Toward a Media Ecology of GenAI: Creative Work in the Era of Automation

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Abstract

Generative artificial intelligence (GenAI) is a complex and compelling machine learning technology that has sparked widespread social debate about its limits and possibilities. An analytical view from media ecology offers a remarkable framework to identify interrelationships between this emerging technology's problems and challenges. This article delimits the features of GenAI as a medium attached to media ecology and resorts to the conceptual tools of the laws of media (Four Effects) put together by Marshall and Eric McLuhan to reflect on creative work in the era of automation: amplification (or enhancement), obsolescence, retrieval, and reversal. Among the issues addressed are the implications of Gen AI as a technology for encoding representations, the loss of referentiality and traceability of works,

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the future of intellectual property and its impact on creative industries, and the return and revaluation stand out of shared experiences or performance.

Keywords

Automation; creativity; disruption; media ecology; creative industries; generative artificial intelligence.

Hacia una ecología mediática de la IA generativa: la obra creativa en la era de la automatización

Resumen

La inteligencia artificial generativa (IAG) constituye una forma compleja y efectiva de tecnología de aprendizaje automático que suscita un amplio debate social acerca de sus límites y posibilidades. En este sentido, una mirada analítica desde la ecología de medios nos ofrece un marco interesante para identificar interrelaciones entre los distintos problemas y desafíos derivados de esta tecnología emergente. Este artículo delimita los rasgos de la IA Generativa como medio inscrito en la ecología mediática y recurre a las herramientas conceptuales de las leyes de los medios que formularon Marshall y Eric McLuhan para reflexionar sobre la obra creativa en la era de la automatización: las leyes de la extensión, obsolescencia, recuperación y reversión. Entre las cuestiones abordadas destacan las implicaciones de la IA Generativa como tecnología de codificación de las representaciones, la pérdida de la referencialidad y trazabilidad de la obra, el futuro de la propiedad intelectual y su impacto en las industrias creativas, así como el retorno y revalorización de las experiencias compartidas o la *performance*.

Palabras clave

Automatización; creatividad; disrupción; ecología mediática; industrias creativas; inteligencia artificial generativa.

Rumo a uma ecologia midiática da IA generativa: a obra criativa na era da automação

Resumo

A inteligência artificial generativa (IAG) é uma forma complexa e eficaz de tecnologia de aprendizado automático que é objeto de muito debate social sobre seus limites e possibilidades. Nesse sentido, uma visão analítica da ecologia midiática oferece uma estrutura interessante para identificar as inter-relações entre os diferentes problemas e desafios derivados dessa tecnologia emergente. Este artigo delimita as características da IAG como um meio inscrito na ecologia midiática e recorre às ferramentas conceituais das leis do meio formuladas por Marshall e Eric McLuhan para refletir sobre a obra criativa na era da automação: as leis da intensificação, da reversão, da recuperação e da obsolescência. Entre as questões abordadas estão as implicações da IAG como uma tecnologia para codificar as representações, a perda de referencialidade e rastreabilidade da obra, o futuro da propriedade intelectual e seu impacto nas indústrias criativas, bem como o retorno e a revalorização de experiências ou desempenhos compartilhados.

Palavras-chave

Automação; criatividade; disrupção; ecologia midiática; indústrias criativas; inteligência artificial generativa.

Generative AI in the context of intelligence artificial

Generative artificial intelligence (AGI) has undergone a significant qualitative improvement over the last year from the development of large language models (large language models—LLM) based on access to large symbolic solution datasets on the internet (verbal and iconic languages of a representational nature). Adding software for the creating generative artificial intelligence (GAI) tools and the exponential progress of the functionalities of successive versions (popularly, in the passage from ChatGPT3 to ChatGPT4, developed by OpenAI) and the impressiveness of some of its results have fostered a social debate that has been ongoing since the middle of the previous decade.

