or Verne (see Romo, 1997).

Nevertheless, adopting the nothing special approach does not imply denying that exceptionally creative individuals often share certain personality traits. While these traits do not necessarily make them "unique and great," they can form a combination of factors that facilitate the development of creativity. Such personality traits include boldness, risk-taking ability, tolerance for frustration and uncertainty, motivation to excel, and a healthy degree of self-confidence (Contini, 2001; Lebuda, 2024; Selby et al., 2005).

In contrast, the Hungarian American psychologist Mihaly Csikszentmihalyi [1934–2021] describes the complexity of the creative personality as a tendency to exhibit characteristics that do not typically coexist, such as insight and naivety, or energy and calmness (Csikszentmihalyi, 2014). This blend of traits enables exceptionally creative individuals to adapt to various contexts and leverage situations that might pose conflicts for others. Additionally, a

fundamental personality trait of the creative individual would be the capacity for self-promotion. This trait allows a person to publicize their work within their field, which includes other socially recognized creative individuals who will ultimately assess the work and decide whether to endorse this new member of the community (Gardner, 1994).

The concept of self-promotion aligns with the *investment theory of creativity*, developed by the American psychologist and psychometrician Robert Sternberg [1949-]. According to this theory, a creative individual "buys low and sells high" in the world of ideas. That is, they identify unpopular and undervalued ideas and opportunities, work on them by revealing their value and usefulness to society, and finally use their practical intelligence to position the product or idea in the market (Sternberg & Lubart, 1995).

However, the idea of a specific type of creative personality is not universally accepted. For example, Robert Weisberg (mentioned previously) argues that the personality characteristics of exceptionally creative individuals vary depending on the field in which they work and even the stage of their career. He notes that great artists have produced both high- and low-quality works while exhibiting the same personality traits, suggesting that there is no single creative personality. Consequently, while certain personality traits may facilitate creative production, they are neither defining nor necessary conditions for the creation of high-level creative work (Weisberg, 1986).

## 2.11. Creativity and the brain

Another angle in the study of creativity, heavily influenced by an individualistic perspective, focuses on the neuroanatomical, neurophysiological, and neuropsychological foundations of the creative process. In this context, neuroscience aims to characterize and predict creative thinking by evaluating functional and structural brain parameters. For instance, changes in cortical volume and thickness, as well as alterations in electrical or metabolic activity, are commonly assessed to estimate creative capacity (Ross et al., 2023). Specifically, creative potential has been linked to increased gray matter volume in the prefrontal gyrus and the precuneus, the latter being involved in introspection and the retrieval of information from episodic memory (Chamberlain et al., 2014). Furthermore, variations in the volume and thickness of the right precuneus are reliable predictors of verbal creativity (Chen et al., 2015), while changes in the cerebellum are linked to enhanced artistic creativity (Adamaszek et al., 2022).

It has also been found that highly creative individuals exhibit increased activation in the right hemisphere and greater synchronization of alpha waves across different brain regions. Additionally, structural changes have been observed, such as alterations in the white matter of the lower frontal regions and increased gray matter in the dorsolateral prefrontal cortex and the striatum (Abraham, 2013). Moreover, creative cognition has recently been associated with dopamine release in ventral brain regions (Liu et al., 2024).

From a neurocognitive perspective, creativity is regarded as a relatively stable ability throughout life and an inherent aspect of cognitive functioning. Cognitive flexibility, along with episodic and semantic memory, is often regarded as the substrate for creative thinking. However, while several authors have emphasized the role of episodic memory in creative processes, data from the meta-analysis conducted by Gerver et al. (2023) challenge this notion. Their findings indicate a much stronger correlation between semantic memory and creative cognition.

From a functional perspective, creativity involves a strong interplay between three neural networks: the *default mode network*, the *executive control network*, and the *salience network* (Beaty, 2020; Beaty et al., 2016). The default mode network, a communication network active during rest, enables flexible attention and the retrieval of information (Chen et al., 2015). The executive control network supports judgment and decision-making processes based on inputs from the salience network, which, in turn, is involved in switching between the default and control networks. In this scenario, creativity is thought to be facilitated during the resting state, when the brain's electrical activity fluctuates spontaneously and slowly across the cerebral cortex. Although the precise role of these fluctuations in cognitive processes remains unclear (Malach, 2024), it has been suggested that oscillations in the right temporal lobe promote the generation of unconventional ideas by inhibiting obvious semantic associations (Luft et al., 2018).

Finally, a widely held notion links the right hemisphere to creativity. Supporting this idea, Aberg et al. (2017) provided empirical evidence showing that the right hemisphere facilitates cognitive flexibility and the association of remote ideas through an asymmetrical dopamine flow involving communication between the striatum and temporal, parietal, and frontal cortical areas. Cognitive flexibility, in turn, is seen as a function of the prefrontal cortex that plays a significant and distinct role in creative processes. Specifically, rostral regions of the lateral prefrontal cortex are implicated in the creative combination of ideas, whereas lateral regions are involved in generating ideas freely and in novel ways (Gonen et al., 2013).

## 2.12. Creativity versus intelligence: beyond high IQ

To conclude this section, we will briefly address the relationship between creativity and intelligence from an individual perspective. In this regard, it has been proposed that an IQ above 130 does not necessarily guarantee the creation of highly creative works. This is because individuals with such high levels of intelligence are often characterized by

convergent and practical thinking, which helps them execute tasks as efficiently as possible, avoiding "unnecessary paths" (Contini, 2001; Sternberg & O'Hara, 1998; see the distinction between convergent and divergent thinking discussed above).

Based on a review of the existing literature, Dutch psychologist Franz Mönks [1932–2020] argues that while most highly creative individuals tend to be highly intelligent, the reverse is not necessarily true: not all highly intelligent people are exceptionally creative (Mönks et al., 1997). Additionally, Mönks' *model of triadic interdependence* suggests that talent, creativity, and even motivation and personal abilities are influenced by cultural and social contexts. Such an idea serves us precisely as a bridge between the individual conception of creativity and theories that give special relevance to the environment and the collective dimension as fundamental elements in achieving useful, novel, and relevant ideas or artifacts.

## 3. The Creative Individual in Context: Relationships and Influences

The individualistic conception of creativity prevailed until around the 1980s, when new systemic and distributed conceptions emerged (Glăveanu & Kaufman, 2019). These contextual approaches drew on social psychology and sociology to study the creative outputs generated by large and complex groups. Nonetheless, since the 1950s, some psychologists had considered the influence of the environment on creativity, though subordinated to the individual. One example is J. P. Guilford (mentioned earlier), who, in his 1950 inaugural address as president of the APA, called for the formal study of creativity (Guilford, 1950).

### 3.1. Evolving frameworks of creativity: from 4P to 8P

One of the many results of Guilford's appeal was the seminal work by the American educational psychologist Melvin Rhodes [1916–1976], entitled *An Analysis of Creativity* (Rhodes, 1961). In this paper, in addition to emphasizing that creative processes can be fostered during childhood, Rhodes presents the *4P framework of creativity*, which covers: *Person*, referring to the individual characteristics of creative people, such as personality traits, domain-specific skills, intrinsic motivation, and intelligence; *Process*, referring to the mental development of the creative process, covering aspects such as creative thinking techniques, redefinition of variables, and problem-solving methods; *Press/Place*, referring to the environment and contextual influences that can facilitate or inhibit creativity, such as the work environment, social expectations, and cultural norms (for the difference between the terms *Press* and *Place*, and their use, see Runco, 2007); and *Products*, referring to the outcomes of creativity and how they come to be considered original, useful, and valuable.

Although the 4P framework was a pioneering approach to organizing the study of creativity, it presents significant limitations. For instance, by separating the Person and Press/Place dimensions the model fails to capture the reciprocal dynamics between individuals and their cultural and social environments. This critique has been raised by scholars such as Glăveanu (2013), who emphasize that creativity emerges from interactions between creators and their contexts. Furthermore, the Press/Place dimension is somehow ambiguous, as it encompasses both positive and negative factors without providing an in-depth analysis of how these influence the creative process or their relative weight across different stages of creation (Runco, 2007). Another criticism is the model's focus on a linear conception of the creative process and tangible products, as Sternberg and Karami (2022) note. This excludes more emergent and iterative forms of creativity, such as those involving unfinished or collectively redefined processes.

A hierarchical reorganization of the 4P framework of creativity is known as the *6P framework of creativity* (Runco, 2007; Simonton, 1990). In addition to the original four Ps (Person, Process, Press/Place and Products), the new model includes *Persuasion* and *Potential*. Persuasion refers to the ability to convince others of the validity and usefulness of the creative product (compare to the concept of self-promotion capacity and to the investment theory of creativity, discussed earlier), while Potential refers to the latent capacities of individuals or groups to generate creative actions (a concept similar to the psychological concept of talent; see the *myth of genius*, discussed below).

