Cinémas
Revue d'études cinématographiques
Revue d'études cinématographiques
Journal of Film Studies

Digital Editing and Montage: The Vanishing Celluloid and Beyond

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Volume 13, Number 1-2, Fall 2002

Limite(s) du montage

URI: https://id.erudit.org/iderudit/007957ar
DOI: https://doi.org/10.7202/007957ar

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Publisher(s)

Cinémas

ISSN

1181-6945 (print)
1705-6500 (digital)

Explore this journal

Cite this article

Lefebvre, M. & Furstenau, M. (2002). Digital Editing and Montage: The Vanishing Celluloid and Beyond. *Cinémas / Revue d'études cinématographiques*, *13*(1-2), 69–107. https://doi.org/10.7202/007957ar

Article abstract

In this essay we consider some of the effects of digital film editing technology on editing. Through an analysis of this technology, as well as DVD technology, we examine the impact these new interfaces have on the film experience. In addition, a study of the effects of compositing—understood here as digital montage *par excellence*—permits us to dig deeper into its impact on traditional approaches to film style, as well as to question the anxiety stemming from the new technology, given that many critics today argue that digitization has obliterated film's indexicality.

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RÉSUMÉ

Nous cherchons ici à étudier l'impact des technologies informatiques sur le montage, qu'il s'agisse du montage assisté par ordinateur ou du *compositing*, entendu ici comme montage numérique par excellence. Après avoir montré comment l'ordinateur conceptualise le film d'une façon nouvelle (conception qui trouve également à se manifester dans la technologie DVD), nous examinons l'impact du *compositing* sur les conceptions traditionnelles de la stylistique filmique et questionnons l'angoisse que ces technologies soulèvent trop souvent chez les commentateurs qui y voient la mort de l'indice au cinéma.

ABSTRACT

In this essay we consider some of the effects of digital film editing technology on editing. Through an analysis of this technology, as well as DVD technology, we examine the impact these new interfaces have on the film experience. In addition, a study of the effects of compositing—understood here as digital montage *par excellence*—permits us to dig deeper into its impact on traditional approaches to film style, as well as to question the anxiety stemming from the new technology, given that many critics today argue that digitization has obliterated film's indexicality.

"A cut… is a cut, is a cut—and so is the impression of a cut." This is how one might characterize the film viewer's reaction to digital editing. For the obvious fact is that cuts "made" with the

help of a digital system look exactly the same as cuts made by hand or with the help of a flatbed. The truth of the matter is that digital editing systems do not actually "cut" film; they either help with the preparation of a cut list with which the negative cutter then physically cuts the negative so as to produce a print, or they are used to generate a version of the film which will then be scanned onto a new negative, thus leaving the original negative intact and untouched. In the latter case film editing can be achieved without any real "cuts" at all (an effect not entirely unlike in-camera edits). The question, however, is whether or not this is at all relevant to anything or merely "academic"—as non-academics like to say. After all, film viewers are unable to tell whether a given film has been edited by hand, with the help of a Moviola or a Steenbeck, or with the help of an Avid. Yet, and here is the dilemma, unless we can "perceive" some difference (i.e. some "effect" or "consequence") with regards to films edited with the help of a digital system, digital editing will be as meaningless for the study of film as, say, the replacement of glue by tape in the traditional editing process!

The problem, of course, is that digital editing—as a tool for achieving what can be done by hand and scissors or with the help of a Steenbeck—has no clear, immediate and direct impact on editing patterns such as continuity editing or intellectual montage. This, however, is not to say that it does not or cannot have any impact at all.

