Photographic Indexicality and Referentiality in the Digital Age

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ABSTRACT. This article attempts to understand the fate of conventional notions of photographic indexicality and referentiality in the digital era where digital images have replaced analog images almost completely. Following a critical overview of relevant literature on digital photography, the author makes a conceptual distinction between referentiality and indexicality with respect to their implications for the notion of photographic realism. With a particular focus on the concept of indexicality, defined herein as an element that radically determines the definition of photography, the author argues that the image becomes a "thing" in digital images in the absence of indexicality by using Jean-Paul Sartre's notion of "illusion of immanence", a claim that would strongly challenge the view that digital images can still be regarded as photographs that themselves presuppose a particular relationship between an image and its object.

1. Introduction

Despite having been defined in nearly countless ways, photography has long secured its place among other forms of imagery by representing objects in a reliable, consistent manner. Such supremacy may be considered a culturally or socially constructed outcome born of an entrenched affinity between seeing and knowing. Alternatively, photography might appear to be a product of its social functions (i.e., proving and verifying). No matter the rationale, photography's superiority in object representation remains essentially indisputable. Yet a solid corpus of literature has emerged along with the rise of the so-called "digital revolution" or "digital age" examining the issue of whether or not digitality has transformed the ties between reality and photography or, put more precisely, the ways in which reality is

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represented through photography. Even before digitality rose to prominence, many critical accounts in literature challenged the notion that the so-called direct and "natural" link between the external world and the photographic image is imperative to the indexical character of photography. Instead, some scholars contended that photographs are more akin to a factitious construction of reality than to the actual world. The ubiquity of digitality has since called into question more than ever photography's power of proof, to the point that some claim it has been undermined completely (Punt, 1995, p. 3). The effects of digitality on photography have rendered seemingly simple questions controversial, including the extent to which the traditional definition of an image applies to digital images and whether or not proper photography still exists at all.

A trademark discussion of photography nearly always includes remarks about the 'realism' that distinguishes photography from other image forms. More specifically, photography involves a somewhat complex relationship between an image and its referent in that the object being photographed is effectively etched on the photographic surface (i.e., *indexicality*, wherein the photographic surface is an index of the actual object being photographed). To this point, Sontag argues that a photograph is "not only an image (as a painting is an image), an interpretation of the real; it is also a trace, something directly stenciled off the real, like a footprint or a death mask" (1975, pp. 154-55). Bazin suggests that "the photographic image is the object itself" (1967, p. 14), insinuating that a photograph is an extension of the object pictured but not, as many scholars have argued, a "mirror of reality." These depictions of photography as a trace, which emphasize indexicality, are common in the field's scholarship. Arnheim explains photography thusly: "the physical objects themselves print their image by means of the optical and chemical action of light" (1974, p. 155). Krauss (1986, p. 203) echoes this sentiment, noting that photographs "look like footprints in sand, or marks that have been left in dust." Armstrong (1998, p. 2) further defines photography as "first and foremost an indexical sign, [...] an image that is chemically and optically caused by the things in the world to which it refers." Thus, the photograph is "predicated on its relation to nature before it is mediated by a code of

legibility."

Digital imaging techniques began to gain popularity in the early 1990s and have since come to constitute a new cultural practice. As such, an accompanying body of literature regarding photography's now-fluid definition further complicates the already problematic notion of its truthfulness. I will attempt to offer a critical overview of prominent discussions in this vein to clarify the implications of the "digital revolution" on the changing meaning of what is disputatiously referred to as photography with a particular focus on the issues of indexicality and referentiality. These discussions, I believe, share a few commonalities with respect to their theoretical frameworks. Initial approaches were more concerned with the representation of "new" images; that is, they examined whether or not the ways in which conventional photography reflects reality were significantly undermined or changed, thereby challenging the assumed vraisemblance of photography given the rise of digital imaging. This consideration was closely related to another concern, namely photography's long-standing (but loosely established) status of certificate of evidence associated with photography's entrenched notion of causality. This raises the question of whether or not the conventional notion of representation can still be used to describe adequately the relationship between photography and reality; or, alternatively, should we use the notion of simulation to depict this association following the so-called digital revolution? Perhaps not surprisingly, such theoretical accounts deal primarily with documentary or press photography to offer a somewhat pessimistic view of the future of these genres. They also suggest, rather provocatively, an overall dissolution of the link between the photographic surface and its referent. Complementing this second view is another line of thought which claims that the nature of photography has fundamentally transformed due to digital photography, wherein the notion of indexicality has ceased to be a defining characteristic. This theory is largely concerned not with how photographs appear to us, but instead with the type of medium photography has become; i.e., the ontological definition of what is now considered photography, for better or for worse.

