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Updating McLuhan: AI and its mental, sociological, and artistic consequences

Actualizando a McLuhan: IA y sus consecuencias mentales, sociológicas y artísticas

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Abstract:

This study critically updates Marshall McLuhan's media theory to analyze the mental, sociological, and artistic effects of generative artificial intelligence, understood as a radical cognitive extension that reconfigures perception, identity, and cultural production. A qualitative approach based on comparative conceptual analysis is employed. Foundational texts by McLuhan are examined in dialogue with recent scholarship in neuroscience, algorithmic sociology, and computational creativity studies. McLuhan's tetrad is systematically applied as an interpretative framework. Findings indicate that AI externalizes cognitive processes such as synthesis and writing, enhancing efficiency while activating the Law of Reversal. Risks of digital amnesia, cognitive sedentarism, and the erosion of deep reading are identified. Sociologically, the "global village" evolves into algorithmic fragmentation and a surveillance capitalism model. In the artistic domain, authorship becomes decentralized and creativity is redefined in terms of statistical recombination. AI emerges as a structural media environment whose efficiency may reverse into intellectual dependency and conformism. The study underscores the need for anticipatory governance and renewed critical media literacy to safeguard human agency.

Keywords: McLuhan, artificial intelligence, media theory, cognition, creativity, global village, digital amnesia, algorithmic culture, posthumanism.

Resumen:

Este estudio actualiza críticamente la teoría mediática de Marshall McLuhan para analizar los efectos mentales, sociológicos y artísticos de la inteligencia artificial generativa, entendida como extensión cognitiva radical que reconfigura percepción, identidad y producción cultural. Se emplea un enfoque cualitativo basado en análisis conceptual comparativo. Se revisan textos fundamentales de McLuhan y se contrastan con aportaciones recientes en neurociencia, sociología algorítmica y estudios sobre creatividad computacional. La tétroda mcluhaniana se aplica sistemáticamente como herramienta interpretativa. Los hallazgos indican que la IA externaliza procesos cognitivos como la síntesis y la escritura, potenciando la eficiencia pero activando la Ley

de Reversión. Se identifican riesgos de amnesia digital, sedentarismo cognitivo y erosión de la lectura profunda. En el plano sociológico, la “aldea global” evoluciona hacia una fragmentación algorítmica y un modelo de capitalismo de vigilancia. En el ámbito artístico, la autoría se descentraliza y la creatividad se redefine en términos de recombinación estadística. La IA emerge como entorno mediático estructural cuya eficiencia puede revertir en dependencia intelectual y conformismo. Se subraya la necesidad de gobernanza anticipatoria y alfabetización mediática crítica para preservar la agencia humana.

Palabras clave: McLuhan, inteligencia artificial, teoría de los medios, cognición, creatividad, aldea global, amnesia digital, cultura algorítmica, poshumanismo.

1. INTRODUCTION: AI AS THE ULTIMATE EXTENSION OF MAN

Marshall McLuhan anticipated that media technologies do not merely transmit information; they fundamentally shape perception, cognition, and social organization (McLuhan, 1964; McLuhan & Powers, 1995).

His assertion, "the medium is the message," drives to analyze the effects of each technology beyond its content, focusing on how media transforms human experience and mental structures. This principle is more striking yet in the face of Artificial Intelligence's popularization. AI is not merely a tool; it functions as a complex, mediating, and meaning-producing agent that demands a thorough revision of McLuhan's categories, for its potential to not only amplify human capabilities but also introduce new forms of interaction, automation, and creation with consequences that remain noticeably underexplored in mental, sociological, and artistic domains (Paxton, 2025; Takkeci, 2024; Turkle, 2011).

The recent and accelerated development of generative AI (GAI) has generated a media environment in which information is produced, distributed, and consumed at unprecedented speed. This velocity and volume directly affect attention, memory, and user subjectivity (Carr, 2010; Han, 2022). AI, as a new medium, does not simply

automate existing processes; it produces meaning, predicts behaviors, and generates artistic works, profoundly blurring the boundary between the human and the artificial, raising questions about agency and authorship (Barrientos-Báez *et al.*, 2024, Boden, 2016; Pasquinelli, 2023). Scholars have warned about the risks of digital amnesia, information overload, and fragmented attention—phenomena (Robert *et al.*, 2024) that significantly impact concentration and critical thinking, echoing McLuhan's warnings about the subliminal and unconscious effects of media technologies (Bustos Díaz & Martín-Vicario, 2024; Carr, 2010; Han, 2022; Hayles, 1999; McLuhan, 1964).

Recent scholarship has intensified reflection on the effects of AI on the mind, society, and art, highlighting both the potential for growth and the systemic risks of the technology (Carrión Salinas & Andrade-Vargas, 2024; Paxton, 2025; Takkeci, 2024; Pedreschi *et al.*, 2025). This article proposes an update of McLuhan, placing his concepts in dynamic dialogue with the challenges and opportunities posed by AI in the twenty-first century. The central hypothesis is that AI, as a radically new medium, not only amplifies but radically transforms cognitive processes, social dynamics, and artistic production, in line with McLuhan's postulates regarding the pervasive, unseen effects of media on the human sensorium.

1.1. OBJECTIVES

To critically update Marshall McLuhan's theoretical framework by relating his concepts to the development and consequences of artificial intelligence, with a special focus on mental, sociological, and artistic domains.