Consider, for a moment, an analogous technological advance such as the invention of the printing press during the Renaissance. Now, it can be argued that Gutenberg's invention did not have an *immediate* and *direct* causal effect on literature. After all, the *codex* had already long replaced scrolls—and with it had introduced a new mode of viewing written data[1]—so that the printing press could be seen simply as a more efficient tool for producing books regardless of their content or of literature as a whole. To a certain extent this is true. Certainly, neither Gutenberg nor his contemporaries thought of the press as having an influence *on* literature. Yet, in retrospect, it seems likely to have had profound long term and *indirect* effects on literature. For instance, by enabling a faster and greater production

and circulation of written texts, the printing press arguably helped foster a culture of literacy which, in turn, found expression in practices of reading and writing initially in religious and then in growing secular contexts. The very institution of literature has been dependent ever since on the printing process. Moreover, it is well known that most authors are also avid readers, and in fact an argument could be made to connect the development of the classical novel form with the greater accessibility to written material enabled by Gutenberg's invention. Thus one could possibly infer that the widespread availability of books encouraged reading as an individual and introspective activity, possibly contributing (along with various other factors) to the development of the modern subject which lies at the centre of the novel form.[2] Of course, the difficulty with an argument of the sort is that the causal route which leads from premise (the printing press) to conclusion (the novel) is anything but straightforward, to say the least.

Now it may be that it is simply too early to predict the impact—if any—of digital editing on the films themselves. With hindsight, Barry Salt was able to observe that within a year after the introduction of sound Moviolas in 1930, there was a noticeable drop in the Average Shot Length (ASL) of American films.[3] And it may equally be argued today that the quickening pace of many contemporary feature films (2506 shots in Ridley Scott's 155 min. *Gladiator*, and over 2550 in David Fincher's 139 min. *Fight Club*, for instance[4]) is one possible outcome of the new technology. However, the inference is once again far from certain and runs the risk of leading us toward absolute technological determinism. Surely other technical as well as broad cultural factors may play an equivalent—if not sometimes more important—role in the overall editing rhythm/patterns of films in any given era and place (a good example, of course, being the films of the Soviet montagists of the 1920s whose editing technology—magnifying glass, scissors and glue—was the most basic).

Though the film viewer, as we have said, cannot perceive any difference between a film whose editing is computer-based and one whose editing was achieved the traditional way, there is

nonetheless a specialized category of viewers for whom digital editing technology does make a difference in how a film is experienced. We are referring, of course, to film editors (and along with them filmmakers or anyone involved in the process of editing). To start, then, we would like to briefly speculate on the way films are experienced and "conceived" through the interface of digital editing systems. We will then move on to discuss an expanded notion of digital editing understood as digital montage and its implication for our conceptions of film style. Third, we will consider some of the consequences of digital images and digital montage for film theory.

I. What Does Digital Editing Mean?

Editors, it goes without saying, are no "ordinary" spectators, though, of course, in order to edit a film they must screen[5] what has been recorded. And though the film does not yet fully exist when it is being edited, still the editor must have a way of viewing the material that has been gathered through the production process. The relevance of discussing the editor's mode of viewing the film may be gauged in part by considering some of the ways pre-digital technology (specifically the Steenbeck) lets the editor view film and by comparing it to the ways a VCR "conceives" of a film through how it lets one view it—both of which may be differentiated from the way movie theatre projection "defines" the medium.

In the movie house, a film is defined as something that is temporally linear, moving forward in time thanks to projector-induced motion. There are no stops (freeze-frames only give the impression that the image is stalled) and, after electrical projectors came to replace hand-cranked ones, usually no slow, accelerated, or backward motion (except for those already printed on the film, obviously).[6] On the editing table, however, things are quite different. The editor is able to view the film in ways that disrupt its continuous forward movement: the pace of the film can be quickened or slowed down, or even come to a dead halt. Also, the film may be played forward or backward. Now, once a film is transferred to video and played back on a VCR its mode of viewing also changes: though the film is still linear by virtue

