





The Upscaling of the Early Cinema Image through Artificial Intelligence. A New Aesthetics between Continuity and Dissent in Image Theory (1)

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EN Abstract. An active community of users is manipulating the image of early cinema using Machine Learning-based software. This practice, encompassed in the field of Artificial Intelligence, has transformed the materiality of these images, generating a mutated image as a result. Through a qualitative research design, based on a hermeneutic approach, this research aims to delimit the nature of this new image by observing it from the theoretical parameters that have shaped the specificity of the original filmic image. Starting from three historical concerns of film image theory, we have studied the interferences that this mutated image produces in the field of aesthetics, in its signifying relationship with reality and in its own ontology. Surprisingly, the new mutation presents a meagre break with the theoretical tradition of the cinematic image, oscillating between a slight dissidence and a marked continuity of its postulates.

Keywords: early cinema image; image aesthetics; image ontology; artificial intelligence; machine learning.

ES La mejora cualitativa de la imagen del cine primitivo a través de inteligencia artificial. Una nueva estética entre la continuidad y la disidencia en la teoría de la imagen

ES Resumen. La imagen del cine primitivo está siendo manipulada por una activa comunidad de usuarios a través de *Machine Learning*. Esta práctica, englobada en el campo de la Inteligencia Artificial, ha transformado la materialidad de estas imágenes, generando como resultado una imagen mutante. A través de un diseño de investigación cualitativo, basado en un enfoque hermenéutico, esta investigación pretende delimitar la naturaleza de esta nueva imagen observándola desde los parámetros teóricos que han configurado la especificidad de la imagen fílmica clásica. Partiendo de tres preocupaciones históricas de la teoría de la imagen cinematográfica, hemos estudiado las interferencias que esta imagen mutada produce en el campo de la estética, en su relación significativa con la realidad y en su propia ontología. Sorprendentemente, la nueva mutación presenta una exigua ruptura con la tradición teórica de la imagen fílmica, oscilando entre una leve disidencia y una marcada continuidad de sus postulados.

Palabras claves: imagen del cine primitivo; estética de la imagen; ontología de la imagen; inteligencia artificial; machine learning.

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1. Introduction

The early cinema image (Burch, 1990) is being manipulated by an active community of users through the application of Machine Learning tools. This practice, included in the field of Artificial Intelligence, has changed the materiality of these images –color, format, resolution, and number of frames–, and has favored the appearance of a participatory disposition in an image historically associated to a contemplative regime. Machine Learning's praxis induces the manipulation of images through the operational interaction by which the program empowers the user through its interface. This tautology of interactivity (Manovich, 2001), typical of a computer-based mediation, allows the transformation of the cinematographic image into the properties indicated.



Figure 1. *Arrivée d'un train à la Ciotat*. Directed by Frères Lumière, 1897. Aspect ratio: 4:3 (1.3:1). Source and License: YouTube, CC BY.



Figure 2. *Arrivée d'un train à la Ciotat*. Directed by Frères Lumière, 1897. Aspect ratio: 16:9 (1.78:1). Resolution: 3840 x 2160 (4K). Source and License: YouTube, CC BY.



Figure 3. *Arrivée d'un train à la Ciotat*. Directed by Frères Lumière, 1897. Aspect ratio: 16:9 (1.78:1). Resolution: 3840 x 2160 (4K). Color: Colorized. Source and License: YouTube, CC BY.

This transition towards a participatory capacity is due to the extensive power of software in its interference in the field of media (Manovich, 2013). In this way, Machine Learning empowers us to operate a profound intervention on the early cinema image turning it into a new cultural object: a *mutated image*. This new image produces interferences (1) in the field of aesthetics (Renoir, Debray), (2) in its signifying relation with reality (Burch, Morin, Bazin), and (3) in its own ontological character (Virilio, Mitchell). In the following paper, we try to weigh the gravity or futility of these observations from the field of image theory.

When we speak of Artificial Intelligence's applicability to the early cinema image, we do so in a loose sense. Strictly speaking, we are talking about a computational framework that has managed to assimilate the nature of this image thanks to the previous swallowing of a huge amount of them. This accumulated experience in the form of ingestion subsequently allows the composition of new images. This process is not

governed by abductive principles, it is not based on unknown environments (Eco, 1983), but on a preceding contextual work that, inexorably, distances it from the usual meaning of understanding.

The task of the software is to find a mathematical formula that, when applied to a collection of inputs called ‘training data’, produces the desired outputs. This supervised learning formula is susceptible to generate correct outputs for other types of inputs, other than those used in the training data process, ‘on the condition that those inputs come from the same or a similar statistical distribution as the one the training data was drawn from’ (Burkov 2019, p. 3; Cf. Eco, 1983, p. 281).

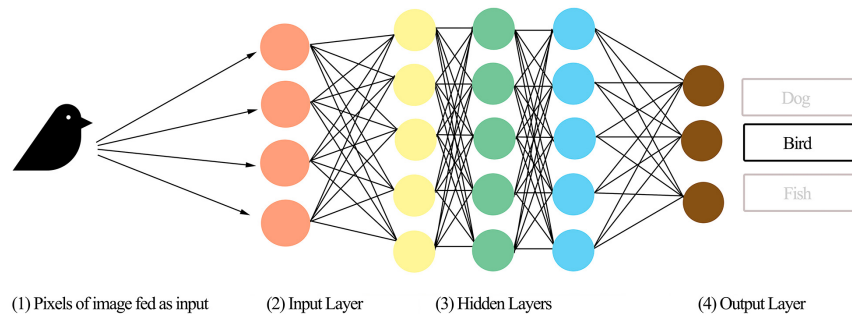


Figure 4. Graphical Representation of the Convolutional Neural Network (CNN) Process for Image Upscaling through Machine Learning. Source: own elaboration.