Lister's (2009, p. 314) distinction between analog and digital may

shed light on this issue.[2] Images are conventionally analog in nature; they are formed by physical signs and marks on particular surfaces, which are not separable from the very surface that carries them. However, the digital medium does not transmit physical properties; it involves instead the transformation of information, a symbolization of physical properties via arbitrary numerical codes. In that case, analog images can be regarded as being based on continuity, comprised of materials and techniques specific to that particular medium. Digital images, in contrast, are unitized (i.e., separate, quantifiable, and perfectly reproducible mechanically), constituted by materials and techniques that are not limited to the digital medium. These nearly irrefutable differences between digital and analog images gain more convincing meaning in the context of discussions regarding digital photography. For example, the duality between continuity and unitization calls to mind a discussion of whether analog and digital photography are irreconcilably different in terms of technical qualities such as dynamic range and tonal richness.[3] On the other hand, the contrast between the irreversible and inconvertible characteristics of analog images, which rely on transmission, and the reversible and convertible characteristics of digital

[2] I use the term "analog photography" with reservation in the remainder of the text. As Jäger (1996, pp. 107-8) asserts, it is quite problematic to define all conventional photographs as analog. Although it is a general tendency in the digital era, this applies the label of 'analog' to even the most abstract photographs simply because they are based on film, which is obviously not true. Moreover, Jäger contends that the process of transmission of light onto the digital sensor is itself an analog process. Thus, he chooses the term "technical picture" for photographs that are considered either analog or digital. I make the conceptual distinction between analog and digital photography by focusing on the act of processing, not the moment of photographing. I will further legitimize this point in the context of the absence of indexicality and referentiality in digital photography.

[3] I would like to make a brief note on this point. These "technical" discussions offer both phenomenological and ontological insights. However, it is not uncommon for these discussions to be couched at times in belief rather than fact. For example, there is a general belief that digital photographs still fall considerably behind analog photographs with respect to generating tonal richness and depth of black-and-white photographs. Yet, as a person with extensive experience in darkrooms who has studied exclusively on the tonal characteristics of black-and-white photography, I am almost unsuccessful in discerning "analog" photographs from their film-simulated counterparts generated by various software in blind tests when looking at tonal richness and forms of expression. Thus, the discussions based primarily on phenomenological grounds have become essentially meaningless considering the unprecedented pace at which digital imaging technologies have developed.

images, which rely on transformation, summons the issue of indexicality. More specifically, there is a question of whether or not digital photographs are considered indexical in nature.

2. Early Approaches: The End of Photography?

As has been touched upon briefly, nascent approaches that emerged in the early 1990s tended to interpret the rise and gradual prevalence of digital imaging systems as a serious challenge to the definition of photography as a realist medium and a certificate of evidence (and presence).[4] Undoubtedly, these approaches were perhaps over-reactive in their assessment of digital imagery because the phenomenon was new and undeveloped compared to the digital imaging techniques available today. Initial approaches tended to focus more on the state of photography's power to reflect reality and, by extension, whether or not photography had lost its status as a certificate of evidence. In his book, which exemplifies perfectly these early approaches, Ritchin (1990, p. 3) offers an image of a science fiction dystopia in a passage in which he muses about photographic advertisements adorning the New York City subway:

> I tried to imagine how it would feel if, despite the evidence of the photographs, everything depicted in them had never been. It was difficult to do because the images seemed so life-like … If so, the photograph referred to nobody … I looked at the people sitting across from me in the subway car underneath the advertisements for reassurance, but they too began to seem unreal, as if they also were figments of someone's imagination. It became difficult to choose who

[4] Flusser's argument emerges as an exception among early approaches. Flusser (1986, p. 331) asserts that in the digital era, photographs are emigrating from their "material support into the electromagnetic field" to be seen on screens rather than on paper. For him, this technical revolution is indeed a cultural revolution, which would be an answer to the problem of oblivion. Humans have long been in pursuit of the preservation of information (and immortality) with a tendency to avoid entropy. Thus, immaterial photographs are the best means by which to preserve memory and overcome entropy. Flusser suggests that new photography has the potential to transcend the long-standing duality between science and art.

> or what was "real," and why people could exist but people looking just like them in photographs never did.

Fast-forwarding a quarter-century, now that raw data can be processed to generate "genuine" images via computer, Ritchin's reaction might seem rather archaic. However, his statements also convey the conventional belief that photography is a certificate of evidence. Ritchin points out new ethical problems in the realm of photojournalism in light of the emergence of digital post-production manipulation. For him, manipulation was common in conventional photography as well, but it was moderate and did not harm the integrity of the image. Ritchin's critique is not confined to a particular realm of photographic practice but rather implies a general transformation of photography itself. In another work belonging to the same period, he argues that photography has gradually lost its immanent realism and declares the end of photography as we have known it (Ritchin, 1991).[5] Put simply, Ritchin was anxious—especially with respect to the future of photojournalism—because he feared that manipulated photographs that have very little to do with reality would become indiscernible from unmanipulated, "straight" photographs, a situation which would undermine the credibility of photographs altogether.[6]

Probably the most influential and oft-referenced work in these early discussions was Mitchell's *The Reconfigured Eye*, published in 1992. In it, Mitchell declares the year 1989 (the 150th anniversary of photography) the end of photography, then prudently revises his observation by claiming that photography is being displaced radically and permanently by digitality much like painting was displaced by photography 150 years prior (1992, p. 20). Yet Mitchell's assertion does not necessarily mean that he naively

[5] Such pessimistic approaches declaring the end of photography, or claiming the disappearance of the distinctive characteristics of photography given the rise of the digital era, were especially common in early approaches. For other prominent examples, see Willis (1990), Mitchell (1992), and Robins (1995).