of the video tape, freeze-frames (pause), slow-motion (including "frame-by-frame" advance), fast-forward and rewind motions, all become possible ways for the viewer to view the same footage. In this sense, *VCRs don't so much reproduce film projection as they partially mimic the way an editor may access a film that has been threaded onto a Steenbeck*—including even viewing the film on a reduced-size screen. The question remains, however, how relevant or meaningful can such change in the manner of viewing a film be? Answering it requires that we dispense with the usual assumption, according to which a given film projected on a movie screen and a video version of it played back on a VCR are understood as identical. Though such *textualism* is useful when considering narrative, *mise en scène*, or an actor's performance, it doesn't account for differences in meaning resulting from the technological basis of the film experience. Now, it must be clear from the outset that meaning, here, is conceived pragmatically as the outcome, effect, or consequence of a sign.[7] It is in this sense that we have claimed earlier that such devices as projectors, flatbeds or VCRs "define" or "conceive" of films as having certain properties which, in a certain sense, they seek to represent. As examples of the meaning of such conceptions, let us briefly consider two such "consequences" before moving on to speculate on the conception of film involved with the interface of digital editing systems.

Possibly one of the most striking effects of watching films by way of VCRs has been the growth of film analysis during the last twenty years. This development had been foreshadowed by the (occasional) use of the Steenbeck (or other similar editing suite devices) as an analytical tool for producing close readings or "textual analyses" of films.[8] Yet difficulty in getting access to editing suites, the prohibitive cost of Steenbecks (or even analytical projectors) and print acquisition, all made it next to impossible to generalize the use of editing-device-like film viewing facilities to analyse films.[9] Today, though, the VCR arguably constitutes the most important tool for film analysis.[10] The ability to search the film, to freeze the image or to advance and rewind at varying speeds has dramatically altered how film

scholars analyse films. By mimicking certain functionalities of the editing suite and thus partially altering the predetermined temporal flow of the projected film, the VCR, we believe, has helped foster rigorous descriptions and close studies of films and is responsible for much, if not most, film analysis produced today. *In this sense, it could be argued that part of the meaning of VCR technology lies in current film analyses found in articles and books devoted to the study of films.* In other words, such articles and books could be understood as interpretants of VCR technology (or at least of those playback functions VCR technology shares with the film viewing possibilities offered by editing devices such as Steenbecks).[11]

Another such interpretant can be found in the work of avant-garde artist Douglas Gordon, whose *24 Hour Psycho* installation is a further manifestation of the meaning of the VCR's flatbed-like "playback" technology. In this piece, a videotape of Hitchcock's *Psycho* is played back and projected on a slightly tilted screen at a speed of approximately two frames per second so that it takes roughly 24 hours to run its course. Gordon explains how he got the idea for the installation by playing with the controls of a VCR:

> In 1992 I had gone home to see my family for Christmas and I was looking at a video of the TV transmission of *Psycho*. And in the part where Norman (Anthony Perkins) lifts up the painting of *Suzanna and the Elders* and you see a close-up of his eye looking through the peep-hole at Marion (Janet Leigh) undressing, I thought I saw her unhooking her bra. I didn't remember seeing that in the VCR version and thought it was strange that, in terms of censorship… more would be shown on TV than in the video, so I looked at that bit with the freeze-frame button to see if it was really there… It was as if the slow-motion revealed the unconscious of the film (Gordon, quoted in Tobin 1996, p. 70).

Moreover, as Amy Tobin (1996, p. 75) notes, "anyone with a top of the range VCR or laser-disc player could make a DIY [do-it-yourself] version of *24 Hour Psycho*." Theoretically, the same effect could also be achieved on an editing table.

Thus while the apparatus used by film editors determined how they would be able to view a film, and presumably affected the ultimate organisation of raw footage, once this viewing mode was imported into the domestic technology of the VCR it can be seen to have had a more general effect on film culture: on the understanding of, and analysis of, the cinema. No longer affecting the elaboration and organisation of a film, the VCR nevertheless transformed the terms of film reception along the lines that we have suggested. Gordon's *24 Hour Psycho* represents at least some aspects of that transformation, and points to the new capabilities granted to the film viewer, as well as suggesting some of their consequences. What *24 Hour Psycho* represents, in a certain sense, is the sort of manipulation that can be achieved that make particular kinds of analyses possible, analyses that have sometimes been described as searches for a film's "unconscious."