Specific Objectives:

1. To analyze the mental and cognitive effects of artificial intelligence, specifically the risk of cognitive atrophy, in light of McLuhan's "law of reversal" and the concept of "extensions of man."
2. To examine the sociological transformations produced by AI in identity formation, community dynamics, and political polarization, in dialogue with McLuhan's notion of the "global village" and the reality of algorithmic culture.

3. To explore the complex impact of AI on creativity and art, considering the relationship between media, authorship, originality, and artistic meaning as theorized by McLuhan and posthumanist scholars.
4. To apply McLuhan's tetrad systematically to interpret the multifaceted effects of generative AI across the aforementioned domains, anticipating its long-term societal flip or reversal.
5. To propose a critical and reflective perspective on the ethical and governance challenges inherent in the large-scale integration of AI in contemporary society, inspired by McLuhan's prophetic thought.

2. THEORETICAL FRAMEWORK

2.1. MCLUHAN'S MEDIA THEORY: THE MEDIUM IS THE COGNITIVE MESSAGE

McLuhan's central thesis posits that the medium itself, independent of the content it transmits, fundamentally alters human perception and societal structures (McLuhan, 1964). Media are extensions of human faculties—physical, sensory, or cognitive—and their impact is determined by how they reshape experience, not by the information they carry. The light bulb, for instance, had no content, yet its effect was a radical change in human social timing and activity patterns (McLuhan, 1964; McLuhan & McLuhan, 1988). This is what is called by McLuhan himself "Technological determinism" (McLuhan, 1951; 1962; 1968; 1989; 2004; McLuhan & McLuhan, 1988) as for his famous aphorism "The Medium is the message". Meaning technology influences the message directly: newspapers-built nationalism via big headlines and easy audience segmentation. Radio and phone built simultaneous communication via electricity (McLuhan, 1969, 1994). Television leaned towards highly emotional tales capable of keeping the audience looking by the sheer impact of images and testimonies. And Internet turned the simultaneity of radio into the global village of continuous, immediate communication. As Innis (2022a) said, each media creates a different Empire, based on its technological possibilities.

In this they are followed by the rest of the Toronto School: The so-called Toronto School refers to a group of scholars associated with the University of Toronto, including Harold Innis (2022a,b), Marshall McLuhan, and Eric A. Havelock, who developed a historical and material approach to media (1978; 1986). Rather than focusing primarily on content or ideology, these authors argue that communication technologies shape social organization, sensory regimes, and structures of knowledge. From Innis's concept of the "bias" (2022a) of communication to McLuhan's already mentioned aphorism "the medium is the message," the Toronto School exists around this idea that technological change functions as a structuring force in cultural history via language.

In the context of AI, generative systems are not just tools for content creation or data analysis, but transformative cognitive media with their own inherent "message" (Paxton, 2025; Pedreschi *et al.*, 2025). AI is the ultimate extension of the human mind, automating not just muscle or movement, but thought and creative synthesis itself, moving beyond the physical or perceptual extensions of earlier media (Hayles, 1999). This radical shift means AI is actively shaping not just communication, but ideation, knowledge production, and consciousness, becoming an active participant in the creative process and altering its very nature (Boden, 2016; Gómez-Domínguez, 2025; Pasquinelli, 2023).

2.2. MEDIA AS MENTAL AND COGNITIVE EXTENSIONS: HOT, COOL, AND ALGORITHMIC

McLuhan argued that media technologies extend human abilities, including mental and cognitive capacities (McLuhan, 1962; 1964; 1970). The distinction between "hot" and "cool" media is central to understanding the required level of user engagement. Hot media (like print and radio, McLuhan, 1962) deliver high-definition information, encouraging passive consumption and low participation, while cool media (like television and the telephone) (McLuhan, 1966) require active participation and "completion" by the user due to their low-definition nature. This difference influences how individuals process information, affecting attention, memory, and the depth of mental engagement (Abanades Sánchez & Vargas Delgado, 2025; Carr, 2010; Han, 2022).

Algorithmic AI introduces a new, complex category. Generative AI, while appearing "hot" due to its high-definition, immediate output, paradoxically functions as a "cool" medium in terms of the depth of input required from the user. The user supplies a simple prompt (low-definition input) and receives a complex, highly synthesized answer (high-definition output). The medium, however, risks becoming cognitively "cold" by automating synthesis, prediction, and aspects of creativity, potentially conditioning users to expect and accept the familiar and efficient, reducing creativity to optimization (Han, 2022; Hayles, 1999). The extreme personalization enabled by AI may further fragment collective experience and understanding, as each user receives outputs tailored to their individual prompts and history, leading to a loss of shared cognitive ground (Barragán-Romero *et al.*, 2024; Paxton, 2025; Zuboff, 2019).

2.3. THE GLOBAL VILLAGE AND ALGORITHMIC CULTURE

McLuhan famously predicted the formation of a "global village" as a result of electronic media, where instantaneous global communication would return humanity to a state of tribal, auditory, and highly interdependent existence (McLuhan & Powers, 1995). In this electric retribalization, the medium of information overload was expected to foster intense involvement and participation.