[6] Another influential critique with respect to photojournalism comes from Bossen as early as 1985. Bossen (1985, p. 27) claims that as photography moves toward its optical-electronic-computer future from its optical-chemical past, its sources of credibility and philosophical notions of truth will become obsolete.

believes in the claims of truth and realism that pervade conventional photography:

> An interlude of false innocence has passed. Today, as we enter the post-photographic era, we must face once again the ineradicable fragility of our ontological distinctions between the imaginary and the real, and the tragic elusiveness of the Cartesian dream. We have indeed learnt to fix the shadows, but not to secure their meanings or to stabilize their truth values; they still flicker on the walls of Plato's cave (p. 225).

Although Mitchell's argument offers a critical and even groundbreaking perspective, it is still plagued by certain weaknesses endemic to the early approaches. For example, Mitchell (1992, 6) compares the amount of information generated by analog and digital images and then concludes that analog or film-based images offer an infinite amount of information whereas digital images have limited tonal and spatial resolution. This claim becomes essentially meaningless given the astonishing technical capabilities now offered by digital imaging systems.[7] Manovich (2006, p. 244) criticizes Mitchell's discussion by raising the simple point that as early as the mid 1990s, digital technologies were capable of producing high-resolution images with few major pixelization issues. Manovich (2006, p. 245) goes on to challenge Mitchell's perspective by contending that "normal" or "straight" photography has never existed.

[7] When comparing digital and analog photographs on the basis of data gathered through scientific experiments, Archambault (2016) concludes that digital photography outdistanced analog photography some time ago with respect to grain and noise levels and dynamic range. Although it is problematic to compare analog and digital images on the basis of quantifiable characteristics, this observation renders claims similar to Mitchell's effectively meaningless. For example, as early as 2005, the highest-quality digital cameras reached 13 stops of dynamic range, which the highest-quality film cameras were able to capture. Another example is the amount of grain, sometimes regarded as an aesthetic tool for artistic expression, which is technically nothing but chemical particles that have not received sufficient light. A similar element in digital images is noise, which is unwanted signals generated by a camera's digital circuitry. Like the former observation, digital photography long ago surpassed analog photography with respect to the elimination of these technically "unwanted" elements.

Although not directly related to the impact of digital imaging technologies on analog photography, Crary's (1992) perspective is quite impressive in its comprehensiveness. He investigates this issue in light of the overall transformation within what he calls the "modern scopic regimes." Specifically, Crary (1992, p. 1) argues that sweeping progress in computer graphic techniques is a part of "reconfiguration of relations between an observing subject and modes of representation" and "transformation in the nature of visuality." For him, this transformation is "probably more profound than the break that separates medieval imagery from Renaissance perspective." He adds that digital images operate not through the mimetic capacities of analog mediums, but instead relocate vision from the level of the human eye to someplace else where there is no reference to the position of the observer in a "real", optically perceived world. Crary's position regarding the absence of referentiality in digital images, along with his prophetic vision during digitality's nascent period, has become a cornerstone of subsequent literature:[8]

> Most of the historically important functions of the human eye are being supplanted by practices in which visual images no longer have any reference to the position of an observer in a "real," optically perceived world. If these images can be said to refer to anything, it is to millions of bits of electronic mathematical data. Increasingly, visuality will be situated on a cybernetic and electromagnetic terrain where abstract visual and linguistic elements coincide and are consumed, circulated, and exchanged globally (p. 2).

Apart from these exceptional approaches, a common thread in early theories was the establishment of a duality between digital and analog photographs with respect to their capacity to reflect reality. There are a number of potential explanations for scholars' initial reactions: widespread anxiety

[8] Another early figure who emphasized the absence of referentiality in digital images was Jacques Derrida. For him, recording an image digitally is inseparable from image production. Thus, digital images do not refer to any external and unique referent (Derrida, 2010, p. 5), and photography becomes instead a performative act which further complicates the issues of truth and reference.

evoked by the common practice of manipulation in digital images, the assumed absence of the direct link between image and photographic object in digital images, and the relatively underdeveloped technical capabilities of digital imaging systems at the time. Thus, it is not reasonable to assert that early literature regards photography as a "mirror of reality" or that scholars overlook the fact that photography's immanent realism is indeed a cultural construction. Kember (1998, p. 17) raises a critical question that underlies this point:

> Computer manipulated and simulated imagery appears to threaten the truth status of photography even though that has already been undermined by decades of semiotic analysis. How can this be? How can we panic about the loss of the real when we know (tacitly or otherwise) that the real is always already lost in the act of representation? Any representation, even a photographic one, only constructs an image-idea of the real; it does not capture it, even though it might seem to do so.

Thus, the anxiety that infiltrates early approaches is likely a result of threatening the subject's position itself in the very act of beholding or, more generally, within the production of images themselves. As Martin Lister (2009, p. 321) notes, what is at stake is a "historical and psychic investment in photography's 'realism'."