If the application of Machine Learning to the early cinema image cannot be considered an *intelligent* procedure, neither can we define it as an act of *learning*. If the input is slightly distorted, it is very likely that the output returned will be incorrect. As we know, learning in animals is much more flexible. If a person learns to play a video game sitting in front of a screen, he will be able to continue playing if we turn the screen slightly. However, if a Machine Learning algorithm has been trained to play in the identical position, it will not be able to continue if we rotate the image, unless it has also been trained to recognize the new location of the output device (Eco, 1983; Burkov, 2019).

Before continuing, it should be noted that in this work there is a latent opposition between the concepts of *Upscaling*, a term we apply to Machine Learning work with images, and *Film Restoration*, a process that starts from a given work to improve its reception in the interest of recovering the original state of the film at the time of its filming (Peters, 2014).

In the latter case, the materiality of the early cinema image, which as we will see has been ideologically assumed by image theory as an improvable *imperfection*, has become one of the resources of humanity to understand the development of the social and historical foundations of the twentieth century (Jones, 2012). Is it convenient to permute the constitution of these images, or should we preserve them as intact vestiges of our historical, aesthetic, technological, and social footprint? Obviously, the purpose of this paper is not to invalidate the practice of Machine Learning, whose application has proven successful in various fields, from driverless driving or language translation to coronavirus diagnosis through images (Narin, Kaya and Pamuk, 2021). However, its intervention in the field of the early cinema image may cause problems conceptually close to the paradox of the time machine. If the materiality of the film encloses a certain conception of the epoch and, consequently, of our past, altering it means a rupture with our present because ‘history should not be reconstructed solely on paper’ (Rosenstone 1995, p. 20).

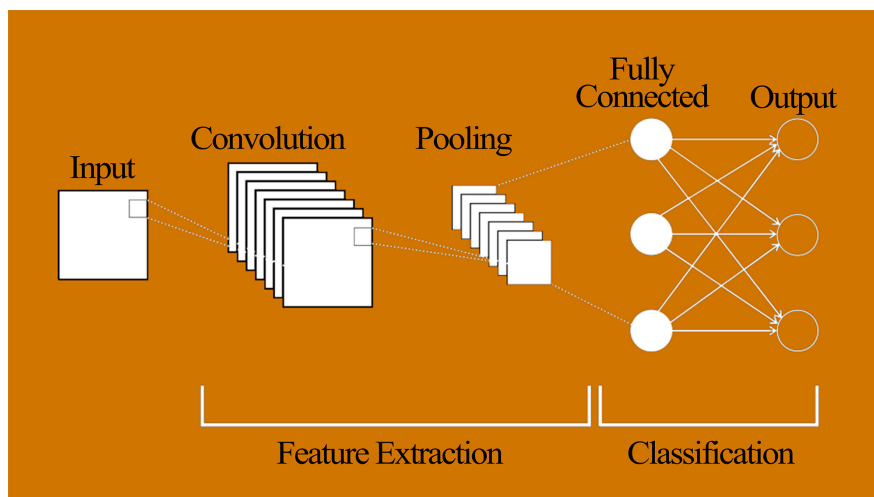


Figure 5. Showing the Three Essential Layers of the Convolutional Neural Network (CNN) process. Source: own elaboration.

2. A New Materiality Prefigured from a Double Convergence

The emergence, capacity and operability of Machine Learning software can be traced in the genealogy of media. The change in the materiality of the digital image is described by Manovich in *The Language of the New Media* (2001) through his famous pentagram. These five characteristics remain valid twenty years after their establishment and are still useful to describe the processes by which two successive convergences, *digital* in the first instance and via *software* in the second, have changed the face of media.

The first pair of these principles, *numerical representation and modularity*, deals with problems concerning the specificity of new media; the next pair, *automation and variability*, affected by the previous binomial, is related to more far-reaching operational issues connected with authorial intentionality and interface ductility. But it is undoubtedly the fifth element, the principle of *cultural transcoding*, the most important for this research (Manovich, 2001, p. 92).

According to Manovich, cultural objects produced by the new media show a double facet where before there was only one (p. 92-95). Thus, 1) all new media objects can interact with culture, as was already the case with those created by the old media, but, in addition, 2) they are able to establish a particular dialogue between them. This dialogue is impossible in traditional media because it is determined by their exclusive informatics layer. For example, a video file shares with an image file a certain data structure and compression method that can be extended to an audio file. This new ability, at once a statement of uniformity exacerbated by the hegemony of software, is changing the relationship of objects to culture, affecting it as never before in the analog era.

Manovich's principles are encompassed in the *first convergence* of new media, caused by the application of digital processes to the production of cultural objects. But it is also possible to recognize in them the emergence of the *second convergence*, brought about by the totalitarian irruption of software in the field of media (Manovich, 2013). Machine Learning can be understood as a result of both.