GAI is a small part of a much larger and more complex phenomenon. In generic terms, AI is defined as "the imitation by machines of cognitive and learning systems for problem solving" (Baum et al., 2017). In this sense, AI assumes that any problem or task "can be solved automatically using self-governing mechanical and electronic devices that use intelligent control" (Regona et al., 2022). We operate in limited artificial intelligence (*Narrow* IA), which is applied to the solution of specific tasks based on complex models, such as translation or weather predictions. We are still far from general artificial intelligence (*General* IA), which anticipates the ability to solve complex problems without external intelligent control through its own dynamics, or artificial superintelligence (Super AI), which anticipates overcoming human capacities (Randaliev et al., 2022).

The areas of AI development include machine learning (*machine learning*), knowledge-based systems (*knowledge-based systems*), computer vision (*computer vision*), robotics, natural language processing, automated planning and programming, and process optimization (Regona et al., 2022). Beyond the canonical definitions, Table 1 summarizes some of the best-known tools and applications for each of these areas of AI development.

Table 1. Areas of AI development

Machine learning	nowledge-based systems	Computer vision	Robotics	Natural language processing	Automated planning and scheduling	Process optimization
Supervised learning	Case reasoning	Image restoration	Complex displacement systems (climbing, etc.)	Spoken language processing	Automated planning	Evolutionary algorithms
Unsupervised learning	Linked systems	Scene reconstruction	Locomotion systems	Textual language processing	Automated scheduling	Genetic algorithms
Reinforced learning	Smart agents	Motion analysis	Action systems			Differential evolution
Deep learning *	Expert systems	Image recognition	Sensory systems			Particle swarm optimization **

** Deep learning. ** Particle swarm optimization* (PSO).

Source: Authors' elaboration from Regona et al. (2022).

GAI (Cao et al., 2023) designates a subfield of artificial intelligence that focuses on creating systems capable of generating original and creative content, such as images, music, text and other types of language, including programming. Unlike conventional AI, which is focused on specific and predefined tasks, GAI is dedicated to generating new content based on machine learning models and data generation and processing techniques.

GAI uses a broad set of AI tools that place it at a key point of intersection for developing this type of technology, from various types of advanced artificial neural networks, such as adversarial generative adversarial networks (GANs), recurrent neural networks (RNN), and variational flow neural networks (VAE), to pretrained language models and deep learning applications, such as convolutional neural networks (CNN), which use spatial criteria of the data.

GAI is a type of AI dedicated to learning and identifying patterns and characteristics of datasets and cultural texts to generate new data or similar cultural texts according to the application context. It is important to highlight the unifying nature of GAI, which involves many areas of AI development, including machine learning, knowledge-based systems, computer

vision, natural language processing, and process optimization. Hence, it is an important milestone in current AI development (Cao et al., 2023).

Generative AI from the perspective of media ecology

From a media ecology perspective, GAI can be understood as a means of symbolic nature that, in McLuhan's terms (McLuhan and Powers, 1989), amplifies or complements the linguistic (that is, coding) competence of the human mind. Therefore, GAI is a language technology since it allows for the automation and expansion of the coding capacity of human beings; in other words, it is the ability to construct representations according to pre-established textual or visual codes of contexts or certain processes.

When the representation achieves certain perceptible singularity relative to its creator, the "unrepeatability" of its configuration or the transcendent capacity of its encoding ("going beyond language"), we move into the sphere of artistic creation, corresponding with what Walter Benjamin defined as "aura" (Weber, 2022). Benjamin (1999) questioned the place of artistic creation within the framework of massive industrial production and analyzed the difference between meaning and data by conceptually separating the "story" from the "information" (Benjamin and Zhon, 1963). Manovich (2013) extends the reflection on the status of a work of art to the absolute reproducibility of the digital environment and identifies modularity, recoding—that is, the translation of some codes to others—and automation as defining features of artistic creation in a new context. The possibility of mechanizing signifying action, the production of meaning – notes Manovich – is inscribed in the logic of the new media. Therefore, it is no coincidence that one of the first questions that arises when talking about artificial intelligence in a social field is that of creative singularity: can originality, innovation and opportunity be mechanized autonomously in the construction of sense, or are we facing a refined version of the Turing test (1948), which defines AI by the indistinguishable *outputs* regarding those of a conversation between humans? If the intelligent behavior of the machine is, ultimately—and as defined by Turing —a game of imitation (*imitation game*), the question refers to the possibility of coher-

ence between the unrepeatability and the indistinguishability of the (artificial) act of creation of meaning.