These somewhat impetuous approaches led to more moderate and cautious discussions beginning in the mid-1990s.[9] In his critique of early pessimistic approaches, Manovich (2006, pp. 244-45) suggests that they were based on the comparison of manipulated digital photographs and unmanipulated documentary photography, a contrast which is hardly operational since, for him, the realist tradition and photography based

[9] However, that does not mean that these emerging discussions can be classified as optimistic. I hardly agree with Lister (2007, p. 251), who asserts that early approaches have gradually reached a consensus on the fact that photography was not dying; on the contrary, digital technology has paved the way for new and alternative ways of producing photographs. As will be discussed shortly, subsequent literature has also been generally pessimistic, if not to the same extent as early approaches.

largely on manipulation had already existed as two separate realms in conventional photography. However, I will argue that Manovich's critique becomes ineffective because the anxiety surrounding manipulation, which infiltrated early approaches, was mostly tied to an entrenched belief in photographic transparency. It was often closely associated with the indexical character of photography and sometimes regarded as a discursive element that challenges the conventional notions of representation. Bolster and Grusin's (2010, p. 110) observation illuminates this point:

> It is not any one digital photograph that is disturbing. We are disturbed because we must now acknowledge that *any* photograph might be digitally altered. Digital technology may succeed-where combination printing and other analog techniques have not succeeded in the past -in shaking our culture's faith in the transparency of the photograph … If the viewer believes that a photograph offers immediate contact with reality he can be disappointed by a digitally altered photograph. The reason is that the logic of transparency does not accord the status of reality to the medium itself, but instead treats the medium as a mere channel for placing the viewer in contact with the objects represented [emphasis original].

Their observation insinuates that manipulation in the analog and digital eras are radically different and have distinct implications. Thus, Manovich's criticism fails to explicate adequately the anxiety provoked by digital-era manipulation.

With regard to Manovich's seminal criticism, it is important to examine his attempt to answer the question of how digital images operate within their own peculiar semiological dynamics. Manovich is against a clear-cut division between digital and analog images. For him, when we look at concrete digital images and their uses, there are few notable differences from analog images apart from abstract principles. In fact, he even goes so far as to allege that "digital photography simply does not exist" (Manovich, 2006, p. 242). A superficial reading of Manovich in this context would likely reveal that he analyzes photography on a phenomenological level. The minor structural details that cannot be discerned by the beholder

do not have significant implications; as such, digital images retain meanings and functions inherited from analog images. In fact, however, this is not the case. Manovich's claim can be interpreted as an expression of his core observation: the paradox of digital photography is its imitation of the cultural and aesthetic codes of analog photography. Moreover, the film look (i.e., "the soft, grainy, and somewhat blurry appearance of a photographic image") has become fetishized in digital images (p. 242). He prefers the term "photography after photography" rather than the *end of photography* or *post-photography*, both of which were commonly used in earlier accounts. In a more provocative theoretical maneuver, digital imagery, for him, "annihilates photography while solidifying, glorifying and immortalizing the photographic" (p. 241). One could argue that within what Manovich conceptualizes as the paradox of digital photography, the digital image is itself being annihilated. Roberts' (2009, p. 289) observation is particularly illuminating in this context:[10] He regards a central element in digital photography, digital effects, as a space in which "the real is self-consciously 'put together', transforming naturalism's idea of the photograph as a neutral transcription of appearances into its very opposite: the figural (metaphoric) construction of the real, as in painting." Undoubtedly, Manovich's observation two decades ago has proven prophetic today. In the contemporary economy of images, the fetishization of the characteristics of analog mediums is so pervasive that competition among digital mediums and images is determined largely by their ability to imitate analog mediums.

To this point, Batchen (1997) presents the most radical view of the second generation of discussions with respect to the notion of manipulation in digital images. Specifically, he asserts that the photographic practice itself is an act of manipulation. For him, even documentary photographs, generally termed "normal" photographs, are comprised of various technical elements, such as cropping, flash use, exposure preferences, etc., that render

[10] As an interesting observation, the first filter produced for Photoshop was the lens-flare filter. Although the first uses of this filter intended to reproduce images from raw data on computers with a photographic look, it was soon discovered that this filter created depth illusion. Lens-flare, a previously unwanted element in analog photography, has become a desired effect in digital photography as a way to imitate analog images and create depth illusion (Cubitt et al., 2015, pp. 7-8).

the emergent image an artifice. That is, the photographer manufactures an image by representing a three-dimensional object within a two-dimensional image (p. 212). Thus, digital photography upholds the very tradition of depicting an altered version of the world inherited from conventional photography, which suggests that the digital era is an evolution in photography itself rather than a revolution that breaks with photography's tradition. Although Batchen has put forth many insightful analyses in subsequent works, his efforts to define digital photography as a continuation of the tradition of analog photography are hardly convincing. While one could understand Batchen's rejection of earlier approaches' laser focus on the notion of manipulation, his perspective again places this notion into the very center of the analysis in reverse. In other words, the centrality of manipulation prevents us from discerning other elements of digital photography that render it ontologically different from analog photography.[11]

3. Indexicality and Causality in Digital Photography

One could regard a digital image as having an ontological and causal relationship with the photographic object. However, the scenario is not so simple in the context of digital images. Digital cameras' circuitry and software process sensory information to transform such data into something recognizable, which is then perceived as an image by us. However, let us