However, the "global village" of the twenty-first century is not a simple utopia of shared experience; it is an algorithmic culture (Zuboff, 2019). The village square is now mediated by opaque algorithms that control visibility, moderate dialogue, and actively shape identity and community through personalized feeds and filter bubbles:

- Fragmentation vs. Retribalization: While McLuhan envisioned retribalization, AI-driven personalization and filter bubbles often lead to hyper-fragmentation into intense, polarized micro-tribes, exacerbating political and social polarization (Han, 2022; Sunstein, 2017).
- Surveillance Capitalism: The engine of this new village is often Surveillance Capitalism, where algorithmic media function not primarily to communicate, but to extract behavioral data for prediction and control (Zuboff, 2019). The "message" of this AI medium is the commodification of human experience.

- The Loss of the "Other": The relentless personalization of the algorithmic environment limits exposure to genuinely different perspectives and challenging experiences. The resulting "infocracy" risks fostering a sociological state where true dialogue and the encounter with the "Other" are supplanted by self-confirming echo chambers (Han, 2022).

2.4. THE TETRAD AND THE LAW OF REVERSAL: ANTICIPATING AI'S FLIP

McLuhan's tetrad offers a robust, predictive framework for analyzing any medium by asking four critical questions (McLuhan & Powers, 1995):

1. Enhancement: What does the medium amplify or intensify?
2. Obsolescence: What does the medium push aside, render irrelevant, or make obsolete?
3. Retrieval: What does the medium retrieve from the past?
4. Reversal: What does the medium reverse into when pushed to the extreme?
(The Law of Reversal)

Applied to AI, the tetrad reveals AI's multifaceted and contradictory effects. Specifically, the Law of Reversal posits that any technology, when pushed to its limits or overused, produces effects opposite to its intended purpose (McLuhan, 1964; McLuhan & Powers, 1995). AI, intended to augment human intelligence and creativity, harbors the potential to reverse into cognitive atrophy and dependency (Carr, 2010; Han, 2022; Paxton, 2025).

3. METHODS

This article employs a qualitative, theoretical approach grounded in comparative conceptual analysis to critically update McLuhan's media theory in relation to AI.

The methodology consisted of the following structured steps:

1. Literature Review and Mapping: Systematic examination of core primary texts by McLuhan (1964, 1995) and contemporary scholarly work across three core domains:
 - Cognition and Digital Media: (Carr, 2010; Han, 2022; Hayles, 1999; Turkle, 2011).

- Sociology and Algorithmic Culture: (Zuboff, 2019; Sunstein, 2017; Han, 2022).
- Art and Creativity: (Boden, 2016; Pasquinelli, 2023; Paxton, 2025).

2. **Conceptual Alignment and Comparison:** Systematic comparison of McLuhan's foundational concepts (The Medium is the Message, Global Village, Hot/Cool Media) with current developments in AI, focusing on the identification of convergences (where AI fulfills McLuhan's prophecy) and divergences (where AI introduces phenomena not directly predicted).

3. **Critical Synthesis and Refinement:** Development of the core arguments concerning cognitive atrophy, algorithmic retribalization, and mediated creativity, ensuring that the integration of new sources refines rather than merely supplements the existing framework.

4. **Systematic Application of the Tetrad:** Use of McLuhan's tetrad to formally interpret the multifaceted effects of generative AI across the mental, sociological, and artistic domains, identifying the specific nature of its long-term reversal (Paxton, 2025; Takkeci, 2024).

4. FINDINGS

The deepest "message" of AI is its perceived potential for cognitive externalization. By automating tasks like synthesis, summarization, and idea generation, AI systems are becoming external prostheses for the human mind, echoing McLuhan's idea of media as extensions of man (McLuhan, 1964; Hayles, 1999; Zúñiga, 2023). However, this convenience triggers the Law of Reversal. Intended to augment intelligence, excessive reliance on AI may lead to cognitive atrophy—a weakening of memory, attention, and critical thinking (Carr, 2010; Han, 2022).

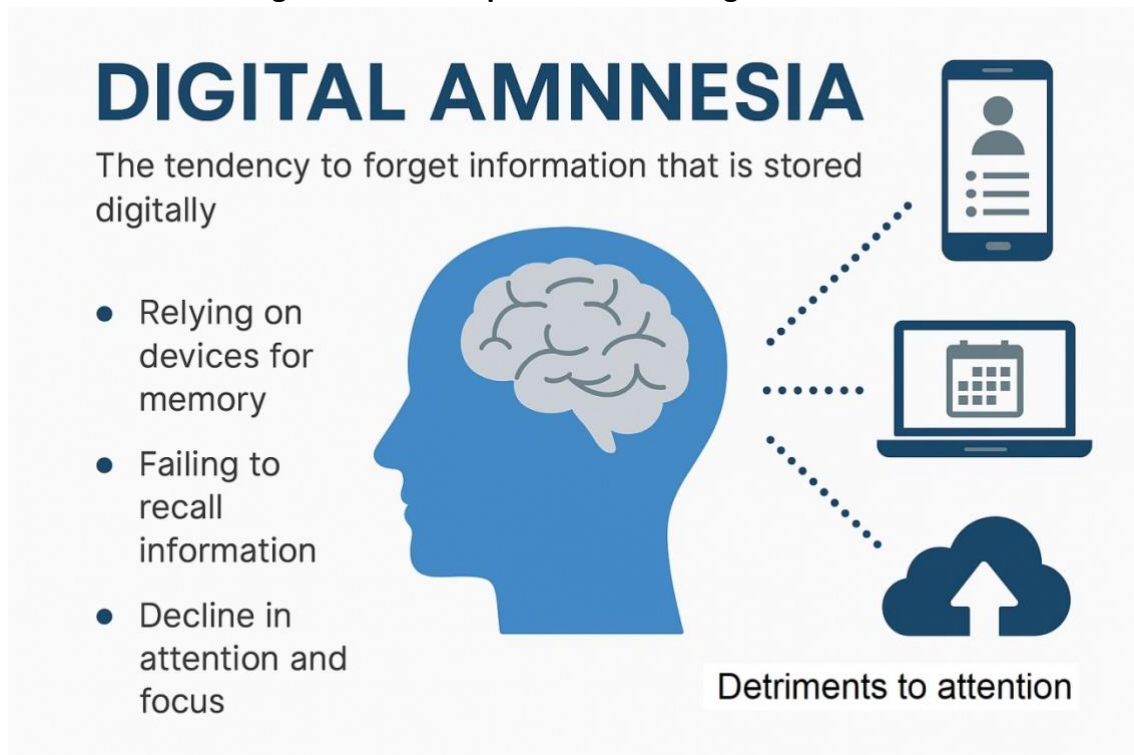
4.1. DIGITAL AMNESIA AND COGNITIVE SEDENTARISM