The *first convergence* was foreshadowed by McLuhan and R. Powers in the field of communication theory and prefigured by Deleuze and Guattari from the field of philosophy. Influenced by the exuberant terminology of *L'anti-Oedipe* (1972), McLuhan drew in *The Global Village* (1989) a technological landscape split into two realities. The Deleuzian concept of *line* was renamed as *visual space*, whereas the *rhizomatic* model was renamed as *acoustic space*. While visual space possesses qualities such as hierarchy, order, and sequentiality, acoustic space, which is much more fluid, is characterized by decentralization, holism, and juxtaposition. Both spaces are only figures for the intellection of the distinction between the technologies of the past and the technologies of the future. Is not this double spatiality a metaphor for the transition to digitalization that occurred in the nineties of the last century? Digital has transmuted the watertight compartments of the old media into fluid space. The technology of pre-digital video and the technology of analog photography maintained serious ontological connections as they both shared their capacity to mechanically record reality; however, they both inhabited independent technological dimensions. Today we contemplate the spaces of video and photography as an undifferentiated continuum whose boundaries have been erased by the digital.

In the same work, the terms *enhancement and obsolescence*, one of the two pairs of *figure and ground* of McLuhan's famous tetrad, serve to explain the phases of a technological artifact in culture. When a new technology becomes a figure, occupying a relevant position in our lives, another becomes a blur in the background. Possibly, this conversion of the early cinema image into a *mutated image* will come to occupy a prominent position in the study of primitive cinema. Will this be the case in the immediate future? For McLuhan, this is the traditional functioning of any cultural object.

However, to the apocalyptic relief, the process pointed out by the media theorist is completed thanks to another *figure and ground* binomial, composed by the instances of *retrieval and reversal*. Every technology promotes the recovery of a previous forgotten factor or process when it reaches a high level of saturation, showing an inverse behavior for which it was created. At present, digital cinema has not yet reached this stage of recovery, although the so-called *material turn* is affecting the current discourse of film heritage. This movement pursues a renewed yearning for the purity of the material experience of cinema, a return to film at the expense of the numerical format; currently its traces can be found in the work of filmmakers and artists alike, 'including Peter Delpout, Gustav Deutsch, Bill Morrison, Tacita Dean, and most recently Hollywood filmmakers such as Christopher Nolan, Paul Thomas Anderson and Quentin Tarantino' (Fossati 2018, p. 18).

The *second convergence*, initiated with the software revolution, has ended up imposing *modus operandi* that further standardize media differences. This new mass media reality has brought about an operational unification due to the impregnation of software logic in the constructive processes of cultural objects, thus affecting our understanding of culture. Therefore, 'Are there some structural features which motion graphics, graphic designs, websites, product designs, buildings, and video games share since they are all designed with software?' (Manovich, 2013, p. 4). This question tries to show how interfaces are modifying our worldview in a direction of no return towards the simulation of a reality that is born in the execution of the computing machine itself. The interactive dialectic of software imposes itself in the era of the technical image (Flusser, 2017) making the user participate, manipulate, reconstruct, alter and modify different cultural objects (Lammes, 2017), and generating new dispositions in prosumers that entail profound cultural changes.

3. Methods and Instruments

In this intersection of software with culture, of Machine Learning with the early cinema image, certain questions are foreshadowed that have only been sketched so far. The main question to which this research aims to answer can be stated as follows: What levels of dissidence and continuity does this transformation

of the materiality of the early cinema image show with the classical formulations postulated by the theory of the image?

In this paper we will undertake the analysis of certain configurative aspects of the early cinema image – called *instruments*– in order to verify their resilience in the *mutated image*. Despite the intrusion of software in the result of the new image, is the latter still indebted to the ideological principles that helped theorize a certain specificity of the early cinema image? This last question leads us to the definition of the methodology and the instruments chosen for this work.

The answer to these questions must be sought through a methodology based on a qualitative design. Qualitative research aims to approach the world *out there* in order to understand, describe, and sometimes explain social phenomena by analyzing their interactions as they occur. This procedure is based on the observation of the phenomenon and ‘on the analysis of appropriate material, texts, images, films and other similar traces, product of these interactions and of the experiences of individuals in society’ (Flick, 2015, p. 12).

The qualitative method is not defined in negative terms –qualitative research is *not* quantitative and *not* standardized– but is characterized by “the use of the text as empirical material, starts from the notion of the social construction of the realities under study, and is interested in the everyday practices and knowledge that refer to the studied issue” (Flick, 2015, p. 20). In this sense, qualitative research studies things in their natural environment, tries to make sense of the different phenomena, and interpret them from the point of view of the meanings that people give to them (Denzin & Lincoln, 2005).

Several purely qualitative research perspectives can be defined, all with different theoretical positions, data collection methods and interpretation approaches (Flick, 2015). This research has started from a hermeneutic analysis of the underlying structures of the object of study, chosen from a triad of possible approaches (*Table 1*). The following is a description of its elements shaded in color.