Just as the VCR may, as we've suggested, be understood as the domestic version of traditional editing systems, such as the Steenbeck or the Moviola, so the DVD player, we believe, may be understood in relation to new digital editing software and platforms, such as the Avid, FinalCut Pro, or Media 100. The most significant difference between the two editing systems, between linear and non-linear, lies in their respective modes of viewing the footage being edited. Unlike traditional film editing, non-linear digital editing offers random viewing of digitized motion picture data. In other words, one can view instantly any frame of the footage without searching sequentially through the material. It also allows changing the order of shots in a given sequence without any consequence for the rest of the edited footage. It also gives the editor the ability to produce—quickly and at little cost—multiple versions of any given sequence (or section) of a film, and provides several on-screen (analog) display possibilities for the digitized data, including simultaneous visual display of unedited and edited material (showing up either as still or motion images in the source and record monitors), and corresponding timeline (i.e., a graphic—linear—representation of the duration of any given shot that indicates its temporal position with regards to the film's temporal progression).

The random viewing of digital editing systems is also what characterizes the domestic version of this technology, the DVD player, and it is here that we may begin more precisely to distinguish between the DVD and the VCR. Though the DVD will likely continue to be used in many instances in the manner of a VCR, a consideration of the differences between DVD and VCR technology may reveal other possible approaches for the analysis and understanding of the cinema.

For one thing, the non-linearity of digital editing systems that is reproduced in DVD players and other domestic technologies that allow viewers to view and manipulate images suggests the possibility of resurrecting other traditions of analysis, which are based on fragmentation and recombination. At stake here is a significant difference between VCR and DVD technology. While the VCR may be understood as roughly analogous to flatbed editing systems, there is, of course, a crucial difference. The mode of access of the Steenbeck was elaborated to help editors view the film *as it undergoes the process of being edited*. It is a vehicle for both viewing and editing the film. According to its domestic functionality, the VCR is *not* designed to allow the user to cut the film, to re-edit the film. While one may, admittedly, connect two (or preferably three) VCRs together and thereby produce a rudimentary editing system, it is not a function that is built into the apparatus. The DVD player, on the other hand, while it reproduces most of the same functions of the VCR, also allows non-linear, random viewing of the film. Films on DVD are typically separated into "chapters," or sequences, which the viewer may view instantaneously simply by choosing from a set of thumbnail images representing the chapters in the DVD menu. One may move about the film even more precisely, by entering a specific time, instantly taking the viewer to the corresponding location in the film. In addition to such ready viewing, one can also program the DVD player to play the chapters in a purely random order, or re-order the chapters oneself, producing an effectively *re-edited* version of the film. While the VCR also allows for a kind of random viewing, made possible by the built-in time counter, this nevertheless takes some time, since the linear video tape has to be spooled.

What distinguishes the DVD player is the instantaneous character of the random accessibility, as well as the rudimentary editing possibilities, which together may alter the viewer's very conception of the film, which becomes an object of intervention rather than merely observation. What most DVDs offer, in fact, are several possible *versions* of a film. The viewer, that is, may, within certain various parameters, and through the various playback operations, alter the film to suit his or her specific desires. Many DVDs, for instance, offer the choice of viewing the film either in its original aspect ratio, or formatted to fit the screen. One may also choose from among a variety of subtitles, or between dubbed and non-dubbed versions. On the recently released DVD edition of Joseph Losey's *Eva*, the viewer may choose to see either the theatrically released version of the film, or Losey's original cut (titled *Eve*) which had been suppressed by the studio. One could, in fact, through the functions described above, "edit" the two versions together, so that each sequence from the two films could be viewed one after the other, providing the possibility of a careful comparison.