Recent neuroscientific studies confirm the phenomenon of "digital amnesia," where the constant use of AI and digital devices for information storage reduces the brain's capacity to retain and process data independently (Carr, 2010; Robert *et al.*, 2024). When individuals delegate crucial cognitive processes—such as writing, complex

problem-solving, or long-term retention—to AI, the neurological effort required to strengthen memory and critical skills diminishes. This is particularly concerning in education, where deep reading and critical analysis cannot be replaced by AI-generated summaries in their role as critical-thinking tools (Ballesteros-Aguayo & Ruiz del Olmo, 2024; Han, 2022; Turkle, 2011).

The consequence is a form of "cognitive sedentarism"—a passive intellectual state where the mind is no longer actively exercised through effortful thinking and learning (Carr, 2010; Pastorino, 2024). The paradox is stark: while access to knowledge has never been greater, the ability to comprehend, integrate, and use that knowledge creatively is at risk of decline (Barrientos-Báez *et al.*, 2025). The so called "Google effect" which is reduced to the brain shifting from remembering content to remembering how to access it, a strategy that is efficient for retrieval but detrimental to the formation of robust, internalized knowledge schemas (Sparrow *et al.*, 2011).

Figure 1. Visual representation of digital amnesia



Source: Own elaboration

4.2. INFORMATION OVERLOAD, INTELLECTUAL CONFORMISM, AND THE DEATH OF DEEP READING

The proliferation of AI-generated content (text, image, code) exacerbates information saturation, making it increasingly difficult to find original, diverse, and human-authored sources. This contributes to a digital environment filling with redundant, superficial, and statistically derived material, which can block genuine knowledge-seeking and foster intellectual conformism (Han, 2022; Zazo Correa & Martínez-Fresneda Osorio, 2024).

The quality of attention suffers dramatically (Zimmerman *et al.*, 2023). McLuhan warned that electric media favor a fragmented, highly involved, but superficial engagement (McLuhan, 1964). AI amplifies this, training the user to prioritize speed and efficiency over depth and complexity. The reliance on AI to summarize and synthesize complex material risks the extinction of deep reading—the slow, sustained, and focused reading necessary for sophisticated analytical thinking and empathy (Carr, 2010; Cristófol-Rodríguez *et al.*, 2024). The mind, habituated to AI's fast, statistically optimal outputs, may lose its tolerance for ambiguity and intellectual friction, essential ingredients for innovation and critical inquiry (Han, 2022).

4.3. SOCIOLOGICAL TRANSFORMATIONS: THE ALGORITHMIC GLOBAL VILLAGE

McLuhan's "global village" is now under the governance of algorithmic mediation (McLuhan & Powers, 1995; Zuboff, 2019; Cheriti, 2025). While electronic media created interdependence, AI has introduced a system that optimizes social interaction for engagement and data extraction, fundamentally altering community dynamics and the nature of public discourse.

4.3.1. *Algorithmic Society: Polarization, Surveillance and the Posthuman Challenge of Authorship*

In the AI-driven global village, algorithms designed for personalization create filter bubbles and echo chambers (Sunstein, 2017). This relentless personalization, driven by behavioral data extraction, reinforces existing beliefs and biases, leading to hyper-fragmentation and extreme political polarization (Zuboff, 2019). The "message" of this

algorithmic medium is not global consensus but customized, perpetual confirmation. The retribalization McLuhan predicted is less a unifying return to the collective and more a fracturing into intensely insular, algorithmically curated micro-tribes that lose the shared cognitive ground necessary for civic discourse (Han, 2022).

The economic model underpinning this AI media environment—Surveillance Capitalism—further complicates McLuhan’s vision. Here, the medium is designed not only to extend human senses but to extract and predict human behavior for profit (Zuboff, 2019). This economic logic fundamentally undermines individual autonomy and critical engagement. The ultimate sociological reversal of the "global village" is its transformation into a "global panopticon," where personalized convenience comes at the cost of persistent, opaque monitoring and subtle control (Han, 2022). The individual is subtly managed by the platform, transforming the McLuhanian user from an active participant in a cool medium into a passive, predicted data source (Carr, 2010) reliant on the illusion of reliability (López del Castillo Wilderbeek, 2025).