[11] However, a distanced approach to the notion of manipulation should not be interpreted to mean there is no difference between the use of manipulation in digital and analog photography. The very structure of digital photographic practice that allows the photographer to change images effortlessly is radically different from analog photography technology. Seamless alterations are possible in digital photography because manipulation is composed of the addition or removal of image pixels. What is defined as "pixel revolution" in literature leads to "digital wizardry" (Geuens, 2002, p. 20) that allows for the manipulation of any part of an image without modifying its resolution or having any effect on the surrounding area. Thus, this is something of a perfectly immaterial process that leads to a proper "reproduction." The conception of digital photography as a never-ending and permanently becoming process generally emphasizes this feature. Yet such digital wizardry should be seen as the result of the ontological changes and features of digital photography, not the cause thereof. Its explanatory power is thus quite limited apart from ethical discussions common in photojournalism and documentary photography.

assume that this process generates images that are indistinguishable from analog images. In that case, is the only difference between these two image forms ontological, per se? Or, to put it another way, do ontological differences need to result in phenomenological differences? To parse out an answer to this question, we must first consider how causality and "iconic indexicality," generally regarded as constitutive notions of photography, operate within the realm of digital images. Willemen's (2002, p. 20) enlightening observation is a good starting point:

> An image of a person in a room need no longer mean that the person was in that particular room, nor that such a room ever existed, nor indeed that such a person ever existed. Photochemical images will continue to be made, but the change in the regime of "believability" will eventually leech all resistance that reality offers to "manipulation" from even those images … The digitally constructed death mask has lost any trace of the dialectic between the skull and the face, any trace of the dialectic between index and icon.

The causality problem in digital photography has noteworthy implications. The cultural and historical investment in photography's realism and the notion of photography as evidence of presence has gradually become more problematic, not only in the realm of digital photography but also for analog photography. A digital image acts as a photograph not because it has an ontological and causal relation with a thing (i.e., the photographic object); it does so because, as Rubinstein and Sluis (2013, p. 28) aptly state, the recorded data on the digital sensor is designed algorithmically so as to be perceived as a photograph by humans. As Amelunxen (1996, p. 101) contends, although digital images are still perceived within their representational features, they are no longer regarded as a transfer of a temporal and spatial moment.[12] Another consequence of the problematic nature of causality and indexicality in digital images relates to the semiological meanings of the photograph. Indexicality can be seen as a

[12] Amelunxen prefers the term "analogo-numerical photography" in place of "digital image."

distinctive feature of photography as long as it is tied to iconicity. As such, threats to causality also undermine the foundations of iconic indexicality.

Later discussions on the algorithmic character of digital images muddy the issue even more. Røssaak (2011, p. 193) makes a clear distinction between analog and algorithmic culture. There is a causal relationship between storage and display in the former; in the latter, however, "the relationship has become not simply arbitrary, but dependent on the new interstice of software." Røssaak's observation can be clarified with an example: any medium stored in your computer will be "read" in a considerably different way years later, as the tools and software through which you read them will be much different from those available today. Conceptualized accordingly, the digital medium is nothing but information born of a never-ending and amorphous process.[13] The modernist notion of medium specificity loses much of its explanatory power in this context. Hayes' (2008, p. 94) observation frames the very process within a digital sensor as a kind of (re)construction, rather than a process that can be understood within a conventional notion of representation:

> Digital cameras already do more computing than you might think … You might therefore suppose there's a simple one-to-one mapping between the photosites and the pixels … But that's not the way it's done … a digital camera is not simply a passive recording device. It doesn't take pictures; it makes them. The sensor array intercepts a pattern of illumination, just as film used to do, but that's only the start of the process that creates the image. In existing digital cameras, all the algorithmic wizardry is directed toward making digital pictures look as much as possible like their wet-chemistry forebears.

Hayes' argument has significant implications for the present discussion. Firstly, Manovich's argument that digital images are coded on the basis of the "photographic" is confirmed by Hayes with respect to the technical aspects of digital image production. This point can be seen as a humble one;

[13] The conception of the digital image as information, and its potential, can be understood through a simple Google image search. Reverse image searching has been added to this facility as well. Face recognition technologies operate within the same logic.

it is hardly unexpected that digital photographs follow the representational modes of conventional photography. However, this point has more radical consequences than might first be assumed. Digital images are increasingly coded to produce what I would prefer to call a sense of indexicality that would be a more proper term, for the purposes of the present discussion, than Manovich's "photographic look". The sense of indexicality can be attained through many forms. It can be a formal and aesthetic preference, such as emulating the grainy texture of analog images by processing noise accordingly; or the "memorization" or rendering realistic of smooth, plastic, and overly perfect computer images by adding textures believed to be particular to analog images. Secondly, the very nature of the primary level of photography, comprised of the first encounter of light with the surface of contact (i.e., film or negatives in analog photography and sensor in digital photography) would have significant consequences for the ontological definition of the emergent image. Analog photography depends heavily on the causal relationship between the storage (i.e., the surface of contact) and the image. That is, the relative autonomy of the image is limited as long as the medium specificity is retained, which is mostly true in the case of analog images. However, as Hayes puts very clearly, light beams falling on the digital sensor constitute only the outset or trigger of the image. Given the absence of medium specificity, there is no act of "taking" a photograph; there is no causal or indexical relationship within the process. Because "no permanent traces are left since messages pass in and out of the theatre of digits without presuming continued residence" (Binkley, 1993, p. 97), the digital medium can be seen primarily as a space of abstraction that excludes the materiality needed for the existence of indexicality.[14]