The notion of alternate versions, such as Losey's *Eve* and *Eva*, is still governed by the concept of directorial authority, however, and Losey's *Eve* will likely be understood as the more privileged of the two. By placing the two versions on a single DVD, however, such privileging is left more and more to the viewer. While the struggle had originally been between Losey and the studio, it is now the viewer who is given the right of final arbitration. This sort of erosion of directorial authority, this levelling of historical competition between two authorities asserting control over a film, is one particular consequence of DVD technology, one that mimics not only the editor's access to the film but also the ease with which he or she can now produce alternate versions of scenes. Viewers are being granted more material on the basis of which they may make formal and critical choices. The DVD edition of John Dahl's *Joy Ride* offers the viewer a choice of alternate endings, choices which, in the past, were determined by the director and/or editor. Those endings not chosen would then typically be kept out of public view, or even destroyed, so that if it was known that an alternate ending or

endings for a film existed, they could only ever be imagined. If made available, as in the case of the re-released version of *Blade Runner* in 1992, with its far more ambiguous and downbeat ending, it is typically at the discretion of the director, according to whom the new ending would be understood as supplanting the original ending, which would now be understood as the alternate. What DVD technology is encouraging is the inclusion of such alternate endings, of more and more such peripheral material, disturbing the notion of the final cut.

Other options and alternatives are beginning to be incorporated into films in anticipation of the possibilities made available by DVD technology, and which further upset the notion of a stable and unalterable film text. Certain films on DVD, such as Tim Burton's recent remake of *The Planet of the Apes*, include scenes that have been shot with several camera placements. This was not unheard of in the past, when scenes may have been shot from different angles, allowing the director (or producer) and editor to choose the best from among these different set-ups. This choice, though, is now granted to the viewer of the DVD, who, by pressing the "Angle" button on the remote control, may choose from among a variety of camera placements that have been included on the disc. There are comparatively few films to date that offer this option, but it is an option that is built into the technology of the DVD, and, in its drive to encourage consumers to make the switch from the older technology of the VCR, the film industry is altering its practices, prompting directors to produce increasingly more "interactive" versions of films.

It is according to such technological inducements, then, that the very concept of a film may be seen to be undergoing a transformation, as films become less fixed, less determinate, as they are understood to be subject to ongoing and increasingly unrestrained alteration in both the editing room and the living room. From the possibilities for randomization, for shuffling and reordering the film, to choosing camera angles, endings, and so on, there is an increasing tendency to see a film as an object that may legitimately undergo perhaps constant revision and rearticulation. This is not, of course, wholly determined by the advent of digital editing technology, and its domestic ver-

sion in the DVD. The cinema has long been distinguished from other less mutable art forms, the stability of which has derived from the existence of an original. While the Mona Lisa has been updated and transformed many times, according to the avant-garde predilections, say, of Marcel Duchamp, or within the consumerist discourse of marketing and advertising, which has used the look of satisfaction and contentment on the face of La Giaconda to suggest happiness with a variety of commodities and consumer products, the painting itself remains carefully protected behind a Plexiglas screen in the Musée du Louvre. In the cinema, as Walter Benjamin noted, there is no comparable original that requires such care and attention, and from which a film's meaning and significance are seen to derive.

Cinema history, as a result, is characterized by transformation, and punctuated by famous instances of alteration and modification, typically at the hands of producers and studios, and often in defiance of the aims and wishes of directors. Directors have recently begun reasserting their rights over their films, and the phenomenon of the "Director's Cut" has become an increasingly familiar one. But this, too, has encouraged the notion of the cinematic work as something that may, even if according to the authority of the director, be altered and re-edited. One may also consider earlier historical contexts within which a film was understood less as the completed aesthetic statement of a director and more as something that could be altered according to local tastes and inclinations, mainly through the agency of the film lecturer or *bonimenteur*'s narration or even that of the projectionist who was able—within certain limits, it is true—to re-cut and re-order the films that had been distributed, so that the exhibition of a film might be a relatively unique experience.[12] But the notions of transformation, of alteration—of *fragmentation*—may be having a more acute effect on our concept of the cinema as the means and protocols of digital editing are dispersed and made available through such domestic technologies as the DVD, and consumer versions of digital editing platforms, such as Apple's I-Movie. Films are becoming understood as objects available for intervention, interaction, alteration—as subject to a process of fragmentation