However, while the 6P framework succeeds in addressing some limitations of the 4P model by incorporating dimensions that acknowledge the social and prospective nature of creativity, it does not fully resolve the challenges of integrating individual and contextual factors into a cohesive analysis. For instance, its emphasis on elements such as Persuasion risks perpetuating a bias toward publicly recognized forms of creativity, potentially marginalizing less visible but equally valuable expressions, such as individual or emergent creativity. Additionally, while the inclusion of the Potential dimension is valuable for considering the latent capacities of individuals or groups, it risks becoming overly vague without clear criteria for measurement.

Since their introduction, the 4P and 6P frameworks have been essential in explaining the phenomenon of creativity. However, different theoretical models for the creative process have been proposed since then, including the *5A framework of creativity* (Glăveanu, 2013). This framework differentiates between *Actor*, *Action*, *Artifact*, *Audience*, and *Affordances*, recognizing respectively the roles in the creative process of the individual or group that creates, the

creative actions along with their corresponding cognitive processes, the result of the creative process, the audience that reacts by adopting, adapting, or rejecting the product, and the opportunities for creative action available in the social and cultural context in which the creation is conceived and carried out. In this way, it is understood that although creative capacity has an important individual cognitive and behavioral component, it is also influenced by social relationships, environments and cultural norms, and various other aspects such as institutional support, access to resources, and technological advances.

From a critical perspective, while this model is notable for its sociocultural approach, this same emphasis may also be its greatest limitation. By prioritizing the dynamics between the Actor, the Audience, and the Affordances, the model tends to underestimate the role of internal and individual processes in creativity, such as intrinsic motivation or internal conflict, which have been discussed in this paper. For instance, its focus on the Audience as an evaluator of creative products introduces a bias toward social and cultural acceptance, relegating to the background the subjective and transformative value that the creative process can have for the creator. Furthermore, although the inclusion of Affordances represents a step forward in conceptualizing context, the concept does not sufficiently account for structural factors such as unequal access to resources or cultural capital and their impact on creativity.

The *7C framework of creativity* (Lubart, 2017), in turn, differentiates between *Creators*, *Creating*, *Contexts*, *Creations*, *Collaborations*, *Consumption*, and *Curricula*. This approach encompasses, in addition to the creators, the creative action, the context, and the product recognized in the 5A framework, the collaboration between people or groups during the creative action (Collaborations), the process of acceptance and adoption of creative ideas (Consumption), and the processes of formal teaching and promotion of creativity (Curricula).

Although the 7C framework represents an advancement in addressing the complexity of the creative process in contemporary contexts, it has certain limitations. For instance, while the inclusion of Collaborations highlights the importance of collective work in creativity, it may reduce the importance of individual autonomy in contexts where creativity unfolds in a more introspective or solitary manner. Similarly, the Consumption dimension introduces a utilitarian perspective that may constrain the intrinsic value of creative ideas that do not necessarily seek mass acceptance. Meanwhile, the Curricula dimension, though innovative, lacks sufficient detail on how to implement pedagogical strategies that foster creativity at both the individual and collective levels, leaving open the question of how to balance these dimensions within educational contexts.

Finally, the *8P framework for understanding creativity* encompass *Purpose*, *Press*, *Person*, *Problem*, *Process*, *Product*, *Propulsion*, and *Public* (Sternberg & Karami, 2022). This model integrates several elements from previous frameworks, adding new dimensions such as the purpose of creativity, which distinguishes between the positive, negative, and mixed consequences of creative acts (Purpose), the type of problem addressed by creative thinking and its relationship with convergent and divergent thinking (Problem), and the impact of a creative idea or product on a field of knowledge, a way of thinking, or a category of products (Propulsion).

It should be noted that the negative consequences of creativity, often termed *negative creativity*, are less frequently discussed than traditional forms of creativity (Kapoor, 2024). Negative creativity refers to the application of creative thinking to produce ideas, products, or solutions that have harmful or destructive effects. Examples include destructive technology, psychological manipulation techniques, and financial fraud. Unfortunately, the proliferation of advanced, user-friendly digital tools, coupled with the anonymity of online interactions and social and economic factors such as inequality and unemployment, has contributed to the rapid spread of this negative form of creativity (for a general discussion on this matter, see Sternberg & Karami, 2024).

On the other hand, by expanding upon earlier frameworks, the 8P framework introduce greater complexity into the study of creativity. This, in turn, may present challenges for both its theoretical and practical application. For instance, while the purpose of a creative act is undeniably important, distinguishing between positive, negative, or mixed consequences introduces a subjective component that is difficult to measure consistently. Another limitation of the 8P framework is its reliance on the social validation of creative products, which may bias the analysis toward publicly recognized outcomes, potentially overlooking less visible yet equally significant forms of creativity.

In sum, while these different frameworks of creativity represent significant advances in conceptualizing the phenomenon by addressing individual, social, and contextual aspects, they also share critical limitations regarding their scope, particularly their tendency to favor socially recognized forms of creativity. Additionally, larger models, such as the 8P and 7C, risk fragmenting the analysis by incorporating multiple dimensions that, while enriching, may complicate practical application due to a lack of clarity regarding their interactions.

### 3.2. Creativity and motivation: balancing internal and external drivers

Regarding the role of motivation in the creative process, it is important to consider whether intrinsic (individual) motivation alone is sufficient for generating novel and useful work or if external motivation is also necessary. In this

context, the American chemist and organizational psychologist Teresa Amabile [1950-] proposes the *componential theory of creativity*, which identifies three fundamental components: *domain-relevant skills* (factual and technical knowledge and specific talents), *creativity-relevant processes* (cognitive and personality traits that foster creativity), and *intrinsic task motivation* (personal interests, goals, and passions that can influence the other two components when they are lacking) (Amabile, 1983; Romo, 1997). According to this model, intrinsic motivation can influence the difference between what we are capable of doing (potential capacity) and what we actually achieve in a given situation (actual capacity) (The potential/actual distinction with respect to a mental function has also been developed in the field of sociocultural studies of intelligence under the name of *zone of proximal development* [Vygotsky, 1934/2012]).

Providing a broader context for extrinsic motivation, Csikszentmihalyi (2014) introduces the concept of *flow experiences*—moments when a creative individual feels a profound sense of fulfillment and well-being, which can enhance and sustain the creative process. However, intrinsic motivation alone may not always suffice to initiate and maintain the creative process. This is because flow experiences, while beneficial, are not guaranteed to accompany the individual continuously. Additionally, various obstacles, such as boredom induced by the activity itself, may hinder or directly impede the process. In such cases, extrinsic motivation becomes crucial for continuing the work.

External rewards, whether financial, material, social, symbolic, or even in the form of negative reinforcement (such as alleviating an obligation or nuisance), can provide the necessary motivational boost to help the creator complete their work. These rewards can be particularly effective in overcoming periods when intrinsic motivation fades, disappears, or drives the individual away from completing the task.

### 3.3. The myth of genius and the role of social recognition on creativity

With respect to the existence of unique and brilliant creative personalities, the nothing special approach, discussed earlier, aligns broadly with the so-called *myth of genius*. This myth challenges the traditional view of exceptionally creative individuals as extraordinary beings endowed with innate, almost superhuman talents (Weisberg, 1986). According to this perspective, genius is more of a cultural construct than a scientific reality. Success and recognition as creative are seen as outcomes of various factors, including the cultural characteristics of the environment, contextual influences, practice, and collaboration within social networks, rather than solely the result of exceptional innate abilities.

Similarly, the concept of "genius" often involves social recognition, which may not always occur during the lifetime of the creative individual. In this context, Csikszentmihalyi (2014) argues that for a new and valuable idea, action, or product to cause cultural change (which is a fundamental goal of creativity) there must be a specific interaction between the *field* (experts, critics, evaluators, and other influential individuals who have the authority to judge and validate new ideas and products within a particular domain), the *domain* (the body of knowledge and practices constituting a specific area of expertise), and the *individual*.

From this perspective, creativity is often recognized when a field composed of experts acknowledges it as such. However, if the field later changes its evaluation or recognizes what it previously overlooked, an individual once considered creative by society may become seen as ordinary. Moreover, in such scenarios, creative ideas might fade away if there is no receptive audience to recognize and implement them. Therefore, without the assessment of competent outsiders, it is difficult to reliably determine the validity of claims made by individuals who assert their creativity (this subject is discussed in more detail in a later section on creative inconclusiveness).