Thus, what is at stake at this point is whether or not the surface of contact (i.e., film or digital sensor) perpetuates the very trait of the

[14] I want to warn the reader that the discursive use of *medium* in this context does not exactly intend to equate medium with materiality. The notion of materiality here only implies a necessary, but not sufficient, condition for indexicality. If we were to equate medium with materiality, we would fall into the trap of posing the absurd question, "Where is the exact physical location of the image?" The reader might refer to Doane's (2007) study for a sophisticated discussion on the relationship between indexicality and the concept of medium specificity.

photographic object at the moment of contact. To be precise, a photographic image has referentiality only so long as this perpetuation occurs. Moreover, because the notion of referentiality existentially depends on that of indexicality, this statement inherently involves indexicality. Røssaak's and Hayes' discussions and findings imply that the trait of the photographic object is lost at the moment of contact; instead, it is coded instantly in digital photography (or any image process via computer). In the early approaches to photography beginning with the invention of the medium, the notion of indexicality had been regarded as a distinctive feature of the photographic image in which an essential part of the image was impressed on the surface of contact to leave some trace of it there, much like residual mud on a boot. Photographic realism has been conceived apart from any analogical association to define photography as a "supremely realist medium" (Walton, 1984, p. 251) or "a kind of deposit of the real itself" (Krauss, 1984, p. 110) by virtue of indexicality. Barthes (1981, pp. 5-6) echoes a similar conception in his account of the adherence of the referent in which the photograph "always carries its referent with itself"; "they are glued together."[15]

Moreover, the loss of the photographic object at the moment of contact in digital photography brings into question many aesthetic forms of expression and particular artistic positions exalted in conventional photography. Henri Cartier-Bresson's notion of a "decisive moment" or the creative imagination that Ansel Adams frequently pointed out as an essential artistry of the photographer is largely challenged within the aesthetic realm of digital photography where "seeing the moment" is no longer a trademark of the photographic act. As Palmer (2015, p. 153) suggests, in contrast to "creative visionary engaged in a poetic encounter with the world" in conventional photography, there is the "deferral of creative decision making" in digital photography that can generate many unexpected forms.

Whether or not digital images have lost any trace of reference has

[15]. Barthes makes a clear-cut distinction between the photographic referent and the referents of other systems of representation. For him, the photographic referent is the "optionally real thing to which an image or sign refers but the necessarily real thing which has been placed before the lens" (Barthes, 1981, p. 76).

been the subject of many discussions in the literature. In an earlier assessment, Robins (1996, p. 44) regards digital images as increasingly independent from meaning and referents in the real world; in this postmodern situation, identity is formed on the basis of the image rather than reality. Batchen (2000, pp. 139-40) insightfully relates the absence of the referent in digital photography to the notion of representation:

> Where photography is inscribed by the things it represents, it is possible for digital images to have no origin other than their own computer program. These images may still be indexes of a sort, but their referents are now differential circuits and abstracted data banks of information (information that includes, in most cases, the *look* of the photographic). In other words, digital images are not so much signs of reality as they are signs of signs. They are representations of what is already perceived to be a series of representations.

Batchen contends that digital images cannot be understood within a conventional notion of representation; they have instead come to simulate signs of signs rather than signs of reality. Moreover, his observation parallels Manovich's claim that digital images imitate analog images. Batchen's observation appears even more radical upon his assertion that digital images are already representations of representations.[16] While mimesis is a notion that operates within "real" or ideal realities, simulation is tied to representational realities. The distinction between simulation and mimesis is especially significant in the context of the present discussion. If digital images operate through simulation and the trait of the photographic object is lost at the moment of contact, then there would be no reason to define digital images as photographs. Rather, the distinctive characteristics of the photographic image would effectively vanish.

To sum up, as Rodowick (2001, p. 36) notes, while analog images transform the substance which is isomorphic with the original image, digital images (or virtual representations) depend entirely on numerical

[16] Batchen's (1994, p. 48) statements in another context explicate his position further. For him, digital images undermine the discourse of and belief in the truth claims of analog photography "which have never been 'true' in the first place."

manipulation. Thus, in contrast to the constructive nature of the Euclidian geometry essential in analogical representations, the computational power of Cartesian geometry comes into play in digital images. This observation brings to light the impact of loss or radical change in the nature of materiality on the aesthetics of the image. The status of certificate of evidence of analog images and their causality is conditionally reliant on spatial and temporal isomorphism and associated materiality. The loss of isomorphism and associated materiality operates within virtuality, which thereby transforms the ontology of the image. Furthermore, because the image has neither closure nor an end point, it is exposed to a multitude of changes. The mutant versions of the image are therefore subject to displacement and decontextualization at any point. That is to say, the image becomes in and of itself those altered or mutant versions, such that the notion of originality disappears altogether.