The qualitative method chosen consists of three elements. First, the theoretical perspective that allows us to approach two different stages of the image –image and softwarized image– is called *Genetic structuralism*. By simple image we mean images that have not been generated by the intervention of digital technology or thanks to the power of software. In order to analyze these two types of images, technologically different, we must accept that in both of them, despite the intrusion of this technological component, the same ideology underlies, that which allows the researcher to jump from one to the other, knowing that in both cases, and despite their differences, he is dealing with the same cultural object. Secondly, this qualitative method requires certain materials on which the researcher must operate. These materials, which we have called *interactions*, are the enhanced images that we have analyzed for the research. Their name, interactions, reveals that they are the result of human agency, either directly or indirectly. Finally, thirdly, we have chosen a hermeneutic, i.e. interpretative, approach. To counteract the subjectivity of the researcher, something very common in any interpretative process, we have proposed certain instruments with the desire to limit it. These instruments are themes recurrently investigated by the authors on whom we have relied to make this research, a selection of themes that has helped us to erect the limits of the interpretation. The selected qualitative method is now described in more detail with the help of tables showing the *interactions* and the *instruments*.

Table 1. Qualitative approach to work.

	Focus on subjective points of view	Descriptive approach to social situations	Hermeneutic analytical approach to underlying structures
Theoretical positions.	Symbolic interactionism.	Ethnomethodology. Constructionism.	Genetic structuralism.
Methods of data collection.	Semi-structured interviews. Narrative interviews.	Discussion groups. Ethnography. Participant observation. Interaction log. Collection of documents.	Interaction log. Photographs. Films.
Interpretation methods.	Theoretical coding. Content and narrative analysis. Hermeneutic methods.	Conversation, discourse and documentary analysis.	In-depth hermeneutics.

Source: own elaboration.

Genetic structuralism is understood as a theoretical position where the critic adopts a historical approach to the analysis of the structure of a phenomenon in the belief that there is a homologation with the collective mental structure of the epoch in which it is manifested (Goldmann, 1980). In other words, we can observe the same categories in the description of the early cinema image and its mutation because elements belonging to the same epoch underlie in both. As stated before, from this perspective we will try to verify if the appearance of the software has also changed, beyond the evident material transformation, the historical and genetic ideas that have helped to define the early cinema image in our culture or, on the contrary, if its mutation into a new image is indebted to its same regulating principles and, therefore, to a projection of the immutable ideology of a certain historical time, in the sense expressed by Goldmann.

On the other hand, the *interactions* section of the research is made up of the different mutations of films from the early cinema period that have seen their materiality altered through software.

Table 2. Interactions.

Film	Enhanced image
<i>Repas de bébé</i> . Directed by Frères Lumière, 1895. Operator: Louis Lumière*. Vue n° 88.	(Channel Nineteenth century videos. Back to life, 2021, 3m16s). (Cf. References for link to <i>Youtube</i>).
<i>Rue Tverskaïa</i> . Directed by Frères Lumière, 1896. Operator: Charles Moisson*. Vue n° 307.	(Channel Denis Shiryayev, 2020, 2m10s). (Cf. References for link to <i>Youtube</i>).
<i>Arrivée d'un train à La Ciotat</i> . Directed by Frères Lumière, 1897. Operator: Louis Lumière*. Vue n° 653.	(Channel Deoldify videos, 2020, 48s). (Cf. References for link to <i>Youtube</i>).
<i>Bataille de neige</i> . Directed by Frères Lumière, 1897. Operator: unknown*. Vue n° 101.	(Channel Nineteenth century videos. Back to life, 2021, 52s). (Cf. References for link to <i>Youtube</i>).

Source: own elaboration. *Data: Catalogue-Lumière.com

Finally, the *hermeneutic perspective* of the method (Ricoeur, 1969; Thompson, 1990) is justified by the place from which we analyze the early cinema image through the selection of certain recurrent themes of image theory. Indeed, *depth hermeneutic*, an articulation of Ricoeur that Thompson modifies *motu proprio* 'with the aim of studying the ideology of mass communication' (p. 405), seeks to understand cultural objects –in our case, the early cinema image and its mutated reverse– from the construction of its meaning, marked by the historical and social conditions of its production. Let us not forget that the theory of the image, like any other theoretical process, can be considered a sediment, and at the same time a driving force, of the historical and social meaning of images.

In a way, what Thompson proposes is the objectification of interpretation, clearly an oxymoron, through the establishment of a methodology erected *ex profeso* to approach the object of study. This new method is materialized in the choice of a certain number of tools, a series of *instruments* chosen in a sampling work (Flick, 2015). Thus, we have decided to work with certain recurrent themes of image theory and to disregard others according to their suitability to the interests of the study. Let us not forget that all interpretation is a constructive operation of the interpreter who selects and reconstructs by imputing a meaning among many other possible meanings. All hermeneutics is an open process that does not aspire to total mediation, in the sense of Gadamer (2004), because it can never be closed (Ricoeur, 1969).

As we shall see, these instruments are historical objectifications undertaken on the image by one or more scholars. Their concreteness responds to the verbalization of the commonplaces of image theory that best fit the objectives of the research. Generally speaking, the triad corresponds to the problems derived from the user's interventionism as was seen in the introduction to this article: (1) interference in the field of aesthetics, (2) significant relationship with reality, and (3) ontological problems of the image.

Table 3. Instruments for a hermeneutic analysis.

Instrument	Image theory topics	Essential authors
(1) Aesthetics.	(1) The value of the aesthetic experience. The ages of looking.	Renoir, Debray.
(2) Realism.	(2) The total image and its historical relationship with the psychic drive of realism.	Burch, Morin, Bazin.
(3) Ontology.	(3) The disappearance of the subject and the visibility of the non-existent.	Virilio, Mitchell.