Within this environment, the artistic and creative domain becomes a privileged site for critical reflection. McLuhan described artists as the “antennas of society,” capable of sensing and expressing the psychological and social effects of new media before they become widely understood or consciously perceived (McLuhan, 1964; McLuhan & McLuhan, 1988). This capacity derives from the artist’s structural detachment: unlike the general population, which becomes rapidly “numb” to the effects of a new medium, the artist can stand outside its totalizing environment and treat it as material rather than being subsumed by its message.

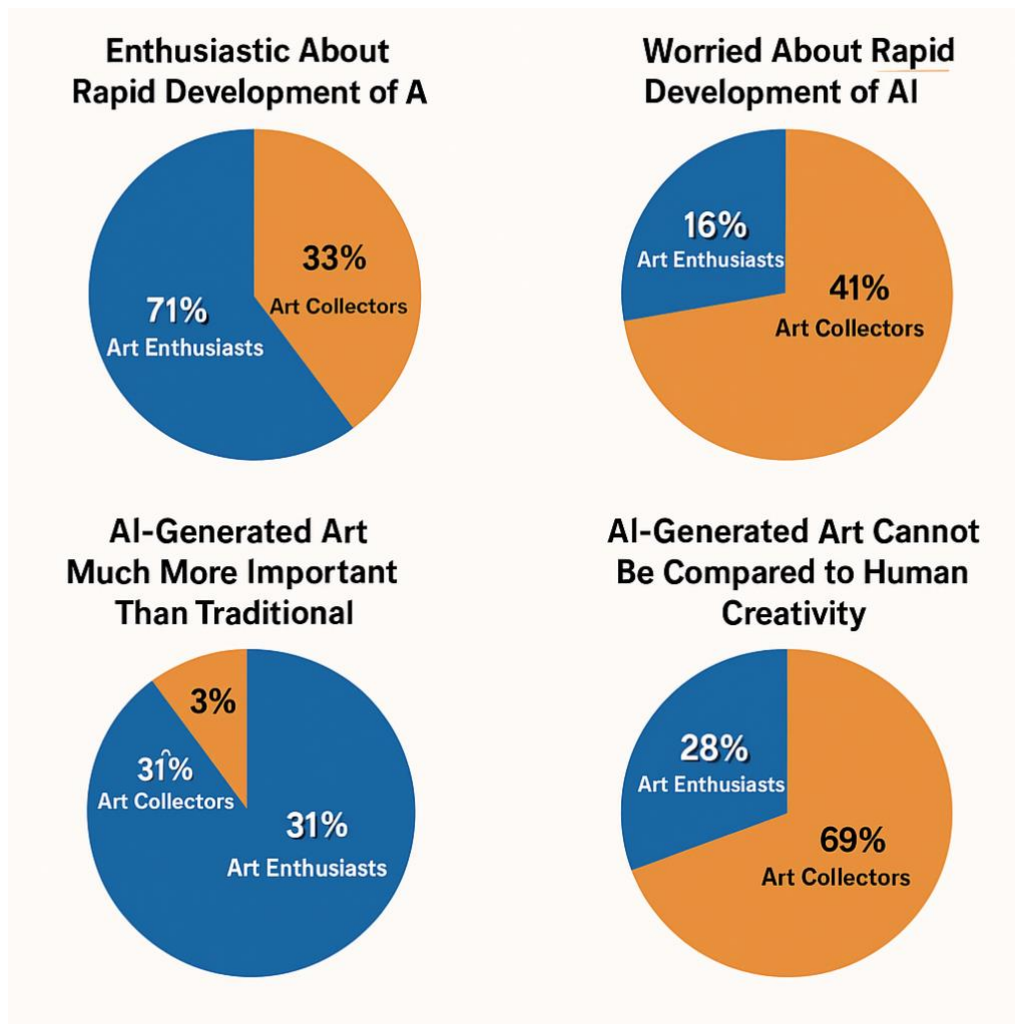
For McLuhan, every new medium creates an environment that is initially invisible. The population becomes anesthetized to its effects almost immediately upon adoption. The artist’s role is to resist this numbness, to render the invisible visible, and to create not merely with the new medium but about its systemic implications (McLuhan, 1964). In the context of AI, this critical function is undergoing radical redefinition. Generative algorithms can now produce images, music, and text that are aesthetically compelling, fundamentally challenging traditional notions of authorship, originality, and creative value (Boden, 2016; Pasquinelli, 2023).

AI-generated art forces a confrontation with posthumanist aesthetics and the conventional definition of authorship. If an algorithm synthesizes a novel work based on millions of human creations, where does authorship reside? With the programmer who constructed the model, the user (prompt engineer) who guided the output, or the algorithm itself as a new form of “creative” agent? (Pasquinelli, 2023). McLuhan’s emphasis on the effects of the medium (1968; 1970) suggests that the “message” of AI art is precisely the de-centering of the human creator (Jackson, 2025). The artistic work becomes the result of co-creation and computational synthesis, shifting value from the individual genius and the expressive “hot” self toward the complexity of the data infrastructure and the statistical model that enables production (Boden, 2016). Ciharently with the mechanics of communication arts outlined by Havelock and Hershbell (1978).