Building on Csikszentmihalyi's postulates, H. Gardner (1994) introduces the concept of *fecund asynchronies*. This concept refers to situations that create discrepancies or mismatches between the individual, field, and domain, thereby fostering creativity (compare with Barron's proposal on conflicting internal impulses discussed earlier). For instance, discrepancies between an individual's economic status or cultural level and the normative expectations of their environment can generate additional motivation to excel or to challenge the norms of the field. In contrast, *pure asynchrony* describes situations where the three nodes (individual, field, and domain) are almost perfectly aligned, which does not necessarily promote or facilitate creativity.

At this point, the concepts of *P-Creativity* and *H-Creativity* (Boden, 2004) may further illuminate the role of the field and the domain in determining the degree of creativity of a work. *Psychological creativity* (P-Creativity) refers to the sense of creativity experienced by the individual, involving novel and useful ideas from the perspective of the person's own mind. However, these ideas may not necessarily be recognized as creative within a broader context. In this case, the degree of creativity is subjective and based on personal experience, while the domain may be understood as the specific knowledge that the individual uses to evaluate their own novel contributions. *Historical creativity* (H-Creativity), on the other hand, pertains to ideas that are fundamentally novel within the broader cultural and historical context in which the creative individual operates. Here, it is the role of the actual field to assess the creative contribution against the existing body of knowledge within the current domain.

Nevertheless, P-Creativity and H-Creativity are not necessarily distinct processes, as they can interact and mutually influence each other in various contexts. For example, an idea initially considered P-Creativity might eventually be recognized as H-Creativity as the cultural context evolves and embraces new perspectives. Similarly, feedback from the field to the creator not only helps validate individual ideas but can also influence their development. Constructive criticism and mentoring, for instance, can assist individuals in refining their ideas and achieving higher levels of creativity. Furthermore, collective creativity, which emerges from the interaction among multiple individuals, can produce ideas that none of them could have conceived independently.

### 3.4. Social networks and creativity: the power of connections

In addition to social recognition, the network of relationships and connections in which individuals live also influence creativity. For example, within organizations, creativity can be understood as the result of an interaction effect between the opportunities and limits of social networks and the personal values of individuals (Zhou et al., 2009). According to Zhou et al., weak ties create greater opportunities for creativity, especially among individuals with low values of conformity, while strong ties and the density of networks act as constraints to creativity, although the relationship between them and the former does not always seem to be the same. It is possible then that an internal network is sufficient for daily creativity, while more advanced creativity could benefit from networks internal and external to a given organization.

Another important aspect to consider, as we have already mentioned, is that the creative process does not occur in isolation. On the contrary, from a social perspective, the dispositions and talents of individuals are mobilized and oriented within a context of intersecting relationships (Cattani et al., 2013). In this way, creativity is influenced by the position that individuals occupy in the network and the strength of their social ties. According to Perry and Shalley (2003), and in line with Zhou et al. (2009), weak social ties foster creativity more effectively than strong ones, while the external connections of individuals in peripheral positions within their networks facilitate creative breakthroughs. However, over time, a particularly creative individual can end up occupying such a central and fixed place in their network that it generates significant limitations to develop their creativity.

In the educational field, a classroom can be understood as a social network that encourages both learning and creativity (Pulgar, 2021). In this scenario, the role that students assume within the social system in which their education takes place directly influences the manifestation and development of their creative capacity. For example, in classrooms where dialogue, collaboration and the exchange of ideas are promoted, students feel motivated to share their perspectives and take risks in the generation of new proposals. This environment, which values active participation and respect for the diversity of opinions, reinforces individual trust and facilitates the construction of knowledge together.

In addition, the social position that each student occupies, whether through their interaction with peers, their relationship with their teachers or belonging to certain interest groups, can determine the degree of support and encouragement they receive to explore novel ideas. In this sense, a well-configured classroom acts not only as a space for the transmission of knowledge, but also as a dynamic laboratory where creative skills are experimented with and strengthened.

Finally, culturally diverse social networks seem to favor creative processes (Chua, 2015). From this perspective, interaction in contexts that bring together a wide range of experiences and traditions allows the circulation of ideas that move away from one's own sphere, which enriches the ability to innovate. This diversity of points of view facilitates the clash of perspectives, promoting the emergence of unprecedented solutions by combining traditional knowledge with modern approaches. In addition, contact with different cultures encourages the adaptation and reinterpretation of concepts, which can trigger creative thinking processes. Therefore, environments in which various social and cultural networks converge not only expand the collection of references, but also generate a climate of openness and experimentation, key to the development of disruptive ideas.

### 3.5. The role of cultural contexts in shaping creativity

While interest in the social and contextual factors associated with the creative process grew during the 1980s, attention to cultural factors and their relationship with creativity also increased (Rudowicz, 2003). This shift reflected a broader recognition that creativity is not merely an individual cognitive process but is deeply embedded in social and cultural contexts. However, for scholars such as Yong et al. (2020), research on the "moderating" effect of culture on creativity has predominantly focused on isolated cultural dimensions, such as individualism versus collectivism. While these dimensions provide valuable insights, they often fail to capture the complexity and interplay of cultural factors that shape creative expression.

In this regard, it is essential to consider the multidimensional nature of culture to fully understand its moderating effects on creativity. For instance, based on studies across several countries, Yong et al. (2020) propose the *theory of cultural bundles*. These bundles consist of

multiple specific cultural dimensions—values and the ways to secure these values—which moderate the relationship between culture and creativity. For example, a cultural bundle might include dimensions such as individualism, power distance, masculinity, and uncertainty avoidance, which together influence how creativity is expressed, valued, and rewarded in each society.

Regarding the dichotomy between the individual and the group, and its relationship with the influence of culture on creativity, it has also been suggested that groups of people undergo stages similar to those experienced by individuals. Likewise, the characteristics associated with creative individuals can be reflected in group behavior (e.g., Borrup, 2010). For example, creative cities, businesses, and innovative environments share a variety of characteristics, including the drive for creative people to congregate in centers of cutting-edge activity. Thus, in today's business environment, it is common for startups and business incubators to create collaborative spaces that encourage the exchange of ideas and the emergence of disruptive solutions, evidencing a process analogous to the individual development of creativity. In these environments, the diversity of experiences and knowledge is integrated into the same flow that drives innovation, similar to how different stages of individual creativity intertwine to give rise to transformative projects.

Something similar happens in the cultural sector, especially in artistic collectives and communities of practice. In these groupings, the interaction between creators allows individual ideas to enhance each other, giving rise to works and proposals that transcend the talent of each member separately. The synergy of these groups reflects the idea that, as in the personal creative process, the convergence of diverse perspectives can generate unexpected and enriching results.

### 3.6. Creative inconclusiveness: collective dynamics and resignification in sociocultural contexts

As mentioned earlier, from a sociocultural perspective, creativity cannot be fully understood without considering the material and social context in which it occurs (Glăveanu, 2013). Creative potential arises from the interactions between individuals and their environment, with the exchange of perspectives playing a central role. Additionally, the genesis of original ideas is heavily influenced by cultural conditions, social norms, and material opportunities, which either enable or constrain them (Corazza & Glăveanu, 2020).

At this regard, from Corazza's (2016) perspective, creativity involves both originality and potential effectiveness, encompassing not only the outcome but also the inclusivity of the creative process. The process does not necessarily result in an original and effective product, but it includes the potential to do so. In this way, the potential for originality and effectiveness within a creative process may or may not emerge, and may or may not be recognized by the world. This assessment can vary across time, space, and cultural dimensions.

Furthermore, collectivity plays a key role in the resignification of the unfinished. According to the *theory of the universal process of creativity*, individual creative episodes are part of a dynamic continuum that transcends the agents and their immediate contexts (Corazza, 2019). Thus, what is initially perceived as unfinished can acquire new meaning or functionality in the hands of others, thanks to the phenomenon of *exaptation* (a technical term, roughly translatable as *repurposing*). This process, rooted in evolutionary biological factors, explains how creative products can be reinterpreted or reused in contexts different from their original ones, thereby expanding their impact and relevance (Andriani & Cattani, 2016; note the contrast between this idea and the concept of functional fixation mentioned earlier).

On the other hand, in educational and social settings, inconclusive creativity challenges traditional criteria for evaluation and success. Incorporating this concept into educational programs can foster resilience, adaptability, and a broader view of creative contributions, valuing not only the end results but also the latent processes and potentials. This shift in perspective emphasizes the importance of promoting environments that encourage exploration and collaboration, recognizing that the meaning of a creative idea is collectively negotiated and defined within the context in which it operates (Corazza et al., 2022).