Source: own elaboration.

4. The Value of the Aesthetic Experience. The Ages of Looking

For more than a century, most books and articles that have dealt with beauty in art have done so from a psychological perspective. The focus of this operation has been on the human response to beauty in the field of art, i.e., what has been called *aesthetic experience* (Tatarkiewicz, 2001). The current concept of aesthetic experience assumes that there is a mental attitude in the viewer that influences the perception of the work. From a historical point of view, this component of subjectivity is to be found in the focus of the idealist critique of the judgment of works of art. For Kant, the taste that judges whether a work is or is not beautiful has the pretension of a universal judgment without being able to rationally demonstrate its correctness, since its determining cause is the feeling of the subject and not a concept emanating from the object (Venturi, 2004).

Specialists in the study of the early cinema image have established a certain aesthetic disposition towards its viewing derived from its original materiality. The first argument for this disposition is based on the strong epochal imprint conveyed by the early cinema image. Jean Renoir, son of the painter Auguste Renoir, idolized the image conveyed by the Lumière cinematograph because of its capacity to offer us an impression of a period not surpassed by any history book (Rohmer, 1968). As a second argument, we see how the revelation that the prefiguration of this mode of aesthetic reception of early cinema, associated with a certain sense of epoch, lies in the level of development of the technology of the time; a technological development whose consequences are the number of frames per second –from fourteen to twenty–, the instability of the film resulting from a deficient drag system or an unskilled operator, the black and white image, the absence of soundtrack or, in discursive terms, the exclusion of the spectator subject from a non-closed story (Burch, 1990). The power of cinema and its technological evolution end up transferring to the represented object its own capacity, or inability, to register reality. This fact makes indistinguishable our idea of a certain epoch –the

transition to the twentieth century– from the qualities of the image attributable to the technological development of the medium to carry out its task of stenographer. Consequently, as a third argument of this particular aesthetic disposition, the early cinema image has led to a case of iconic fetishism where its imaginary is idolized, making it impossible to separate its own materiality from the meaning that has been culturally granted to it as a metaphor of a certain historical time.



Figure 6. *Rue Tverskaïa*. Directed by Frères Lumière, 1896. Ensemble of neural networks used for: 1) FPS boosting – to 60 frames per second; 2) Image resolution boosted up a bit with ESRGAN (general dataset); 3) Resorted video sharpness, removed blur, removed compression artefacts; 4) Color: Colorized. Source and License: YouTube, CC BY.

However, all these arguments are now in crisis. A new materiality emerges that commands a different aesthetic disposition, objectified in the characteristics of a hyper-technified era whose tentacles extend over all cultural objects. This new aesthetics, which we could call Pythagorean, since its harmony dwells in numerical representation, carries with it the encumbrance of its own time (Agamben, 2004). Thus, the first argument of this new provision 1) states that the image, whether synthetic or not, must be produced and marketed at the highest possible resolution. Although we do not have time for its development, one should consider how much this idea owes to the obsession with graphic quality demanded in the reception of video games (Amanatides, 1987; Pastor, 2017). As a second argument, 2) this desire or drive is implicit in the very growing and inexhaustible logic of hardware and software performance, a simile of the very infinity of the capitalist system from which it emanates (Navarrete-Cardero & Vargas-Iglesias, 2018). Consequently, as a third argument, 3) the power of the image, in the sense wielded by Freedberg (1989), lies more in its tendency to display the result of the upscaling process than in the value of its content. The exchange value imposes itself on the value of use. Thus, the user demands the fulfillment of certain quality requirements, converted into a new standard of vision, but ignores other ideological considerations. The mutation eliminates all traces of the image's historical charge, a gesture that nobody seems to care about as long as it is viewed at a horizontal resolution of four thousand pixels and at a speed of sixty frames per second.



Figure 7. *Repas de bébé*. Directed by Frères Lumière, 1895. AI FPS interpolation: realistic recreation of intermediate frames by AI algorithms, from 15-25 fps, depending on the initial footage, up to 50 or 60 fps, achieving a great feeling of realism. Color: Colorized. Source and License: YouTube, CC BY.

These different aesthetic dispositions can be justified by the inclusion of the early cinema image and the *mutated image* in different historical regimes of looking. As Debray suggests, the history of images 'does not follow the articulation of history-duration in agreed periods' (Debray, 1994, p. 175) and can make use of 'a more radical temporality of its own' (p. 176). This idea comes to mean that the periodization of the image is not watertight, 'there is nothing after a caesura that is not already found before' (p. 176). His well-known division of the image into the realms of *logosphere*, *graphosphere* and *videosphere* may shed some light on the problem of the different aesthetic dispositions already seen. While the early cinema image lies between the *logosphere* and the *graphosphere*, the mutated image through Machine Learning clearly belongs to the field of the *videosphere*. Let us recall that the three regimes establish different characteristics for the image in a sort of shared taxonomy, but of varying significance, of which we highlight the principles of efficacy and authority, the working norm, and the cult object (Cf. Debray, 1994, pp. 178-179).