This shift mirrors McLuhan’s observation that the content of any new medium is always an older medium (McLuhan, 1964, 1968). The content of AI art is the digital aggregate of all previous human art, yet its message lies in the computational process that renders originality statistically derived. Generative systems excel at recombination and at maximizing statistical averages, thereby reflecting the dominant norms embedded in massive training datasets (Han, 2022). This optimization of mediocrity constitutes a structural risk: what is statistically “best” is often aesthetically conventional. Genuine artistic innovation, however, frequently depends on deviation from statistical norms rather than their reinforcement (Havelock & Hershbell, 1978).

In this sense, the AI artist is not primarily tasked with optimizing production but with disrupting algorithmic normalcy. Artistic practices that expose biases in training data, reveal algorithmic failures, or foreground the uncanny valley of machine-generated perfection function as necessary societal alarms (Pasquinelli, 2023; Takkeci & Erdem, 2024). They compel users to consciously examine the medium they might otherwise passively accept. The artist thus remains, even in the age of AI, the anti-numbness agent—though now operating within and against computational systems whose logic is extraction, prediction, and normalization.

Figura 2. Art community perspective on AI



Source: Own elaboration with data from Aseguranza (2024)

To fulfill their McLuhanian role, contemporary artists working with or reacting to AI deploy strategies grounded in retrieval and reversal. These strategies operate not merely at the aesthetic level but at the structural level of the medium itself.

The abundance of technically flawless, algorithmically generated content paradoxically retrieves older aesthetic values. The proliferation of optimized, frictionless outputs enhances appreciation for analog, slow, imperfect, and human-intensive creation—art that visibly bears the mark of effort and material engagement (Adam, 2016; Takkeci, 2024). In this sense, the very perfection of generative systems produces an aesthetic

counter-message. What AI optimizes—speed, coherence, polish—becomes precisely what critical artistic practice seeks to resist.

This retrieval is also sensory. As a primarily cognitive and visual extension, generative AI reactivates the value of tactile, material, and embodied practices that cannot be easily digitized or synthesized, echoing McLuhan’s emphasis on maintaining equilibrium within the sensorium (McLuhan, 1964; Pedreschi *et al.*, 2025). The imperfect, the unique, and the materially grounded regain significance within a digital ecosystem characterized by reproducibility and statistical smoothing.

Simultaneously, AI functions as a collaborative medium. In its current configuration, generative systems retrieve the ancient practice of dialogue and iterative co-creation: the human provides the initial spark (prompt), and the machine expands, refines, and recombines narrative, music, or image (Jackson, 2025; Pedreschi *et al.*, 2025). This recursive feedback loop exemplifies McLuhan’s well-known observation that “we shape our tools and thereafter our tools shape us” (McLuhan, 1964). The human–AI partnership thus constitutes a complex medium in its own right.

However, the artist’s most potent strategy lies in the Law of Reversal. By intentionally pushing AI systems to their extremes, artists expose the structural limitations and biases of the “algorithmic muse.” Projects that visualize training data distortions or deliberately force models to generate contradictory, unstable, or uncanny outputs render the opaque algorithm visible (Pasquinelli, 2023; O’Neil, 2016). This aesthetic exposure counteracts the social numbness produced by algorithmic opacity (McLuhan, 1964).

Within this context, originality itself must be redefined. If AI excels at synthesizing the statistically probable, the truly original human contribution lies in disruption—the conceptual leap that falls outside the probabilistic boundaries of training data. Generative systems maximize recombination and statistical averages, often reflecting dominant norms embedded in massive datasets. What is statistically “optimal” is frequently aesthetically conventional. By contrast, artistic innovation often emerges through deviation from the statistical norm.

The art of the future, therefore, is less about the production of content and more about intervention in the system of production itself. The artist’s critical function is not primarily the co-creation of outputs, but the commentary on and destabilization of the co-creative medium. In this sense, the artist fulfills the essential McLuhanian function: perceiving the ultimate extension of humanity—AI—and defining the human space within it.

McLuhan’s tetrad provides a rigorous framework for anticipating the long-term and non-obvious consequences of generative AI (McLuhan & Powers, 1995; Paxton, 2025). Applied systematically, generative AI enhances speed, scalability, and synthetic creativity; obsolesces certain forms of repetitive artisanal labor; retrieves dialogic co-creation and analog imperfection; and reverses into opacity, statistical conformity, bias, and the algorithmic uncanny when pushed to its limits.

Through retrieval and reversal, artistic practice becomes the site where these transformations are rendered visible before they become normalized and imperceptible.

Table 1. Application of McLuhan’s Tetrad to Generative AI

Tetrad Element	Application to Generative AI (e.g., ChatGPT, Midjourney)	Mental/Sociological/Artistic Effect	Key References
1. Enhancement	Amplifies cognitive synthesis, data analysis, and creative ideation velocity.	Mental: Radical efficiency in task completion; Artistic: Democratization of creative production; Sociological: Accelerated information circulation.	McLuhan (1964); Paxton (2025); Storey et al. (2024)
2. Obsolescence	Renders obsolete skills like manual data research, rote memorization, and foundational composition/drawing skills.	Mental: Weakening of deep reading and critical synthesis abilities; Sociological: Obsoleting of certain professional analysis/writing roles.	Carr (2010); Han (2022); Turkle (2011)
3. Retrieval	Retrieves older forms of oral dialogue (via conversational interfaces), rapid ideation, and the value of imperfect human expression (in contrast to AI perfection).	Mental: Revives interactive, dialogue-based learning; Artistic: Renews appreciation for analogue and human-intensive art (as foil).	Adam (2016); Takkeci (2024); Pedreschi et al. (2025)
4. Reversal	Flips into a state of intellectual dependency, cognitive atrophy, and profound conformism when pushed to the extreme (overuse).	Mental: Digital Amnesia, loss of critical autonomy; Sociological: Hyper-polarization and algorithmic control (The Global Panopticon).	Carr (2010); Han (2022); Zuboff (2019)

Source: Own preparation

The most significant insight from the tetrad is the Reversal. AI, the technology of ultimate augmentation, risks reversing into a widespread state of intellectual passivity and dependency. This is the ultimate "message" of the medium: the efficiency of the machine comes at the cost of the user's critical agency (Carr, 2010; Han, 2022).