Due to its implications and potential impact on a culture built around the mass production of texts or symbolic artifacts, the delimitation of a technology as an autonomous and universal encoder demands an in-depth reflection within the framework of media ecology. We will address this task, at least in part, in these pages with some contributions from the information theory of Claude Shannon and Warren Weaver (1949) and from pragmatics, which reminds us that language is also a technology in context. To articulate our journey, we will follow the coordinates of the tetrad that McLuhan defined in his collaboration with Powers in *The Global Village* (1989) and revisited by his son Eric: the laws of extension, recovery, obsolescence and reversal (McLuhan and McLuhan, 2009).

Along the lines identified by Francis Bacon in the thirteenth century and, later, by Lewis Mumford (1969), McLuhan viewed technology as the extension of the physical and mental capacities of human beings. However, in its implementation, he also saw consequences, not only political, social or economic but—and here is the germ of media ecology—also cultural, cognitive and physical. The simultaneous biological, cognitive and cultural substrate of technology that Mumford, McLuhan, Innis and Ong observed acquired its maximum expression in the case of the GAI.

Extension

> *What does the medium extend, intensify, accelerate or make possible? This question can be posed for a wastebasket, painting, steam engine or zipper, just as it [applies] to a Euclidean proposition or a law of physics. It can be raised in any world or through any language.*
>
> (McLuhan and McLuhan, 2009, p. 290)

Like any medium, GAI is not an isolated phenomenon, alien to the ecology in which it emerges. In contrast, AI and, in particular, GAI – based on large language models – appear in a context of hyperconnectivity marked

by the availability of large data repositories, the explosion of computational capabilities and the generation of networks at multiple levels.

Hyperconnectivity accelerates the production cycles of multiformat texts and their insertion in daily interactions and introduces an increasing number of automation elements (filters, templates, management and scheduling tools, recommendation and filtering algorithms, etc.). Therefore, GAI is a product derived from this logic of automation of processes linked to the intensive production of content and, at the same time, is sustained by it: the immense repository of texts and multiformat signifiers that makes up the ubiquitous internet is the Ideal training ground for identifying probable patterns and contextual correspondences that makes GAI possible. Following the logic of Turing's "imitation game", the behavior of the machine does not reproduce the cognitive process of meaning creation but rather reproduces the most likely patterns of similarity with the result of that activity. Like writing or printing, AI is thus a means of extending language, that is, of codification. As a means of extending language, the GAI is characterized by having the following:

Universal character. It is applicable to any type of language or coding system, including machine languages or computer codes, which opens up the possibility of automating highly efficient recoding processes, such as automatic translations between different languages or transduction between natural language and programming languages.

Ontological character. The GAI affects all representation codes and their relationships and requires a redefinition of the relationship with the representation of reality. Hence, there is concern about the indistinguishable nature of the author and the lack of traceability of the representation: since the capacity for imitation is absolute, the capacity for manipulation is also absolute. The social debate provoked by the use of realistic but nonexistent "photographs" of public figures in unreal situations illustrates what constitutes a new form of image performativity. With this, the GAI returns the image to its prephotographic status and places the idea of simulation in

a new perspective (Vaskes, 2008) or refers to Fontcuberta's (2016) acute analysis of postphotography as a loss of referentiality of the photographic image. In terms of media ecology, the image returns from the footprint or the map to the sketch or the sacred symbol, from the *eikon* (image as a reference to reality) to the *eidolon* (imagined image) (Aguado and Martínez, 2005).

Mimetic character. GAI is based on reproducing existing models and connections, thus exploiting code redundancy. In their mathematical theory of information, Shannon and Weaver (1949) mathematically associate information with the improbability of the appearance of a given signal in an ordered set of signals (message) constructed according to rules (code). In contrast, the probability of the appearance of a signal in an ordered series is defined as redundancy. The complementarity between information and redundancy is equivalent to the visual complementarity between the figure and background: there is no one without the other, and vice versa. This complementarity between information and redundancy constitutes the robustness of a message and, by extension, of the code and allows its reconstruction, even when it has been partially destroyed by noise.