Debray's principle of efficacy reminds us of Bergson's statement about the image: 'It is more than the representation, but less than the thing' (Bergson, 2010, p. 28). This ubiquity allows the early cinema image to oscillate between its transcendent, almost supernatural consideration, as Bazin understood it, and its nature as an illusion of reality. Its principle of authority underlines this idea. In the regime of the *logosphere* the author of the image is God, while in that of the *graphosphere*, it is the man. As Burch reminds us, the first projections of the cinematograph were seen as the attainment of immortality, a design reserved only for the divinity (Cf. Burch, 1990, pp. 38-39). Therefore, the power of the cinematographic image lies in its capacity to be at the same time *image* of God and *icon* of reality; simultaneously, meaning and sign.

For its part, in the *videosphere*, where upscaling practices are inserted, Machine Learning short-circuits in the *mutated image* any idea of transcendence, of meaning, breaking even its link with reality, that is, its iconic nature, by being able to generate images where there was only emptiness, moving from eighteen frames per second to sixty, to extract them, metaphorically, from nothingness. Its principle of authority no longer refers to God, nor to man, but to the executing power of the software. In the *logosphere*, 'the artist usually operated on a canvas placed on a frame; in the *videosphere*, the visual is fabricated without touching it, by interposed electrons' (Debray, 1994, p. 182).

The working norm and the cult object of the early cinema image and its mutation differ again. If the cinema image is created by someone -'I create'- according to a model of reality and, in the process, this representation can rise -'I extol'- towards transcendence, in the field of the mutated image the working norm is defined by an event that does not refer to a model of reality but to a capricious mode of production -'I produce according to a mode, according to myself'-, made possible by software. Finally, if for Debray the cult objects of the *logosphere* and the *graphosphere*, where the image of cinema is located, are respectively the *saint* and the beautiful -we could rather argue the *movie star* and the beautiful-, in the *mutated image* the cult object is reduced to the surprise and innovation imprinted in the current devotion to software, where its capacity to generate high-resolution images cuts off the possibility of any other value.

It makes no sense to insist on other characteristics of the three continents mentioned by Debray since, irremediably, we will walk towards the rupture of the early cinema image with its mutation. Its aesthetic dispositions are different simply because both the idiosyncrasy of the spectator, who has become a user, and society demand new attitudes towards the image. If this first *instrument* concludes in an irreconcilable stance between the two images, we will now see how it is possible to point out the same ideological and genetic substrate, the same archeology of ideas, in the domain of regularity and repetition (Foucault, 2002; Keightley and Pickering, 2014), which turns this initial schism into a mirage.

5. The Total Image and its Historical Relation to the Psychic Drive of Realism

Although the debate on the relationship between realism and art predates the emergence of the medium of film, its visual nature and its capacity to record reality soon made it a propitious field for discussion. In the 19th century, just a few decades before the birth of the cinematograph, the realist work of the painter Courbet had become the perfect antidote to neoclassical academicism and the dreaminess of early romanticism. The rejection of Courbet's work predicts the negative judgments made about the cinematograph as a realistic and vulgar device and, at another level of incidence, allows us to understand the theoretical urgency for the establishment of cinematographic specificity, located in its formative resources, with the aim of distancing the new medium from the dangerous universe of realism.

With the birth of cinema came the first conceptual bifurcations about the nature of the cinematic image. These oscillate between its apotheosis of realism and its inability to show anything closer than a gloomy shadow of reality. After the premiere of the cinematograph at the Salon indien du Grand Café in December 1895, the Parisian newspaper *La Poste* emphasizes this idea:

When these cameras are made available to the public, when everyone can photograph their dear ones, no longer in a motionless form but in their movements, their activity, their familiar gestures, with words on their lips, death will have ceased to be absolute (Burch, 1990, p. 21).

Very different, but with identical roots, is the idea expressed by Gorky in his text *The Kingdom of Shadows*. Although apparently contrary, the Parisian newspaper's appraisals and Gorky's impressions are inscribed in the same orbit of hyperrealist yearnings demanded by bourgeois culture in terms of representation. On July 4, 1896, the Russian writer discovered the invention of the Lumière brothers at the Nizhny Novgorod fair. His experience is translated into two articles published in the newspaper *Nizhegorodski Listok*. The first is the

story of a descent into the realm of darkness, a place quite different from the realistic space described by the Parisian newspapers, unable to satisfy the Russian writer's desire for integral realism:

Last night I was in the Shadow Realm. If they only knew how strange it is to feel in him. A world without sound or color. All things – land, trees, people, water, and air – are infused there with a drab gray. Gray rays of the sun piercing a gray sky, gray eyes amid gray faces and, in the trees, ash-gray leaves. It is not life but its shadow, it is not movement but its silent spectrum (Gorki, 1981, p. 17).

Years later, in his famous articles *Ontology of the Photographic Image* and *The Myth of Total Cinema*, Bazin demonstrates that the realist demand has not disappeared from the theory of the image (Bazin, 1966). In the first, the French critic links the ontological principle of cinema and photography, that is, their capacity to record reality, to a psychological drive that has always been present in the plastic arts: the overcoming 'of time and death through the perenniality of form' (p. 23). Photography and cinema are inventions that satisfy and at the same time sublimate the obsession for realism.

Thus, it is not surprising that in his second article, Bazin denies the objective existence of the cinematographer by virtue of this perpetual yearning for perfection, oriented towards an integral and total representation of reality not yet satisfied. In other words, cinema exists only in the imagination of men who dream of the myth of integral realism, of a total image that will imply an indistinguishable recreation of the world. From this perspective, 'cinema, really, has not yet been invented' (p. 38).