### 3.7. Synergies in creativity: from human collectives to artificial intelligence collaboration

As we have discussed up to this point, several authors argue that creativity is both an individual and a social phenomenon, with its characteristics depending on whether individual or collective dynamics prevail in a given context or social situation (in this respect, see also Bhawuk [2003] and Walton [2016]). In particular, Glăveanu (2020) proposes that creativity should be understood not merely as an individual process but as a phenomenon deeply shaped by social dynamics, including interaction, exchange, and the collaborative construction of meaning. From this sociocultural perspective, creativity is redefined as a collaborative process in which individual agency is enhanced through integration into communities and social contexts.

In such a scenario, the fundamental role of co-creation emerges as a key driver for creative development in both social and technological spheres. This shift not only underscores the social interaction intrinsic to creative processes but also incorporates advanced technologies, such as

artificial intelligence (AI), which introduce new possibilities, including the expansion of creativity into hybrid dimensions where individual capacities are enhanced through technological advances. For example, the *Co-Cre-AI-tion process*, proposed by Vinchon et al. (2023), represents a form of collaboration in which humans and machines work together, marking a definitive shift toward collective approaches that embrace diversity and complexity (further discussion of AI creativity can be found in the following sections).

Similarly, the *creative ethos model* proposed by Kaufman and Glăveanu (2023) reinforces this shift toward the collective, recognizing that creativity is not an isolated process but a multilateral phenomenon that integrates diverse perspectives and ethical values. This model brings together principles, values, and practices that frame creativity as a collective and ethical phenomenon situated within social contexts. From this perspective, co-creation not only fosters innovation but also raises ethical and social considerations in the generation of ideas.

Building on this perspective, Sawyer (2019) explores the nature of group creativity, arguing that it emerges from the dynamic interaction between group members rather than from isolated individual contributions. This process, known as *emergent collaboration*, emphasizes that the most innovative ideas result from synergy, the continuous exchange of information, and joint improvisation, rather than from planned design. According to Sawyer, successful creative groups cultivate communicative fluency, enabling individual contributions to be transformed into collective ideas, thereby achieving a balance between structure and spontaneity.

### 3.8. Rethinking creativity: how AI challenges and expands human imagination

Examining the relationship between creativity and artificial intelligence (AI), we encounter the concept of *computational creativity*—a growing field that aims to develop systems capable of generating artifacts and ideas that observers might deem creative. Defined as "the philosophy, science, and engineering of computational systems which, by taking on particular responsibilities, exhibit behaviours that unbiased observers would deem to be creative" (Colton & Wiggins, 2012, p. 21), this field challenges traditional notions of creativity by demonstrating that machines can produce works of art, music, poetry, and even architectural designs (see Magni et al., 2024 for a critical perspective).

One of the earliest predecessors of computational creativity can be found in the AI program *Racter*, which composed *The Policeman's Beard Is Half Constructed: Computer Prose and Poetry* in 1984. An excerpt from Racter's work reads: "At all events my own essays and dissertations about love / and its endless pain and perpetual pleasure will be / known and understood by all of you who read this and / talk or sing or chant about it to your worried friends or nervous enemies" (Racter, 1984; without page numbering or punctuation in the original).

Nowadays, computational creativity not only mimics human creative processes but also expands the boundaries of what creativity means. Projects like *The Painting Fool*, an AI system that produces visual artwork using algorithms combining pre-programmed rules and random elements, demonstrate how machines can make complex esthetic decisions, challenging human expectations (Colton & Wiggins, 2012). In this way, by generating artifacts across diverse domains such as music, painting, poetry, and architectural design, computational creativity invites us to rethink the very nature of creativity itself.

Moreover, beyond challenging the concept of individual creativity, AI is increasingly shaping the dynamics of collective creative processes. For instance, AI-driven systems like *SocialMuse* are redefining group creativity by optimizing the flow of inspiration within self-organizing networks (Baten et al., 2024). These tools connect individuals while leveraging semantic and network-structural features to maximize ideation performance. By promoting decentralization and reducing redundancy, such systems also broaden the diversity of inspiration sources, allowing unique ideas to gain visibility and promoting a more dynamic exchange of perspectives.

In addition, AI's role in group creativity extends beyond content generation to mediating the flow of information within creative networks, functioning as both filters and gatekeepers that determining which sources of inspiration are accessible and how creative work is evaluated (Atkinson & Barker, 2023). While this mediation can reorganize collaboration and introduce novel combinations of ideas, it also carries risks, such as reinforcing technological biases or narrowing the diversity of creative influences.

The integration of AI into creative processes also emphasizes the importance of balancing human ingenuity with algorithmic automation. At this regard, as Suchacka et al. (2021) argue, while AI can expand creative possibilities and facilitate interdisciplinary collaboration, excessive reliance on algorithms risks diminishing the role of human intuition, critical thinking, and serendipity—key drivers of creative breakthroughs, as discussed in this paper. Ethical considerations, such as transparency, authorship, and the implications of human-machine collaboration, further complicate the landscape.

In addition, traditional criteria for assessing human creativity may not suffice when applied to machine-generated works, as the processes and motivations behind them differ significantly, raising fundamental questions about how creativity should be evaluated. This has led to the development of frameworks like the *FACE model*, which

evaluates computational creative acts based on their ability to generate, evaluate, and frame concepts (Colton et al., 2011). Such models highlight the need for a paradigm shift in how we define and measure creativity in the age of AI.

### 3.9. Distributed creativity in the digital age

In addition to the challenging influence of AI on our understanding of creativity, the digital era has undoubtedly influenced, both qualitatively and quantitatively, the emergence of diverse types of creative outcomes. For example, the internet is rapidly becoming a space in which the concept of the single author is gradually losing its validity. As communication processes accelerate due to the density of the network and the speed at which information circulates, the boundaries between creators and consumers are becoming increasingly blurred. This shift has given rise to a distributed collective creator (Heibach, 2000).

Moreover, the characteristics of the functioning of the internet have had a significant impact on the phenomenon of creativity, to the point of seeming to be redefining it (Literat & Glavineau, 2016). Thus, immediacy in communication, global interconnection and almost unlimited access to information and resources have transformed both the processes of generating and disseminating ideas, enhancing collaboration between individuals from different cultures and disciplines, and allowing creativity to manifest itself in more dynamic and horizontal ways. The decentralized and adaptable nature of online platforms has fostered experimentation and innovation, providing spaces where ideas can evolve and combine in continuous cycles of learning and reinvention. All this challenges and expands traditional models of creativity, and implies a redefinition of the concept in which creativity is moved from an individual and linear act to creativity as a collaborative, interactive and constantly transforming phenomenon.

In particular, children and young people born during the digital age have unique opportunities to develop creativity and innovation (Maksić, 2016). From a very early age, access to devices and a wide variety of online resources allows them to interact with multiple sources of information and experiment with various technological tools. This environment favors self-taught learning and the construction of knowledge in a collaborative way, promoting an open and adaptive mentality in the face of contemporary challenges. In addition, constant exposure to various formats and digital languages stimulates the imagination and fosters the ability to integrate ideas from different disciplines, which enriches the creative process. The possibility of participating in virtual communities and collaborative projects also facilitates the exchange of perspectives and co-creation, fundamental aspects for innovation in an increasingly interconnected world.

However, although digital media have transformed the way information is circulated and have expanded the possibilities for people to share their creations on equal terms, authors such as Hargittai and Walejko (2008) argue that dedication to creative activities continues to be unequally distributed according to social position. According to this perspective, participation in these creative processes is largely determined by economic factors, since access to digital technologies and platforms, required to fully exploit these tools, is not universal. Another crucial factor in this regard is the possession of technical skills: those with the necessary training can take better advantage of the opportunities offered by digital media, while those in less advantaged contexts may face barriers to developing and sharing their creations. This situation shows that, despite the democratizing potential of technology, gaps persist that reproduce structural inequalities in the creative field.

### 3.10. Non-human animal creativity and the collective nature of human creativity

As a final point in our discussion, we would like to explore some insights into the collective dimension of the creative process that can be drawn from the study of creative behaviors beyond the human species. Indeed, creativity in non-human animals—an increasingly prominent area of study—provides insights not only into the cognitive abilities of other species but also into the evolutionary origins and adaptive functions of human creativity (Kaufman & O'Hearn, 2017).

Research in this field suggests that creativity is not a uniquely human trait but rather a dynamic and adaptive process that can be observed across the animal kingdom. For instance, several studies have shown that non-human animals exhibit innovative behaviors that follow rules, limits, and models like those observed in humans (see Reader & Laland, 2003). But if such innovative behaviors often involve two or more individuals, could the creativity observed in non-human animals reflect a collective dimension that also underpins human creativity?