5. DISCUSSION

5.1. SYNTHESIS AND DISCUSSION OF MAIN FINDINGS

The results show that generative artificial intelligence is not merely a technological tool for cognitive support, but a structural media environment that reconfigures mental processes, social dynamics, and fundamental aesthetic categories. From a McLuhanian perspective, the central finding confirms that the profound "message" of AI does not reside in its content, but in its function as a cognitive prosthesis that externalizes traditionally internal processes such as synthesis, writing, ideation, and knowledge organization.

The first structural finding indicates that the automation of intellectual tasks produces a functional expansion of the human mind, but simultaneously activates the Law of Reversal. What appears as increased cognitive efficiency can transform into a weakening of fundamental capacities such as memory, sustained attention, and critical thinking.

The systematic delegation of processes such as complex writing or analytical problem-solving reduces the neurological effort required to consolidate robust cognitive schemas, generating a phenomenon described as cognitive atrophy.

This process does not imply a disappearance of knowledge, but rather a transformation in its storage method: it shifts from deep internalization to immediate external accessibility. The so-called "Google effect" exemplifies this shift, where the individual remembers how to access information more than the content itself.

While this strategy is efficient in terms of retrieval, it compromises the structural consolidation of knowledge.

A second finding identifies the phenomenon of "digital amnesia" as an observable neurocognitive consequence of the intensive use of digital and AI systems.

The reduction in active information retention and autonomous processing is associated with a decrease in sustained intellectual exercise.

This phenomenon is linked to the concept of “cognitive inactivity”: a passive state in which the mind ceases to be exercised through reflective effort. The result is a contemporary paradox: access to knowledge reaches unprecedented levels, while the capacity for deep understanding, critical integration, and creative use of knowledge shows signs of weakening.

In the educational field, this finding is especially critical, since in-depth reading and argumentative analysis cannot be functionally replaced by AI-generated summaries.

A third set of results demonstrates that the massive proliferation of AI-generated content intensifies information overload.

The digital ecosystem is becoming saturated with redundant, superficial, and statistically optimized material, hindering the location of original sources and fostering forms of intellectual conformity.

Attention is fragmented and oriented toward speed and efficiency, at the expense of complexity and ambiguity. In line with McLuhan's warnings about the superficial nature of electronic media, AI amplifies a mode of interaction characterized by speed and statistical optimization.

The most relevant finding in this area is the risk of erosion of deep reading, understood as a slow, sustained, and empathetic process indispensable for sophisticated thought.

Habituation to quick and structurally “optimal” responses reduces tolerance for cognitive friction, an essential element for innovation and critical research.

On a sociological level, the results show that McLuhan's global village has been reconfigured by algorithmic mediation, and extreme personalization generates filtering bubbles and echo chambers that reinforce pre-existing beliefs and produce political and cognitive hyperfragmentation.

The retribalization predicted by McLuhan does not manifest as an integrative return to community, but rather as segmentation into algorithmically curated micro-tribes that erode the shared cognitive ground necessary for civic discourse. The underlying economic model—surveillance capitalism—further introduces a dimension of extraction and behavioral prediction that transforms social interaction into an exploitable resource.

The result is a structural inversion: the global village is approaching a “global panopticon” characterized by persistent monitoring, systemic opacity, and subtle behavioral management. The user ceases to be an active participant and becomes a predictable and optimizable source of data.

In the artistic sphere, the findings reveal a radical redefinition of authorship and creativity.

Generative AI produces aesthetically compelling works from massive recombinations of previous cultural data, shifting the focus from individual genius to the statistical infrastructure.

Originality then appears as a statistically derived phenomenon, which introduces the risk of “optimizing mediocrity”: the most probable tends to prevail as the most acceptable. In contrast, authentic innovation is identified with deviation from the statistical norm.

The artist, in a McLuhanian sense, emerges as an anti-anesthetic agent: one who reveals algorithmic opacity, exposes biases in training data, and uses “uncanny” or “disquietness” as a critical strategy. The artistic function shifts from the production of objects to intervention in the production system itself.

The application of the tetrad (enhancement, obsolescence, retrieval, reversal) allows for a structural synthesis of the effects of generative AI:

- Enhancement: amplification of cognitive speed and creative democratization.
- Obsolescence: weakening of skills such as deep memorization or manual research.

- Retrieval: recovery of conversational dialogue and the value of human imperfection.
- Reversal: intellectual dependence, cognitive atrophy, and algorithmic conformity.

The most significant finding lies in the reversal. Technology designed to maximize human intelligence can lead to a widespread form of intellectual passivity. Machine efficiency is potentially achieved at the expense of the user's critical agency.