Is, therefore, the application of Machine Learning to the early cinema image one more step towards the search for the total image, one more milestone in the culmination of this ideology? As Bazin suggests, if cinema at its birth did not have all the attributes of the total image, it was against its will. Quite simply, the technology of the time was not up to the imagination of the men who made it possible. Today, creative thinking resides in software, that fairy godmother capable of granting us any wish. The restitution of a perfect illusion of the outside world no longer corresponds to a pleiad of inventors with notable surnames –Niepce, Daguerre, Marey, Plateau, Edison, Lumière– but to an anonymous community of users who have transferred their principle of authority to the executing machine.

On the other hand, the territory of this total image has no borders. Abolished by the hegemony of software, its domains go beyond the realm of cinema and extend into the fields of virtual reality and video games. Recently, *Forspoken* (Luminous Productions/Square Enix, 2022) was advertised as the video game 'with the best visual quality ever seen in an open world' (Márquez, 2021). Instead of considering the presence of this total image in video games as a new and independent milestone in its history, it is legitimate to understand it in a continuist way, seamlessly with the project of that imagination desirous of integral realism pointed out by Bazin.

The inclusion of interactivity as part of the total image, ultimately a defining quality of its formulation in video games, is also a requirement prefigured in the classical theories of the cinematographic image. Bazin himself calls for a total image 'on which no mortgage on the actor's freedom of acting would weigh' (1966, p. 37). But it is undoubtedly in the contemporary theory of another thinker of the cinematographic image, Edgar Morin, where this fact is best materialized. Morin examines the cinematographic image from the anthropological structures of the imaginary. In *The Cinema, or The Imaginary Man* (1956) he underlines the capacity of the cinematographic image to involve the observer, to call him to participate in the game, until it becomes an essential part, where 'the world will be the direct consequence of an engaging participation' (Casetti, 1994). And while the projection of cinema into the realm of the imaginary is linked in Morin to the affective participation and psychic identification of the spectator with the image, the French philosopher and sociologist is aware of the atrophy of motor, practical and active participation of the spectator. Practical participation is 'annihilated, at least atrophied and channeled into symbols of approval (applause) or rejection (whistles), and in any case powerless to modify the course of the representation' (Morin, 2001, p. 89). We will have to wait for the arrival of software and game engines to endow the total image with a participation that is not only affective, but also effective and practical in the sense detected by Morin. From this progressive perspective, rooted in the sin of the integral realism of the total image, could it be said that cinema and video games are the same medium in two different times?



Figure 8. Frame from the trailer of the film *Lady in The Lake* (Directed by Robert Montgomery, 1947), which directly alludes to the participation of the spectator thanks to the use of the subjective camera in the development of the film. Undoubtedly, a search for effective participation in cinema towards the construction of the total image. Source and License: YouTube, Warner Bros.

It seems, therefore, that the distinction found in the previous section between the aesthetic dispositions of the cinematic image and its mutation through software does not lead to a second dissidence but rather to a continuity in the genetic aspiration of the image to achieve a perfect recreation. From this last approach, marked by the search for total realism, the early cinema image and the *mutated image* through Machine Learning are one and the same thing engaged in the pursuit of the old dream of an absolute *imitatio*; a race without discontinuity as old as man's relationship with images. If this second *instrument* combines both phenomena, we will see below how they do not differ radically from an ontological perspective either.

6. The Disappearance of the Subject and the Visibility of the Non-Existent

In 1911, Bergson described cinematographic projection as an abstract movement generated by the projection apparatus itself. This movement, like a *deus ex machina*, is alien and strange to the representation conveyed by each of the immobile images printed on the film. This singular relationship allowed him to affirm that 'the cinematographic artifice' is distanced as much from the intentionality of art as from its realist or pragmatic concerns (Liandrat-Guigues and Leutrat, 2003, p. 18). In a certain way, this alienation between image and reality, originated by the mediation of an artifact, is reminiscent of the ontological problem of technical and virtual images, among which those generated through Machine Learning can be included. Thus, the *mutated image*, artificially created by software, currently enjoys the same consideration that the early cinema image had in the past. The latter is now *socially* legitimized.

This coincidence not only evidences a circularity of the arguments about non-bodily images mediated by technology –for Virilio (1998), body image is directly linked to the action of the human body– but also, how 1) technophobia can be gradually diluted in culture and, consequently, 2) images produced by technological interference can be included in the normality of our perception. Will the *mutated image* be assimilated in the future to the naturalness of human perception?

As we can see, it is possible to approximate the positions of both images by pointing out an ontological similarity between them. However, a more detailed approach reflects some apparently irreconcilable discrepancies. The nature of these oppositions is related to the intervention of human perception in the final configuration of the images.

The cinematographic image tends to show us what usually cannot be seen but is before us. Its realm is defined in the 'picnolesy', or 'crisis of absence' (Virilio, 1980, p. 13). The natural time of our perception flows without discontinuity. However, cinema is based on the rupture of this continuity, on the production of cuts that subtract the subject from this continuous flow. The speed of the cinematographic device, like the speed of any image mediated by technique, is a starting pistol for a race in favor of the exclusion of the subject, a destruction of our *being* in the world, a disappearance of the *self* due to the incapacity of our perceptive faculties in the process (García Varas, 2010).