The well-known hangman game is a good example of these concepts: the most frequent letters do not allow us to guess the hidden word (they provide more redundancy than information), but they do allow us to reduce the search spectrum of the term. In contrast, the less frequent letters provide much information (because they are unlikely) and narrow the search spectrum greatly; however, as their probability of appearance decreases, they increase the risk of failure and penalty. Ultimately, redundancy makes it easier to reconstruct the message, but it does not provide information.

Curiously, the mathematical expression of this improbability is analogous to that of the expression of disorder in the formulation of the second law of thermodynamics (Pérez-Amat, 2009), so that the complementarity between information and redundancy would thus be associated with order and, therefore, with the reduction in uncertainty. As it is associated

with the probability of occurrence, redundancy has a direct connection with the mechanics of the imitation game: the algorithms learn to identify the most likely sign patterns for the proposed framework. The very idea of training with large data repositories affects the idea of redundancy management. Consequently, in systemic terms, we can say that the coding automation process is ultimately a process of redundancy simplification or mechanization. As AI expert Rodney Brooks has stated, "what great linguistic models are good for is to say what an answer to a question should sound like, which is different from what an answer to that question should look like" (Zorpette, 2023).

In conclusion, in systemic-informational terms, GAI has to do with redundancy management, not so much with information, and, more specifically, with the automation of the processes that allow information (repetition vs. creativity).

Obsolescence

> *When the environment extends or enhances an aspect, simultaneously, an aspect of the previous situation or condition is atrophied or disappears. What reduces or makes obsolete the new "organ"?*
> (McLuhan and McLuhan, 2009, p. 290)

Due to its ontological character and capacity for recoding (Manovich, 2013), GAI redefines the rules of representation and the connection between the sign and the representamen. In other words, GAI obliges us to review the pragmatic contract (the interpretation agreement between the creator and viewer) in its figurative or realistic aspects (Eco, 1982). In an environment of absolute reproducibility, indistinguishable from the sender/speaker and the immediacy of recoding, the conventional parameters of credibility in representation become obsolete. This change in the pragmatic contract of the representation of reality has cultural and political implications for the first order since the reliable representation of reality is at the base of the concept of journalistic information, which, in turn, supports the decision-making model that characterizes the citizenry in advanced liberal

democracies. A process of redefining the canons of representation of reality constitutes a cultural change of enormous magnitude and complexity, whose implications and consequences are difficult to foresee.

Additionally, automating textual production processes in natural and iconic language (images and videos) entails a certain loss of validity of important elements of contemporary cultural industries: it affects, for example, the idea of authorship and, with it, derived aspects, such as intellectual property. Who, for example, is the author of a Wall-E software creation? And of a "new" song by Frank Sinatra covering Coolio's "Gansgta Paradise" with his own orchestra?

The programmer, the creators of the multiple images or the various songs on which the software has been based for its creation, the software itself? In addition, where are the intellectual property or rights associated with the image or the voice? Is GAI "copied" into the product?

The challenges on the part of GAI for the current structure of intellectual property and, by extension, for the legal protection of creative processes may, in fact, have a derived impact on the current dynamics of cultural industries. The recent Hollywood actors' strike has one of its precise triggers in the increasing pressure of large studios to include in the acquired rights of actors both the interpretation of the actors recorded in the recording and their physical appearance, their voice and their gestures to be freely used by GAI in subsequent productions (Klippenstein, 2023). Questions have also been raised about the right of GAI companies to unlimited access to data on the internet for training their systems and about their possible obligations derived from the intensive use of images, sounds and texts that are the object of intellectual property.

In addition to the problems of quality and traceability, another distorting element of GAI in the cultural industry is the exponential acceleration of the volume of content production. Only the Mubert platform—one of the many platforms that experiment with music and AI—created 100 million songs, equaling the volume of the Spotify catalog (Tencer, 2023), which places conventional platforms, such as Spotify, in an unsustainable situation.