One compelling argument in this respect is that creativity serves as a powerful adaptive force within social contexts, enabling animals to solve novel problems and transmit these solutions to their groups (Gigliotti, 2022). At this regard, Gigliotti defines creativity as "a dynamic process in which novel and meaningful behaviors are generated by individuals with the possibility of affecting others at cultural, species, and evolutionary levels" (Gigliotti, 2022, p. 4). This perspective highlights the collective nature of creativity, as innovative behaviors developed by individuals can spread through social learning, ultimately benefiting the group as a whole. For example, certain bird species, such as New Caledonian crows, demonstrate remarkable

problem-solving skills, crafting tools to access food. These behaviors are not only innovative but are also learned and shared within the group, suggesting a collective dimension to their creativity (Hunt & Gray, 2003; see also Barón, 2016).

The idea of creativity as a collective and evolutionary process aligns with broader theoretical frameworks, such as Corazza's (2019) *dynamic universal creativity process*. Drawing on Whitehead's cosmological interpretation of creativity as a metaphysical universal principle, Corazza proposes that creativity is an active and pervasive force throughout general evolution. Within this framework, creativity can be understood as a continuum, with non-human animals and humans occupying different branches of the same evolutionary tree. As Corazza and Lubart (2020) assert, "given the prehistoric evolutionary stage of (…) hominids, it is natural to ask whether humans are the only beings that can be accredited with creative behavior: the answer is absolutely not" (p. 4). This perspective highlights the universality of creativity and its potential to manifest in diverse forms across species.

Moreover, creativity in non-human animals often serves as an adaptive mechanism, enabling individuals to respond to unforeseen challenges and environmental changes (Kaufman & Kaufman, 2015). In many cases, these creative solutions are not isolated acts but rather catalysts for broader behavioral shifts. When an innovative behavior proves beneficial, other members of the group may imitate and refine it, leading to a cumulative process of social learning. Over time, this exchange of adaptive behaviors can shape group dynamics and enhance problem-solving strategies within the group.

## 4. Conclusions

The study of creativity, particularly in psychology, spans over 120 years. Initially, the focus was on individual aspects of the creative process, such as cognitive, personality, motivational, and emotional factors, without any of them being established as more prominent. Over time, the study of creativity expanded to encompass broader factors such as context, relationships, and criticism. This shift emphasized the characteristics of the creative process itself, the specific conditions of the problem or matter at hand, and even meta-creative elements such as the pedagogy of creativity, while broadening the scope of creativity studies to include questions about the trainability of creative thinking, the influences of modern technologies such as the internet and artificial intelligence (AI) in the creative process, and even its exploration in non-human animal models.

However, despite the progress made in the study of creativity and the various explanatory frameworks currently available, determining whether creativity is ultimately an individual or collective process may be a futile endeavor—and in any case, it certainly exceeds the scope of this paper. Perhaps the question itself is poorly posed. Nevertheless, we offer a couple of key reflections on this matter based on the discussion developed thus far.

Regarding the need for a field to determine the degree of creativity in a work, as discussed in the section on creative inconclusiveness, consider the case of the Polish composer Frédéric Chopin, of whom several waltzes were lost or remained incomplete due to various reasons. In this case, the field cannot judge them and therefore it could be argued that it is not possible to determine their creativity. What happens, then, to artists who create a work and destroy it as soon as it is finished? For example, a painting, who could say whether or not it is creative if no one appreciated it? However, the artist did create it, and in the case of Chopin, it is very likely that the waltzes were a burst of creativity, as evidenced by his other compositions. In this respect, the potential for originality and effectiveness characterizing a creative endeavor may or may not be recognized by the world.

Additionally, what would happen if in a hundred years no one appreciates Chopin, and the experts of the time label him as uncreative? Was he never creative, or did he cease to be so? The creative assessment may also change across time, space, and cultural dimensions. In consequence, while it is reasonable to postulate that without the existence of a field there is no way to judge the degree of creativity of a given product, it is also reasonable to affirm that the first to judge an artifact or work as creative is the creator themselves. Of course, this evaluation takes place within a specific temporal and cultural framework that limits the available knowledge against which the novel contribution of the potentially creative result is contrasted.

At this point, we could even speak of a *non-existent field* to refer to cases where it is impossible to verify the degree of creativity of a work since it never reaches the public. Field-backed creativity can then be considered *social creativity*. However, such creativity cannot be considered the only type of creativity, as such a notion could imply the devaluation of individual contributions to the arts or scientific discovery, or simply ignore the *mini-c* and *little-c* that we discussed earlier, which would be extreme to configure itself as a comprehensive theory of creativity (see Romo, 1997).

On the other hand, it cannot be overlooked that in a non-existent field situation, the absence of explicit experts, critics, and others does not imply that the creative individual lacks a mental representation of the field, along with its knowledge and practices, internalized from the context: a potential *creative Superego*. This certainly influences the creation of the work or product. Even so, some authors insist that the creative process is something absolutely personal and intimate, at least in the field of art (see Romo, 1997). From this perspective, the creative artistic process occurs between alienation (*distancing*) and separation (*isolation*) from the creative individual, within the context of a search for individuality (Czernikowski, 1994).

To close this topic, consider the following reflection on music criticism by the Russian composer and theorist Igor Stravinsky [1882–1971]: "The listener reacts and becomes a partner in the game, initiated by the creator. Nothing less, nothing more. The fact that the partner is free to accept or to refuse participation in the game does not automatically invest him with the authority of a judge" (Stravinsky, 1947, p. 131).

Regarding the myth of genius, questions arise, such as: Could anyone have written something like Don Quixote? Probably not. In this regard, it is important to remember that figures like Miguel de Cervantes or Beethoven had unique individual characteristics, as well as specific environments. Their works were created within a world of meanings that, while shared and socially constructed, ultimately reflect personal and unique experiences. Anyone with enough tenacity and determination can undoubtedly produce a creative work, but it might not be fair to claim that just anyone could have written Don Quixote. This does not suggest that the creative individual is special or superior to others; rather, it implies that each creator is a unique person operating within a specific context. Their work reflects their distinctive style. Even if another artist attempts to replicate the characteristics of a work or even tries to copy it, the result will never be the same, as J. L. Borges illustrated in *Pierre Menard, Author of the Quixote*.

Continuing with our conclusions, let us turn to the ideas of Colombian philosopher Alfredo Trendall [1933–2015] on art theory, significantly influenced by J. Ortega y Gasset. Throughout history, humans have engaged with a world that both overwhelms and inspires them, finding expression through religion, magic, and art. In the realm of art, individuals encounter experiences that move them deeply and translate these into their own unique artistic language. While artistic creation is undeniably shaped by technical, historical, personal, and cultural factors, it transcends these elements, ultimately surpassing the very artist who created it (Trendall, 2004).

Following this line of thought, creativity and the mental processes that generate it transcend social and cultural contexts. A work can transmit its creative force to its audience and move them only if they have a sufficient affinity with it. Thus, even if a work is never seen by anyone, the act of channeling the creative force that has inspired humanity for centuries is still significant. This act is inherently different from one performed without any influence or inspiration. Thus, a product can be considered inherently creative to the extent that it generates additional creative activity, a concept known as *emergent creativity*, which is regarded by some authors as the highest possible level of creativity (see Romo, 1997). Unfortunately, this type of approach primarily belongs to the fields of philosophy and art criticism and lacks a sufficient foundation in psychology or other sciences. However, it is likely that future discoveries in the sciences will bring us closer to understanding the so-called creative force or inspiration.

Regarding more tangible considerations, we have highlighted in this paper that the possibility of generating computational creativity is an increasingly important topic, particularly in relation to the various forms of AI being developed and the modes of group collaboration they facilitate. At its core, computational creativity not only challenges our understanding of creativity but also expands its possibilities. By enabling computational systems to explore conceptual spaces beyond human capabilities, we open the door to innovations in art, science, and technology that could redefine the boundaries of what is considered possible.

Moreover, from a comparative perspective in cognitive sciences, programming a computer to produce creative outputs may reveal insights into how creative cognition functions in humans. This particular view encourages the development of the cognitive study of creative processes, which, as evidenced by this paper, is the psychological approach that has most extensively engaged with the subject of creativity in recent years.