4. Digital Image as a Simulacrum

The notion of simulation leads inevitably to a discussion including Jean Baudrillard. Being a photographer himself, Baudrillard (1996, p. 86) puts forth the following claim about analog photography: "The photo is not an image in real time. It retains the moment of the negative, the suspense of the negative, that slight time-lag which allows the image to exist before the world." Then, he contrasts it with the computer-generated image in which, for him, "the real has already disappeared." The conventional photograph "preserves the moment of disappearance" and "charm of the real, like that of a previous life." The distinction between digital and analog images relates in fact to images of "reality" and images of self-sufficient hyperreality in which images appear to be "truer than true" or "realer than real" (Baudrillard, 2007, p. 27). Within this system, an image no longer has an "umbilical cord," to borrow Barthes' metaphor (1981, p. 81), which links the photographic object to the gaze; rather, it loses this connection with the photographic object within and through algorithmic codes. In this context, the digital image can thus be perceived as belonging to the third order of simulacra in Baudrillard's (1994, p. 6) famous systematization wherein the

image "has no relation to any reality" and instead becomes "its own simulacrum."

As Vasselau (2015, p. 174) argues, simulation models do not imitate the natural world; they undermine a naturalized metaphysical perspective and operate to produce a world-order comprised of quantifiable and manipulative results.[17] I would contend that within this new system of reality, the digital image has two related realms of aesthetic expression: it can be seen either as a form of expression that imitates the analog and extols the photographic, to use Manovich's formulation explained earlier, or as a form that operates essentially through manipulation which involves perfecting the real through its fabrication (Frosch, 2003, p. 177). Although these two processes are interrelated, the latter, I believe, seems to have significant implications for the future of digital images, in which they will no longer be regarded as merely analog image simulations but as generating new aesthetic modes of expression that can only be understood within terms particular to virtuality.

Returning to the issue of referentiality in digital images, there remains a central question of whether or not the sheer absence of referentiality leads to the disappearance of indexicality. Nöth (2007) rejects a categorical distinction between digital images and conventional photographic images on the basis of the absence of referentiality, in light of various cases in conventional photography in which it is almost impossible to detect any referent at all (2007, pp. 98-102).[18] That is, the presence of the referent cannot be a necessary and sufficient condition of conventional photography. However, as a critical point, Nöth claims that although these images have no referent, they do retain the feature of indexicality in contrast to digital images with no indexicality. He then categorizes digital images

[17] Vasselau's discussion is indeed a novel attempt to explain alternative aesthetic modes of expression that digital images may generate in the future by using the notion of translucency. Because this concept is beyond the scope of the present article, I chose instead to refer to this aspect of his work here to direct readers who are interested in the issue.

[18] Nöth enumerates various forms in conventional photography with no referent, which, for instance, include those in which the self is negated in a paradoxical self-portrait (he gives the example of Hippolyte Bayard's famous work *Self-portrait of a Drowned Man* dated 1839).

and non-referential conventional photographs using Jäger's concepts thusly: Digital images are in the category of "Concrete Photography", which generates its own images without any abstraction, while non-referential conventional images fall under the category of "Abstract Photography", which abstracts from the referent (Jäger, 2003, p. 178, quoted in Nöth, 2007, p. 103). Thus, in the post-photographic era in which there is an undeniable predominance of digital images, the distinctive characteristics of these images cannot be defined by non-referentiality but rather by the radical change within their nature. In a decisive move, Nöth regards these images as iconic in the strictest sense of the word. Moreover, Nöth claims that these "genuine icons" do not operate in a conventional sense of mimesis; they refer to nothing "but its own simple visual qualities of form, luminosity, contrast, or texture" (p. 104).

5. Conclusion

The disappearance of referentiality seems to occur at the moment of contact, the first instance of the photographic act. This fact marks, I will argue, the end of the conventional difference between memory images and images to be seen. In contrast to conventional photographic images, digital images do not mask themselves as things in the past; they do not replace memory images. In other words, because they are devoid of materiality and referentiality, they refer to nothing but the images themselves. They thereby acquire the characteristics of intertextuality and conceptuality. To use Nöth's terminology, the things on the surface of digital images as genuine icons never cease to exist because they have never existed outside this surface at all. The essential characteristic of photography, making its own object more apparent than itself, dissolves in the absence of indexicality. As such, if we reverse Barthes' (1981, p. 6) famous definition,[19] a digital image is perfectly visible; it is it that we see.

I will attempt to contribute to present discussions regarding truth claims in photography as well as photographic realism in early and recent

[19] "A photograph is always invisible; it is not it that we see."

digital photography literature in light of Maynard's (1983, p. 156) two different representational modes or types of authenticity. Maynard distinguishes between visual descriptions and manifestations that imply two modes of authenticity, the former of which refers to hand-made pictures and the latter to photographs. Although the first type is related to information or content, the second depends on causality. He cites the Shroud of Turin to exemplify the notion of manifestation; the shroud has a causal relationship with the "object" of which it carries the marks. Thus, for him, photographs are at once visual descriptions of their subjects and manifestations of what they depict. He asserts that these two characteristics are inherently conflictual: a symptom of a disease is the manifestation of that disease, not the image of it. In this example, the idea of a picture that is both the manifestation and visual description of a disease is confusing and nigh impossible. Maynard is therefore echoing the conventional distinction between icon and index. Moreover, as Goosken (2011, pp. 116-17) contends, Maynard's distinction implies two types of photographic realism: epistemological and ontological. The early definitions of photography as a mirror or reflection of reality depend in part on epistemological realism, in which what Maynard conceptualizes as information or content is of utmost concern. However, ontological realism speaks to the causal relationship between a photograph and its subject, with the photograph being the causal consequence of this relation. Both epistemological and ontological realism regard photography as having a direct relationship to reality. However, while epistemological realism defines this relationship on the basis of the notion of reflection, ontological realism focuses on causality.