Recovery

What actions, services or forms of media return or are recovered with the emergence of the new media? What previously obsolete or outdated bases are recovered and integrated by the new media?
(McLuhan and McLuhan, 2009, p. 290)

We already discussed how the loss of referentiality of representation leads to a return to its imagined condition. By forcing the abandonment of the image footprint (*eikon*) due to the intractability of authorship, the hyperrealism of representation and the infinite plasticity of the code, GAI anticipates the return to the image symbol (*eidolon*). In our hypervisual culture, the image loses its status as a mark of reality and returns to its condition of expression of the imagined, something that the digital medium had already anticipated (Manovich, 2013; Fontcuberta, 2016).

This loss of referentiality of the code, derived from its hyperplasticity and from the automation of the processes that obscures access to the creative footprint, also has a far-reaching consequence: by describing coding—we could say paraphrasing Ong (1982)—GAI seems to impose a return to the traits of orality as a certificate of authenticity: immediacy, proximity, copresence, contextuality, spontaneity, fluency. In the era of profound falsehoods (*deepfakes*), before the horizon of an infinite capacity to impersonate the other (image, voice, words, gestures, even in real time), the exit is a return to the nonmediated interaction: the face-to-face conversation, the daily encounter, the shared context of spontaneity. At least until a redefinition—readaptation—of the canons of presentation/representation of identity occurs.

In contrast, when the automation of a procedure makes its product indistinguishable from the conventional procedure, there is a movement of revaluation of the previous method, sometimes even of its imperfections or limitations: something similar to what happened in the music industry with the revaluation of vinyls amid live broadcasting (*streaming*). In this sense, we can expect an intensive recovery of the taste for the sponta-

neous, the singular, the nonrepeatable, and the "authentic", in the sense of not being automatable, in a correction similar to the revaluation of the artisan in the age of production. Thus, for example, in an environment where songs can be produced and offered with the voice and instrumentation of anyone, in packages with different rates, it is plausible that the evolution of musical consumption will intensify from mere listening to experience, where presence, exclusivity and unrepeatability will constitute added value factors. However, how this dynamic affects the structure of an industry articulated on the basis of mass consumption is difficult to discern. In any case, it seems to be a setting with elements common to those of Renaissance music (the importance of patronage, the value of the experience that frames the performance, class distinction, social brand, etc.). A scenario that indirectly places us in the field of the fourth law formulated by McLuhan: that of reversion.

Reversal

> *When the new form of medium is taken to its limit in its potentialities (a phenomenon that is also complementary), it tends to produce a reversion and a return to the situation prior to its appearance. What is the potential reversal of the new media form?*
> (McLuhan and McLuhan, 2009, p. 290)

This is perhaps the most difficult aspect to address in the face of an emerging phenomenon such as GAI since the reversal requires a certain consolidation of the transforming environment; for example, only when cities were filled with automobiles did the advantages of urbanism designed for the pedestrian become evident. Even so, if it is possible to predict some of the areas in which the paroxysm of the GAI can imply a return to previous situations, it must be from a broad perspective and of a cultural nature.

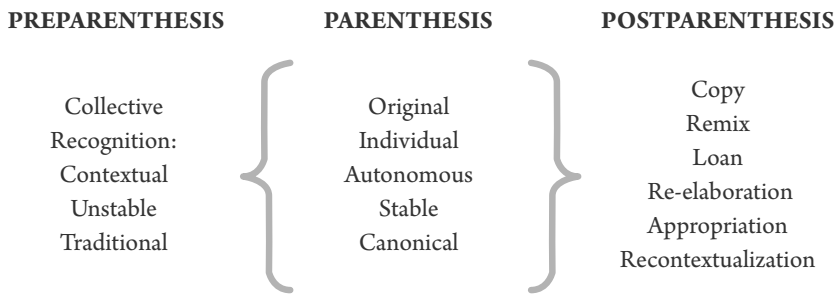
At the level of mass culture, some of the first symptoms of phenomena linked to reversion can be observed: the automation of content curation and the saturation of consumption have generated a passive user and a "commoditization" of the work creative, whose overabundance and

adaptability result in a loss of value, particularly for creators (Arenal et al., 2022). This absolute availability of the work of art as a commodity—initiated in the context of digital hyperconnectivity but accelerated by the IAG—also represents an added problem of discovery and management that adds an imprint of passivity to consumption. Indeed, in the era of personalized recommendation systems using AI, the difference between choice and creation tends to disappear: the distance that separates a selected piece from an infinite repertoire perfectly adjusted to the tastes of the user and a piece created ad hoc at the time and according to the tastes of the user is becoming closer.