However, although AI today creates works of art in painting and music, discovers scientific laws, and even publishes articles—each of which has found some measure of endorsement within its respective field (see Runco, 2023)—the field's endorsement alone does not imply that the underlying processes of creativity are the same in machines and humans. It could be argued, for example, that scientists and programmers equip machines with specific information and variables to develop a work or solve a problem, a process fundamentally different from human creativity (in connectionist AI, this manifests as setting up input layers and initial weights of connections between nodes of information). While this is true, it is also the case that humans come from educational systems and families and follow explicit and implicit models that provide us with variables we mix, consciously or unconsciously, in original and useful ways to generate creative products.

In addition, the origin of a creative work may influence the process of value judgment. For instance, when evaluating a product created by a human, judges may consider factors such as the author's age, "geniality," and emotional and mental stability. Conversely, when the product has been generated by a machine and this information is known to the evaluators, their judgment may be biased by considerations of effort.

Faced with the question of the authenticity of artificial creativity, it is evident that machines now produce a range of useful and novel products through mass analysis of human creations, significantly influencing scientific and artistic developments, among others. However, it seems that these new creative machines do not experience any form of satisfaction, joy, or surprise from their own creations, nor

are they moved by their works or those of others—elements that are crucial to the human esthetic experience. For this reason, we cannot fully agree with Boden (2004) when she states: "a science of creativity (…) does not threaten our self-respect by showing us to be mere machines, for some machines are much less 'mere' than others" (p. 24).

Future studies of creativity will undoubtedly explore the interactions between creativity and various individual factors such as emotions, learning, metacognition, and critical thinking, particularly within the framework of neuroscience. They will also examine how creativity interacts with group, social, and cultural processes, including cooperation, altruism, empathy, ethics, and, of course, extended cognition.

## Acknowledgments

We thank the two anonymous reviewers for their thoughtful comments and suggestions, which helped improve the quality and clarity of our paper.

## Author contributions

Leonardo Barón-Birchenall: Conceptualization, data curation, investigation, methodology, project administration, resources, supervision, validation, visualization, writing (original draft, review and editing). Andrea Sánchez-Vallejo: Conceptualization, data curation, investigation, writing (original draft, review and editing). Carlos Toro-Silva: Data curation, investigation, writing (original draft, review and editing). Andrea Folleco-Eraso: Data curation, investigation, writing (original draft, review and editing).

## Declaration of conflicting interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

## Ethical statement

### *Ethical approval*

This study is a literature review and does not involve new data collection or human subjects. All sources are properly credited, and we have aimed for accuracy and fairness in representing the ideas and findings of the reviewed works.

## ORCID iDs

Leonardo Barón-Birchenall https://orcid.org/0000-0002-4286-3424
Andrea Sánchez-Vallejo https://orcid.org/0000-0003-1921-8846
Carlos Toro-Silva https://orcid.org/0000-0002-2401-1404
Andrea Folleco-Eraso https://orcid.org/0000-0001-7118-7595

## References

Aberg, K., Doell, K., & Schwartz, S. (2017). The "creative right brain" revisited: Individual creativity and associative priming in the right hemisphere relate to hemispheric asymmetries in reward brain function. *Cerebral Cortex*, *27*(10), 4946–4959. https://doi.org/10.1093/cercor/bhw288

Abraham, A. (2013). The promises and perils of the neuroscience of creativity. *Frontiers in Human Neuroscience*, *7*(246), 1–9. https://doi.org/10.3389/fnhum.2013.00246

Adamaszek, M., Cattaneo, Z., Ciricugno, A., & Chatterjee, A. (2022). The cerebellum and beauty: The impact of the cerebellum in art experience and creativity. In M. Adamaszek, M. Manto, & D. Schutter (Eds.), *The emotional cerebellum. Advances in experimental medicine and biology* (pp. 213–233). Springer. https://doi.org/10.1007/978-3-030-99550-8_14

Adams, J. (2019). *Conceptual blockbusting: A guide to better ideas* (5th ed.). Basic Books. https://www.hachettebookgroup.com/titles/james-l-adams/conceptual-blockbusting/9781541674059/?lens=basic-books

Alencar, E., Bruno, M., & Fleith, D. (2021). *Theory and practice of creativity measurement*. Taylor & Francis. https://doi.org/10.4324/9781003238980

Amabile, T. (1983). The social psychology of creativity: A componential conceptualization. *Journal of Personality and Social Psychology*, *45*(2), 357–376. https://doi.org/10.1037//0022-3514.45.2.357

Andriani, P., & Cattani, G. (2016). Exaptation as source of creativity, innovation, and diversity: Introduction to the special section. *Industrial and Corporate Change*, *25*(1), 115–131. https://doi.org/10.1093/icc/dtv053

Atkinson, D., & Barker, D. (2023). AI and the social construction of creativity. *Convergence*, *29*(4), 1054–1069. https://doi.org/10.1177/13548565231187730

Barón, L. (2016). Animal communication and human language: An overview. *International Journal of Comparative Psychology*, *29*(1), 1–27. https://doi.org/10.46867/ijcp.2016.29.00.07

Baten, R., Bangash, A., Veera, K., Ghoshal, G., & Hoque, E. (2024). AI can enhance creativity in social networks. *arXiv: 2410.15264*. https://doi.org/10.48550/arXiv.2410.15264

Beaty, R. (2020). The creative brain. *Cerebrum: The Dana Forum on Brain Science*, *2020*(1), 1–7. https://pmc.ncbi.nlm.nih.gov/articles/PMC7075500/

Beaty, R., Benedek, M., Silvia, P., & Schacter, D. (2016). Creative cognition and brain network dynamics. *Trends in Cognitive Sciences*, *20*(2), 87–95. https://doi.org/10.1016/j.tics.2015.10.004

Beltrán, J. (2005). Entrevista con David Perkins (Harvard University). *Revista de Psicología y Educación*, *1*(1), 65–78. https://www.revistadepsicologiayeducacion.es/pdf/6.pdf

Bhawuk, D. (2003). Culture's influence on creativity: The case of Indian spirituality. *International Journal of Intercultural*

*Relations*, *27*(1), 1–22. https://doi.org/10.1016/s0147-1767(02)00059-7

Boden, M. (2004). *The creative mind: Myths and mechanisms* (2nd ed.). Routledge. https://doi.org/10.4324/9780203508527

Bollas, C. (2014). Creativity and psychoanalysis. In G. Fromm (Ed.), *A spirit that impels: Play, creativity, and psychoanalysis* (pp. 3–20). Routledge. https://doi.org/10.4324/9780429471506-2

Borrup, T. (2010). Shaping a creative milieu: Creativity, process, pedagogy, leadership, and place. *Journal of Urban Culture Research*, *1*(1), 40–57. https://doi.org/10.58837/chula.jucr.1.1.2

Cattani, G., Ferriani, S., & Colucci, M. (2013). *Creativity in social networks*. Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199603510.013.008

Chamberlain, R., McManus, I., Brunswick, N., Rankin, Q., Riley, H., & Kanai, R. (2014). Drawing on the right side of the brain: A voxel-based morphometry analysis of observational drawing. *NeuroImage*, *96*(7), 167–173. https://doi.org/10.1016/j.neuroimage.2014.03.062

Chen, Q., Xu, T., Yang, W., Li, Y., Sun, J., Wang, K., Beaty, R., Zhang, Q., Zuo, X., & Qiu, J. (2015). Individual differences in verbal creative thinking are reflected in the precuneus. *Neuropsychologia*, *75*(1), 441–449. https://doi.org/10.1016/j.neuropsychologia.2015.07.001

Chua, R. (2015). Innovating at cultural crossroads: How multicultural social networks promote idea flow and creativity. *Journal of Management*, *44*(3), 1119–1146. https://doi.org/10.1177/0149206315601183

Colangelo, N., & Davis, G. (2002). *Handbook on gifted education*. Allyn & Bacon. https://eric.ed.gov/?id=ED475670

Colton, S., Charnley, J., & Pease, A. (2011). Computational creativity theory: The FACE and IDEA descriptive models. In *Proceedings of the second international conference on computational creativity* (pp. 90–95). ICCC.