Thanks precisely to speed, Marey's chronophotography makes visible that which is impossible for the human eye to perceive (Virilio, 1980). The result of the image is the showing of something that is there, but we do not see; the manifestation of an absence (Virilio, 1980). However, despite the need for a non-human speed to see the invisible, we are certain that the early cinema image *operates in reality*. The *thing* unveiled was always there, the artifact has revealed to us a world now incorporated into our memory. For Virilio, other images, such as those generated by Machine Learning, no longer require human perception, they are moving towards the automation of perception, towards 'the innovation of an artificial vision, its delegation to a machine of the analysis of objective reality' (Virilio, 1989, p. 77).

Consequently, the *mutated image* mediated by Machine Learning tends to make visible not what is invisible but what never existed. The machine, fed by large amounts of images, recreates spectral frames that were never in direct contact with the reality shown. This enables Machine Learning to reconstitute instants of time without effective existence, allowing it to go from eighteen to sixty images per second. If we follow Bazin's ideas, we can affirm that the mutated image *operates in the mental*, in the concretion *in software* of the desired realm of the total image. But, in the strict case of the *mutated image* through Machine Learning, does it certainly operate and work on what never existed?

By meta-images, Mitchell understands an environment where images speak and deal with other images, exactly 'pictures that refer to themselves or to other pictures, pictures that are used to show what a picture is' (Mitchell, 1994, p. 35). In his desire to keep the relationship and dialogue between images in a purely visual order, Mitchell renounces in the first instance any ideological principle, whether iconological, philosophical or linguistic, for the constitution of this framework, where self-referentiality is not mediated by art or language, but by a metalanguage of the image itself. Overlooking the further development of Mitchell's essay, can it be stated at this point that Machine Learning's work with images is a paraphrase of this idea? Images that dialogue with other images from an exclusively material perspective, where infinite instants of time captured in them are hybridized with others to achieve, not a *non-time* image, in the Deleuzean sense (Sanchez, 2013), but a *pan-chronos* image, a compendium of all the times fixed in each of the *image-input*. From this perspective, we can affirm that the *mutated image* through Machine Learning does not strive to make visible what never existed, but to reveal to us the existence of a multiverse of images concretized in a given *image-output*. Its regime is that of collective memory.

In this history of speeds that is the development of the technical image, where the cinematographic image is one of its first steps, technological processes have been incorporated with the desire to make up for the shortcomings of the previous artifices, always in search of the total image. Thus, the zero speed of the photographic snapshot increased with the cinematographic device, just as it reached stratospheric

speeds in its digitalization and *softwareisation* process. In this historical process, the artifice learned that the simulation of total representation lay in the domain of memory. A total memory for a total image.

The distance between the ontologies of the early cinema image and the *mutated image* through software is not a question attributable to the interference of artifice, since both are mediated by one, nor is it computable to time, since both show a temporal dimension far from a natural concretion in accordance with human perception. Rather, it lies in a revolution of memory. While the early cinema image acts in the order of individual memory, the image mutated through software does so at the level of collective memory.

7. Conclusions

The interpretative analysis of these three instruments yields results that allow us to respond at different levels to the fundamental questions of this research:

1. From the point of view of Goldmann's genetic structuralism, we can affirm that both the early cinema image and its mutated image respond to the same ideology that, despite the intervention of software, keeps them as captive objects of an epoch that has not been able to detach itself from aspirations such as the integral realism of the image or objections such as the mediating artifice in its creation process. As Debray suggests, the image enjoys a time of its own in which these aspects remain constant and immutable.
2. The historical nature of the quest for the total image, sponsored by a psychological drive, has allowed us to include interactivity as a logical consequence of the process. The conjunctural absence of the motor and effective participation of the spectator, pointed out by Bazin or Morin, has led us to raise the question of the univocity of cinema and video games.
3. It is not surprising that, in the field of aesthetics, that is, in the field of human response to the image, there are notable divergences that lead to disparate dispositions. This diversity is possible because the aesthetic aspect concerns all viewers. On the other hand, as we have seen, the implications deriving from realism and the ontology of the image are of particular concern to the scholar or theorist. The psychological, but also sociological, perspective of the bases of aesthetic experience makes possible different responses according to the group or class of belonging of the individuals who judge the image (Bourdieu, 1998). The demands of the image theorist or the historian can be differentiated from those of the computer scientist or the youtuber. While the historian has found in their aesthetic disposition a nexus with the historical value enclosed in the image, the computer scientist or the youtuber dispenses with these considerations, imprisoned by the principles of profitability, enhancement and efficiency that dominate their own experience.
4. We are simply witnessing a coexistence between the two where, to paraphrase McLuhan, the hypertrophy of the latter will lead to the beginning of the saturation process necessary to vindicate the hegemonic return of the former. As Renoir wished, our past will remain encapsulated in the original filmic images. As an object of the *videosphere*, the *mutated image* only responds to the astonishing effect of the power of software.
5. The third *instrument* applied in the hermeneutic analysis, concerned with the ontology of these images, points vaguely towards new investigations of the image from the field of the modal logic of possible worlds. From this perspective, the world evoked by the *mutated image* possesses identical status to that displayed by the early cinema image. The value judgments that make up the aesthetic dispositions seen –so far, the major difference between the two formalizations of the image– are meaningless in the field of possibilistic semantics.

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