In contrast, in the era of infinite supply, the user abdicates precisely his or her power of choice: when more and better can be chosen, less is chosen. First, the user delegates to intelligent systems that consider both their profile and their situation, location or state of mind. Additionally, because the user renounces the status of the message of creative work, this is no longer a text produced "by someone" but rather a text (automatically) produced "for someone". With the creator removed from the creative consumption equation, it becomes a self-referential looping exercise for the user.

Beyond the digital paroxysms of an AI-accelerated mass culture, there is a characteristic debate about the intersection between media ecology and literature studies that takes on an additional dimension from the perspective of GAI. We refer to the so-called "Gutenberg parenthesis", proposed by Sauerberg in 2009 and later developed by Pettitt (CommForum, 2010) and Jarvis (2023). Walter Ong's (1982) thesis on secondary orality, which came to characterize the fusion between characters of oral and written cultures as a consequence of the impact of electronic media, is a step further. Specifically, the common point of the Gutenberg parenthesis is the thesis that digital culture implies a return to cultural practices and dynamics typical of societies prior to the existence of the printing press, as reflected in Figure 1. These return features—that is, reversion—are articulated around immediacy, copresence, transience (or instability of the text), the importance of *performance*, the low relevance of the author and creative individuality, and the low weight of privacy.

Figure 1. Creative work: before and after the Gutenberg parenthesis



Source: CommForum (2010).

According to the theses of Sauerberg, Pettitt and Jarvis, the features of writing ultimately constitute a cultural, cognitive and sociopolitical parenthesis on a continuum of orality, a kind of pragmatic or communicational singularity characterized by the accessibility of the control and use of the representation codes.

The characterization that we developed in these lines of GAI as a means of language automation, that is, coding, precisely reflects the impact of AI within the framework of the Gutenberg parenthesis. In a sense, writing goes back to its elitist phase, when only a small privileged group had access to the domain of codes. The universalization and massification of the GAI on a mass of passive consumers can contribute to producing a similar effect: writing and coding return to the priesthood (the elite that dominates the code), while a majority remains at the level of symbolic immediacy. The lack of access to control of the code raises not only normative and moral problems but also the capacity for choice and, by extension, responsibility issues inherent to the idea of citizenship.

Conclusions

Generative artificial intelligence is a particularly complex and effective form of technology. Popular platforms and tools, such as ChatGPT, have sparked wide social debate in recent months about their limits and possibilities. In these pages, we attempted to delimit the features of GAI as a medium or