The integration of AI into media and communication raises profound ethical and governance challenges that must be addressed alongside the cognitive and sociological shifts.

5.2. ETHICAL IMPLICATIONS: BIAS, OPACITY, AND THE CRISIS OF TRUST

AI systems are trained on historical data, meaning they inherit and amplify existing societal biases related to race, gender, and socioeconomic status. This algorithmic bias is a critical ethical challenge, as AI increasingly mediates social interactions and decision-making in areas like hiring, lending, and law enforcement (O'Neil, 2016). The opacity of AI algorithms—the "black box" problem— further erodes trust, making it nearly impossible for individuals to understand or challenge decisions that profoundly affect their lives.

McLuhan's work encourages us to examine the unseen effects. The ethical risk of AI is not only the content it produces but the subliminal normalization of biased, opaque decision-making (McLuhan, 1964). The "message" of the opaque AI medium is that complex decisions are best left to unaccountable systems, fostering a sense of helplessness and civic disengagement (Cortés Torres *et al.*, 2024; Han, 2022).

5.3. GOVERNANCE AND REGULATORY CHALLENGES: ANTICIPATING THE UNINTENDED

As AI technologies become ubiquitous, the need for effective governance and regulation grows (Benkler, 2019). Policymakers must move beyond simply regulating data privacy to addressing the systemic psychological and social risks identified by the McLuhanian framework.

The application of the tetrad is a valuable tool for anticipatory governance (Paxton, 2025). By asking "What will this technology reverse into when pushed to the extreme?" it becomes possible for regulators and professionals to proactively design safeguards against dependency, intellectual conformism, and hyper-polarization, rather than reacting to crises after they emerge. This requires balancing innovation with the protection of fundamental human capacities, critical inquiry, and democratic values (Takkeci, 2024). Specific areas for regulation include mandatory transparency of training data, frameworks for algorithmic accountability, and the promotion of a "right to be unmediated"—the ability to interact with information and others without algorithmic optimization (Zuboff, 2019). For this case, we understand Intellectual algorithmic conformism as the process through which algorithmic systems—via personalization, statistical optimization, and automated filtering—induce a progressive homogenization of thought, reducing exposure to divergent perspectives and constraining the formation of autonomous judgments.

5.4. FUTURE RESEARCH AND THE HUMAN-AI COEVOLUTION

The rapid evolution of AI demands ongoing, interdisciplinary research. Future studies must specifically explore the long-term neurobiological effects of continuous cognitive delegation to AI. This requires collaboration between media theorists, neuroscientists, computer scientists, and ethicists (Pedreschi *et al.*, 2025). Key research questions moving forward include:

- How does prolonged use of GAI affect divergent thinking and novel problem-solving in adults and children?
- What sociological mechanisms can mitigate algorithmic hyper-polarization and restore a shared public reality?
- Can educational policies effectively teach "AI-literacy" that emphasizes human agency and critical disengagement?

McLuhan's framework, with its focus on the psychological and social transformations wrought by the medium itself, provides the essential compass for guiding this inquiry

and for fostering a conscious, rather than passive, coevolution with artificial intelligence (McLuhan, 1964; Pedreschi *et al.*, 2025).

6. CONCLUSIONS

The updating of McLuhan's media theory in the context of artificial intelligence confirms the continued relevance of his framework for analyzing the mental, sociological, and artistic implications of emerging technologies (McLuhan, 1964; McLuhan & Powers, 1995; Carr, 2010; Han, 2022; Paxton, 2025). As extensions of human cognition, AI systems enhance creative production and data synthesis (Paxton, 2025; Pedreschi *et al.*, 2025). However, this enhancement is associated with the obsolescence of skills such as deep reading, autonomous problem-solving, and non-algorithmic artistic practices, potentially contributing to cognitive atrophy and digital amnesia (Carr, 2010; Han, 2022; Turkle, 2011). At the sociological level, the "global village" can be interpreted as evolving toward a "global panopticon," shaped by surveillance capitalism and algorithmic fragmentation, with implications for shared public discourse (Zuboff, 2019; Sunstein, 2017).

Within this framework, the McLuhanian conception of the artist as an "antenna of society" (1968) remains analytically relevant. The artist maintains critical distance from technological environments that may otherwise become normalized (McLuhan, 1964; Barrientos-Báez *et al.*, 2025). This function is observable through two mechanisms: the exposure of algorithmic bias and opacity (Pasquinelli, 2023; O'Neil, 2016) and the retrieval of slow, analog, and materially grounded practices as counterpoints to statistical standardization (Adam, 2016; Takkeci, 2024; Han, 2022).

The Law of Reversal suggests that technological augmentation may generate unintended effects, including dependency and reduced critical autonomy (McLuhan & Powers, 1995; Carr, 2010). These dynamics indicate the need for anticipatory governance frameworks that address structural media effects beyond content regulation (Paxton, 2025; Benkler, 2019). Sustained media literacy is therefore necessary to preserve critical agency within human-AI interaction (McLuhan, 1964; Pedreschi *et al.*, 2025).

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	Author 1	Author 2	Author 3
Conceptualization	X	X	
Data Processing	X	X	X
Formal Analysis	X	X	X
Research	X	X	X
Methodology		X	X
Supervision	X	X	X
Validation	X	X	X
Visualization	X		X
Drafting	X	X	X
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9. CONFLICT OF INTEREST

The undersigned declare that there is no conflict of interest.

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