Colton, S., & Wiggins, G. (2012). Computational creativity: The final frontier? In *ECAI 2012* (pp. 21–26). IOS Press. https://doi.org/10.3233/978-1-61499-098-7-21

Contini, N. (2001). La creatividad como recurso de afrontamiento en la vida cotidiana. *Psicodebate: Psicología, Cultura y Sociedad*, *1*(1), 19–25. https://doi.org/10.18682/pd.v1i0.519

Corazza, G. (2016). Potential originality and effectiveness: The dynamic definition of creativity. *Creativity Research Journal*, *28*(3), 258–267. https://doi.org/10.1080/10400419.2016.1195627

Corazza, G. (2019). The dynamic universal creativity process. In R. Beghetto & G. Corazza (Eds.), *Dynamic perspectives on creativity new directions for theory, research, and practice in education* (pp. 297–320). Springer. https://doi.org/10.1007/978-3-319-99163-4_17

Corazza, G., Agnoli, S., & Mastria, S. (2022). The dynamic creativity framework. *European Psychologist*, *27*(3), 1–16. https://doi.org/10.1027/1016-9040/a000473

Corazza, G., & Glăveanu, V. (2020). Potential in creativity: Individual, social, material perspectives, and a dynamic integrative framework. *Creativity Research Journal*, *32*(1), 81–91. https://doi.org/10.1080/10400419.2020.1712161

Corazza, G., & Lubart, T. (2020). The Big bang of originality and effectiveness: A dynamic creativity framework and its application to scientific missions. *Frontiers in Psychology*, *11*(1), Article 575067. https://doi.org/10.3389/fpsyg.2020.575067

Csikszentmihalyi, M. (2014). *The systems model of creativity: The collected works of Mihaly Csikszentmihalyi*. Springer. https://link.springer.com/book/10.1007/978-94-017-9085-7

Czernikowski, E. (1994). Repetición y creación en el lenguaje psicoanalítico. *Psicoanálisis. Revista de la Asociación Psicoanalítica de Buenos Aires*, *16*(1), 49–57.

di Bella, D. (2005). *Pensamiento dimensional* [Conference presentation]. Universidad de Palermo.

Franklin, S. (2023). *The cult of creativity: A surprisingly recent history*. University of Chicago Press. https://doi.org/10.7208/chicago/9780226657998.001.0001

Gardner, H. (1994). *Creating minds: An anatomy of creativity seen through the lives of Freud, Einstein, Picasso, Stravinsky, Eliot, Graham, and Ghandi*. Basic Books. https://www.hachette.com.au/howard-gardner/creating-minds-an-anatomy-of-creativity-seen-through-the-lives-of-freud-einstein-picasso-stravinsky-eliot-graham-and-ghandi

Gerver, C., Griffin, J., Dennis, N., & Beaty, R. (2023). Memory and creativity: A meta-analytic examination of the relationship between memory systems and creative cognition. *Psychonomic Bulletin & Review*, *30*(6), 2116–2154. https://doi.org/10.3758/s13423-023-02303-4

Gigliotti, C. (2022). *The creative lives of animals*. New York University Press. https://nyupress.org/9781479815463/the-creative-lives-of-animals/

Glăveanu, V. (2013). Rewriting the language of creativity: The Five A's framework. *Review of General Psychology*, *17*(1), 69–81. https://doi.org/10.1037/a0029528

Glăveanu, V. (2020). A sociocultural theory of creativity: Bridging the social, the material, and the psychological. *Review of General Psychology*, *24*(4), 335–354. https://doi.org/10.1177/1089268020961763

Glăveanu, V., & Kaufman, J. (2019). Creativity. A historical perspective from the nature of creativity. In J. Kaufman & R. Sternberg (Eds.), *Cambridge handbook of creativity* (2nd ed., pp. 11–26). Cambridge University Press. https://doi.org/10.1017/9781316979839.003

Gonen, G., de Souza, L., Levy, R., Urbanski, M., Josse, G., & Volle, E. (2013). Rostral and caudal prefrontal contribution to creativity: A meta-analysis of functional imaging data. *Frontiers in Human Neuroscience*, *7*(465), 1–22. https://doi.org/10.3389/fnhum.2013.00465

Götz, I. (1981). On defining creativity. *The Journal of Aesthetics and Art Criticism*, *39*(3), 297–301.

Guilford, J. (1950). Creativity. *American Psychologist*, *5*(9), 444–454. https://doi.org/10.1037/h0063487

Hargittai, E., & Walejko, G. (2008). The participation divide: Content creation and sharing in the digital age. *Information, Communication & Society*, *11*(2), 239–256. https://doi.org/10.1080/13691180801946150

Heibach, C. (2000). The distributed author. Creativity in the age of computer networks. *Dichtung Digital. Journal für Kunst und Kultur digitaler Medien*, *13*(1), 1–9. https://doi.org/10.25969/mediarep/17384

Hendryx, J. (2024). Edward de Bono. In B. Geier (Ed.), *The Palgrave handbook of educational thinkers* (pp. 1279–1289). https://doi.org/10.1007/978-3-031-25134-4_134

Hunt, G., & Gray, R. (2003). Diversification and cumulative evolution in New Caledonian crow tool manufacture. *Proceedings. Biological sciences*, *270*(1517), 867–874. https://doi.org/10.1098/rspb.2002.2302

Jackson, M. (2015). *Creativity and psychotic states in exceptional people: The work of Murray Jackson*. Routledge. https://doi.org/10.4324/9781315726427

Kapoor, H. (2024). Measuring the dark side of creativity. In M. Runco & S. Acar (Eds.), *Handbook of creativity assessment* (pp. 99–112). Edward Elgar Publishing. https://doi.org/10.4337/9781839102158.00013

Kaufman, A., & Kaufman, J. (2015). *Animal creativity and innovation*. Elsevier. https://doi.org/10.1016/C2013-0-18605-9

Kaufman, A., & O'Hearn, W. (2017). Creativity in non-human animals. In J. Kaufman, V. Glăveanu, & J. Baer (Eds.), *The Cambridge handbook of creativity across domains* (pp. 492–506). https://doi.org/10.1017/9781316274385.027

Kaufman, J., & Beghetto, R. (2009). Beyond big and little. *Review of General Psychology*, *13*(1), 1–12. https://doi.org/10.1037/a0013688

Kaufman, J., & Glăveanu, V. (2023). The creativity ethos: A palette of benevolent processes and outcomes. *Possibility Studies & Society*, *1*(3), 342–360. https://doi.org/10.1177/27538699231178154

Koestler, A. (1964). *The act of creation*. Macmillan. https://archive.org/details/actofcreation0000arth

Kubina, R., Morrison, R., & Lee, D. (2006). Behavior analytic contributions to the study of creativity. *Journal of Creative Behavior*, *40*(4), 223–242. https://doi.org/10.1002/j.2162-6057.2006.tb01275.x

Lebuda, I. (2024). Broadening perspective on creative personality: Surface and core characteristics as predictors of creative achievements. *Creativity Research Journal*, *37*(2), 1–7. https://doi.org/10.1080/10400419.2023.2300198

Literat, I., & Glăveanu, V. (2016). Same but different? Distributed creativity in the internet age. *Creativity. Theories – Research - Applications*, *3*(2), 330–342. https://doi.org/10.1515/ctra-2016-0020

Liu, C., Zhuang, K., Zeitlen, D., Chen, Q., Wang, X., Feng, Q., Beaty, R., & Qiu, J. (2024). Neural, genetic, and cognitive signatures of creativity. *Communications Biology*, *7*(1324), 1–14. https://doi.org/10.1038/s42003-024-07007-6

López, R. (1995). *Desarrollos conceptuales y operacionales acerca de la creatividad*. Universidad Central de Santiago de Chile. https://isbn.cloud/9789567134120/desarrollos-conceptuales-y-operacionales-acerca-de-la-creatividad/

Lubart, T. (2017). The 7 C's of creativity. *Journal of Creative Behavior*, *51*(4), 293–296. https://doi.org/10.1002/jocb.190

Luchins, A. (1942). Mechanization in problem solving: The effect of Einstellung. *Psychological Monographs*, *54*(6), 1–95. https://doi.org/10.1037/h0093502

Luft, C., Zioga, I., Thompson, N., Banissy, M., & Bhattacharya, J. (2018). Right temporal alpha oscillations as a neural mechanism for inhibiting obvious associations. *Proceedings of the National Academy of Sciences of the United States of America*, *115*(52), E12144–E12152. https://doi.org/10.1073/pnas.1811465115

Magni, F., Park, J., & Chao, M. (2024). Humans as creativity gatekeepers: Are we biased against AI creativity? *Journal of Business and Psychology*, *39*(3), 643–656. https://doi.org/10.1007/s10869-023-09910-x

Maksić, S. (2016). Some questions about creativity in digital age. *Nastava i Vaspitanje*, *65*(1), 17–29. https://doi.org/10.5937/nasvas1601017m

Malach, R. (2024). The neuronal basis of human creativity. *Frontiers in Human Neuroscience*, *18*(1367922), 1–7. https://doi.org/10.3389/fnhum.2024.1367922

Minervino, R. (2005). Solucionar problemas. In F. Gabucio, J. Domingo, F. Lichtenstein, M. Limón, R. Minervino, M. Romo, & E. Tubau (Coords) (Eds.), *Psicología del Pensamiento* (pp. 149–189). Editorial UOC. https://www.editorialuoc.com/psicologia-del-pensamiento

Mönks, F., Ypenburg, I., & Blumen, S. (1997). *Nuestros niños son talentosos: Cómo reconocer y desarrollar sus talentos. Manual para padres y maestros*. Universidad Católica del Perú, Fondo Editorial. https://repositorio.pucp.edu.pe/index/handle/123456789/181879

Perkins, D. (1981). *The mind best work*. Harvard University Press. https://www.hup.harvard.edu/books/9780674576247

Perry, J., & Shalley, C. (2003). The social side of creativity: A static and dynamic social network perspective. *Academy of Management Review*, *28*(1), 89–106. https://doi.org/10.2307/30040691

Plucker, J., Meyer, M., & Liu, P. (2024). Divergent thinking: Early views. In M. Runco & S. Acar (Eds.), *Handbook of creativity assessment* (pp. 114–127). Edward Elgar Publishing. https://doi.org/10.4337/9781839102158.00015

Pulgar, J. (2021). Classroom creativity and students' social networks: Theoretical and practical implications. *Thinking Skills and Creativity*, *42*(1), Article 100942. https://doi.org/10.1016/j.tsc.2021.100942

Racter. (1984). *The Policeman's beard is half constructed. Computer prose and poetry*. Warner Books.