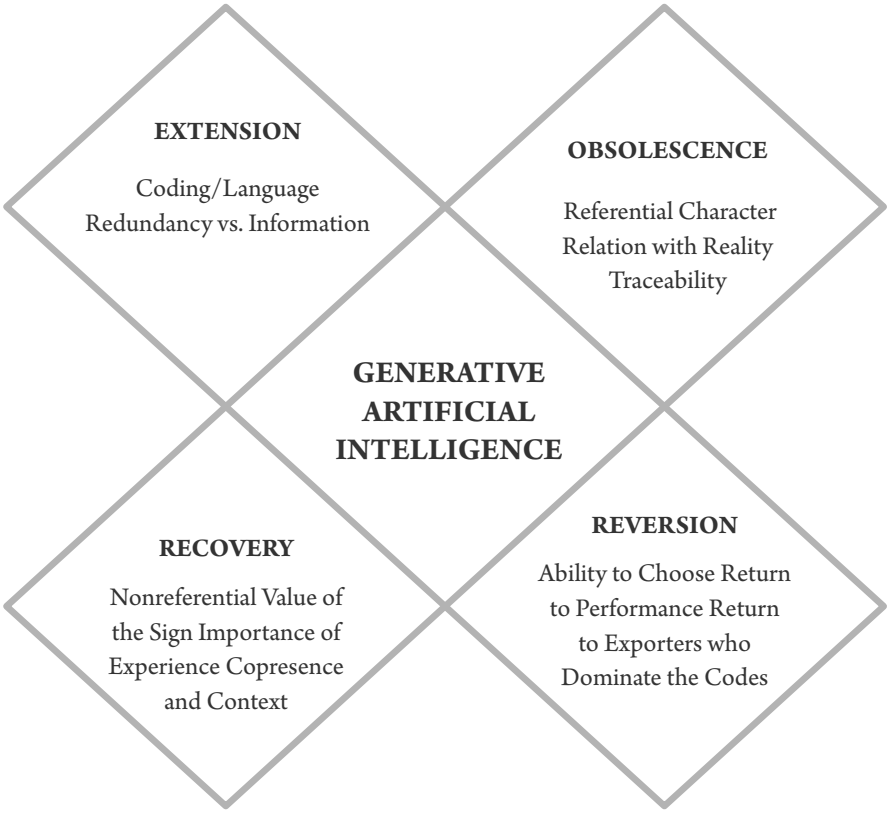
as a technology with a cultural substrate, in the sense of Mumford (1969). For this purpose, we approached his analysis from the perspective of media ecology, using the conceptual tools of the laws of the media that Marshall and Eric McLuhan (2009) formulated. Figure 2 summarizes the main ideas addressed in relation to the four laws of the media: extension, obsolescence, recovery and reversion.

We believe that if there is something that characterizes GAI, it is precisely that it is an automated code technology. In this sense, it is legitimate to identify it as a technology that extends the capacity of human language—that is, of coding and representation—in its broadest sense—textual, sound and iconic—but also performative—as metacoding. This extension of the capacity for representation—including its performative aspect, with effects on the tangible world—has transversal and profound consequences, particularly in the context of the culture of mass production and cultural consumption. However, it is convenient to place the debate on the originality or reproducibility of the creative act and its eventual automation in its proper context: when articulated from probable regular patterns of signs in defined contexts, the products derived from GAI do not relate to the information—in the mathematical sense that Shannon and Weaver (1949) gave it—but rather with redundancy (Pérez-Amat, 2009).

The debate on the automation of the creation of meaning reintroduces several classic problems of mass culture: the obsolescence of the condition of the sign as a reliable mark of the representation of the real and the loss of the traceability of the representation (who is the author?) are perhaps the most pressing. However, these refer, in turn, to perhaps more mundane problems, such as the future of intellectual property and rights over the work created, which in any case support the complex web of creative industries. The loss of referentiality of messages also poses a challenge for those social forms based on information, such as shared public knowledge (Aguado, 2020).

Like all technology, GAI involves the recovery of uses and features of previous contexts and environments. In this sense, it is worth noting how

Figure 2. McLuhan and McLuhan Laws of the Media Applied to GAI



Source: authors.

the loss of traceability and the hyperproduction of content favor a return to experiences, characterized by shared immediacy, copresence and the context of the experience, compared to a loss of value of the conventional work articulated through copying and mass consumption. In summary, it is a return to *performance* that has to do with the uniqueness of the experience of the text or of the creative work.

This return to characteristics of oral cultures, which Ong (1982) had already identified, places GAI as a relevant factor in the framework of the thesis of the "Gutenberg parenthesis" (Sauerberg, 2009), which understands alphabetic culture as a technological and communicative singularity characterized by the democratization of the control of codes of representation.

In this sense, digital acceleration and, particularly, forms of artificial intelligence such as GAI contribute to a new elitization of control and code generation capabilities.

The perspective of media ecology allows us to address the profound implications of GAI in the cultural and social context with the necessary distance from its functional imperatives or its expectations of monetization. The ecological look offers an interesting framework to identify the interconnections between the different problems and challenges derived from an emerging technology that, perhaps for the first time since the press, disrupted the deep structure of the codes of representation of global society.

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