Digital photography does not operate through ontological realism; that is, what it promises to depict as real has nothing to do with the ontological. As a concrete photography, to use Jäger's concept, or a genuine icon, to borrow Nöth's term, digital photography refers to nothing other than its own visual qualities. Digital images are also paradoxical aesthetically due to being detached from the referent ontologically: although they operate primarily through the loss of the referent at the moment of contact, they also imitate a modern representational form that depends largely on referentiality and medium specificity. While digital images pursue a notion of a so-called

"perfect image" that beholds and shows everything, they also use aesthetic forms, such as textures and imperfections, that are traditionally unique to analog images. To examine this paradox from a broader perspective, digital images can be considered photographic images rather than photographs, a difference that is substantiated by self-reference and a sense of postmodern nostalgia for the modern. This sense of nostalgia does not mourn for the referent lost at the very beginning of the photographic act, but for the representation of the referent itself in conventional photography.

The conception of digital images regarded here as genuine icons calls into question the distinction between medium and image. Within the notion of indexicality, there are two possible views on the relationship between these ideas: medium can be thought of as a surface "carrying" the image itself or, alternatively, image can be conceived as a thing that replaces the medium; it becomes the medium itself. However, while the medium already exists within its materiality, the image gains the virtue of materiality only in conjunction with the medium. Sartre (2012, pp. 5-6) once noted that existence-as-imaged is a mode of being that is exceptionally hard to comprehend because we tend to think of all modes of existence in terms of physical existence, a deep-rooted habit that proves difficult to break. If we simplify the complexity of Sartre's account and adapt it for our purposes, if we think of the notion of image without holding any preconceived notions about it, then we can begin to attribute the very features of the imaged thing to the image to bear in mind two different realms: one of the imaged thing and another of the image itself. This is where the image ceases to be an imaged thing but becomes an object that exists in the same way that the object does.[20] Sartre (2004, p. 43) calls this tendency to consider two realms the "illusion of immanence", wherein we see a respective realm of things and images and then place images on level ground with things, both of which have the same mode of existence.

At this point, we can return to the distinction between medium and image in Sartre's terms. Within the conceptual framework of indexicality, the image can disappear in the "transfer" of the photographic object only if

[20] Sartre (2012, p. 6) calls this way of thinking as "naïve metaphysics of the image."

it is tied to a sort of materiality. However, if we assume impartibility of medium and image for a moment, then the indexicality of this medium-image is conceivable within materiality. Paradoxically, however, this notion of medium-image can only be possible within the absence of materiality, or as long as the image is regarded as a "thing." Can we continue to talk about the notion of image in its conventional sense given this perspective? I think not. The digital image as a "genuine icon", which shows nothing but itself (or, in other words, becomes a "thing" in itself), is clearly a perfect example of the situation in which what Sartre calls the "illusion of immanence" ideally occurs. This is especially true in the case of the absence of indexicality where there is no material ground (read as "medium") for the image. When the digital image is conceived as a simulacra of a "modern" notion of the referent, it becomes its own reality; it is essentially a "thing" that refers to nothing but itself.

The lens and the camera are indispensable to and inextricable parts of the transfer process in analog photography. In digital images, although these tools seem to fulfill the same functions as in analog photography, the photographic process ends just after what I have identified in the present discussion as the moment of contact. The data transferred to the digital sensor has nothing in it that is particular to the medium at hand; rather, this data carries the same ontological definition no matter the outcome (i.e., sound, music, visual image, text, etc.). Thus, the trace of the referent is lost after the very brief moment of the actual photographic act. The notion of reality refers exclusively to the self-reference of the digitalized data and a theoretically infinite chain of references. However, the highlighted difference between analog and digital photography does not amount to the photographic act being an inherently realistic and neutral process safe from ideology in which the objects in front of the camera are truthfully brought to the photographic surface without any intermediaries. The distinction only means that the photograph is a certificate of presence of a thing and carries traces of it, rather than encapsulating a specific association between the photographic representation and truth or a claim that indexicality reflects or reversely distorts reality. Relatedly, the presence of referentiality does not lend itself to the fact that a sort of immediacy between the photograph and

its object made possible through the notion of indexicality entails any kind of inference about the nature of reality or truth appearing through the image. If we are supposed to decide whether or not digital images can be regarded as photographs (although it is quite problematic to pose the question in this way), we can content ourselves by claiming that digital images have lost some distinctive characteristics of photographic images, a statement which renders exceptionally challenging the task of determining if they are in fact photographs.

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