Reader, S., & Laland, K. (2003). *Animal innovation: An introduction*. Oxford University Press. https://doi.org/10.1093/acprof:oso/9780198526223.003.0001

Rhodes, M. (1961). An analysis of creativity. *Phi Delta Kappan*, *42*(7), 305–310. https://www.jstor.org/stable/20342603

Romo, M. (1997). *Psicología de la creatividad. Perspectivas contemporáneas*. Paidós. https://www.planetadelibros.com.co/libro-psicologia-de-la-creatividad/299982

Ross, S., Lachmann, T., Jaarsveld, S., Riedel, S., & Rodriguez, F. (2023). Creativity across the lifespan: Changes with age and with dementia. *BMC Geriatrics*, *23*(160), 1–10. https://doi.org/10.1186/s12877-023-03825-1

Rudowicz, E. (2003). Creativity and culture: A two way interaction. *Scandinavian Journal of Educational Research*, *47*(3), 273–290. https://doi.org/10.1080/00313830308602

Runco, M. (2007). A hierarchical framework for the study of creativity. *New Horizons in Education*, *55*(3), 1–9. https://eric.ed.gov/?id=EJ832891

Runco, M. (2023). AI can only produce artificial creativity. *Journal of Creativity*, *33*(3), 1–7. https://doi.org/10.1016/j.yjoc.2023.100063

Sawyer, R. (2019). Individual and group creativity. In J. Kaufman & R. Sternberg (Eds.), *Cambridge handbook of creativity* (2nd ed., pp. 567–586). Cambridge University Press. https://doi.org/10.1017/9781316979839.028

Sawyer, R., & Henriksen, D. (2024). *Explaining creativity: The science of human innovation* (3rd ed.). Oxford University Press. https://global.oup.com/academic/product/explaining-creativity-9780199737574?cc=us&lang=en&

Selby, E., Shaw, E., & Houtz, J. (2005). The creative personality. *Gifted Child Quarterly*, *49*(4), 300–314. https://doi.org/10.1177/001698620504900404

Simonton, D. (1990). History, chemistry, psychology, and genius: An intellectual autobiography of historiometry. In M. Runco & R. Albert (Eds.), *Theories of creativity* (pp. 92–115). Sage Publications. https://psycnet.apa.org/record/1990-97842-000

Sternberg, R., & Karami, S. (2022). An 8P theoretical framework for understanding creativity and theories of creativity. *Journal of Creative Behavior*, *56*(1), 55–78. https://doi.org/10.1002/jocb.516

Sternberg, R., & Karami, S. (2024). *Transformational creativity: Learning for a better future*. Palgrave Macmillan. https://link.springer.com/book/10.1007/978-3-031-51590-3

Sternberg, R., & Lubart, T. (1995). *Defying the crowd: Cultivating creativity in a culture of conformity*. Free Press. https://archive.org/details/defyingcrowdcult00ster

Sternberg, R., & O'Hara, L. (1998). Creativity and intelligence. In R. Sternberg (Ed.), *Handbook of creativity* (pp. 251–272). Cambridge University Press. https://doi.org/10.1017/CBO9780511807916.015

Stravinsky, I. (1947). *Poetics of music in the form of six lessons*. Harvard University Press. https://www.hup.harvard.edu/books/9780674678569

Suchacka, M., Muster, R., & Wojewoda, M. (2021). Human and machine creativity: Social and ethical aspects of the development of artificial intelligence. *Creativity Studies*, *14*(2), 430–443. https://doi.org/10.3846/cs.2021.14316

Tatarkiewicz, W. (2001). *Historia de seis ideas: arte, belleza, forma, creatividad, mímesis, experiencia estética* (6th ed.). Tecnos.

Trendall, A. (2004). *Apreciación e historia del arte*. Seminario de Formación Permanente de Profesores, Universidad Católica de Colombia.

Vinchon, F., Lubart, T., Bartolotta, S., Gironnay, V., Botella, M., Bourgeois, S., Burkhardt, J., Bonnardel, N., Corazza, G., Glăveanu, V., Hanchett, M., Ivcevic, Z., Karwowski, M., Kaufman, J., Okada, T., Reiter, R., & Gaggioli, A. (2023). Artificial intelligence & creativity: A manifesto for collaboration. *Journal of Creative Behavior*, *57*(4), 472–484. https://doi.org/10.1002/jocb.597

Vygotsky, L. (1934/2012). *Thought and language*. MIT Press. https://mitpress.mit.edu/9780262720014/thought-and-language/

Walton, A. (2016). Creativity and a human dichotomy: Individual or part of a team? In G. Corazza & S. Agnoli (Eds.), *Multidisciplinary contributions to the science of creative thinking* (pp. 85–102). Springer. https://link.springer.com/book/10.1007/978-981-287-618-8

Ward, T., Finke, R., & Smith, S. (1995). *Creativity and the mind: Discovering the genius within*. Springer. https://psycnet.apa.org/doi/10.1007/978-1-4899-3330-0

Weisberg, R. (1986). *Creativity: Genius and other myths*. WH Freeman. https://psycnet.apa.org/record/1986-97924-000

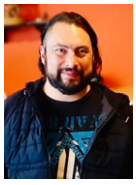
Weisberg, R. (2018). Insight, problem solving, and creativity: An integration of findings. In F. Vallée (Ed.), *Insight. On the origins of new ideas* (pp. 191–215). Routledge. https://doi.org/10.4324/9781315268118-10

Whitehead, J. (2017). *Madness and the romantic poet: A critical history*. Oxford University Press. https://doi.org/10.1093/oso/9780198733706.001.0001

Yong, K., Mannucci, P., & Lander, M. (2020). Fostering creativity across countries: The moderating effect of cultural bundles on creativity. *Organizational Behavior and Human Decision Processes*, *157*(1), 1–45. https://doi.org/10.1016/j.obhdp.2019.12.004

Zhou, J., Shin, S., Brass, D., Choi, J., & Zhang, Z. (2009). Social networks, personal values, and creativity: Evidence for curvilinear and interaction effects. *The Journal of Applied Psychology*, *94*(6), 1544–1552. https://doi.org/10.1037/a0016285

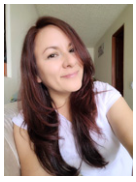
## About the Authors



Leonardo Barón-Birchenall is a psychologist with an MSc in Cognitive Psychology and a PhD in Language Sciences. He conducts research in the psychology of language. His interests also include science communication and the empirical study of cognition and behavior, particularly in the areas of early development, education, and mental health. Email: laescaladesol@gmail.com

Andrea Sánchez-Vallejo is a psychologist with an MSc in Education. She is interested in the study of cognitive development, especially creativity, learning, metacognition, and critical thinking, as well as the relationships among these processes in the context of supporting academic task performance. Email: asanchezv@javeriana.edu.co

Carlos Toro-Silva is a lawyer with an MSc and a PhD in History. He is dedicated to historical research. His work focuses in particular on the intersection of sociocultural history, the history of institutions, and the history of ideas. Email: carlosalberto.toro@tutanota.com



Andrea Folleco-Eraso is a psychologist with an MSc in Neuroscience. She is a doctoral candidate in psychology at Universidad de Los Andes in Colombia. Her research interests include the implications of the gut–brain axis for mental health, brain injury, and neuropsychological assessment and rehabilitation. Email: jafollecoe@libertadores.edu.co