and mutation, upon which our experience of the cinema, as viewers, as scholars and analysts, as interpreters, is likely to be transformed, in a manner similar to the transformation effected by the advent of the VCR. As an emblem of this new aesthetic, we might imagine an updated version of Douglas Gordon's *24 Hour Psycho*. In so far as Gordon's original pointed to the sorts of interventions into a film that the VCR had made possible by mimicking some of the functions of editing-suite devices, interventions that have largely set the parameters for the discipline of film studies and, more generally, allowed for the development of a broad and broadly knowledgeable film culture, an updated version of the piece may suggest the contours of a newly constituted film culture and offer some indications for new modes of analysis. Projected from a DVD player, programmed to shuffle and repeat, we may present a (situationist?) modification of Gordon's work, which we tentatively entitle *Random Psycho*…

II. Digital Montage and Film Style: the Montage of Digital Attractions

> Controversy over the structure and importance of the shot and the cut, of the shot versus the cut, *forms the bedrock of film theory*. In the writings of Sergei Eisenstein and André Bazin, especially, and the work of a variety of filmmakers, belief in the priority of one element over the other has determined the way films are made and understood, at least outside of Hollywood (Kolker 1998, p. 15, our emphasis).

This quote, taken from a recent textbook of film studies, illustrates what many still feel is the central issue of film theory, an issue that has been played out in the arenas of both aesthetics and ideology, namely that of film's relation to the world. In this and the following section, we will investigate how digital manipulation plays into this debate and possibly clarify some aspects of film's relation to reality.[13] We will start by raising some questions relevant to film style.

Everyone knows how Bazin broke down the domain of film style into two camps: filmmakers who believe in reality and filmmakers who believe in the image. This led to an opposition

between the most representative stylistic devices of each group: long take and *mise en scène* versus montage. Yet, Bazin's argument is not entirely formal, for there is also a psychological side to it which relates to the nature of fiction. Thus, regarding Albert Lamorisse's use of several horses in *Crin blanc* (1953) in order to create the impression of a single imaginary animal, Bazin (1967, pp. 47-48) writes:

> If there had only been one wild horse painfully subjected to the demands of the camera, the film would have been just a *tour de force*, an exhibition of successful training like Tom Mix and his white horse[:] [i]t is clear what we would lose by this. If the film is to fulfill itself aesthetically we need to *believe* in the reality of what is happening while knowing it to be tricked. Obviously the spectator does not have to know that there were three or even four horses or that someone had to pull on a [nylon] thread to get the horse to turn its head at the right moment. All that matters is that the spectator can say at one and the same time that the basic material of the film is authentic while the film is also truly cinema. So the screen [reproduces] the ebb and flow of our imagination which feeds on a reality for which it plans to substitute. That is to say, the tale is born of an experience that the imagination transcends.[14]

Bazin's argument rests on the requirement that the spectator *believe* in the fiction of the imaginary horse as though it were real while *knowing* it is not. This, of course, is very close to Coleridge's willing suspension of disbelief. Moreover, this psychological requirement, claims Bazin (1967, pp. 47-48), is met when "what is imaginary on the screen [has] the spatial density of something real." Consequently, Bazin contends that the aesthetic superiority of the long take over montage lies in the fact that the presentation of an event in continuous space should lead us to *believe* in its "reality." Though entirely fictional, the event *appears* to be real and avoids showing itself as the result of purely cinematic manipulation.

At the time of writing his comments on Lamorisse's films, Bazin certainly had no idea what awaited the cinema in the digital

age. One can only guess at how he would have reacted to the development of such techniques as digital compositing, although, as we shall see later, he did mention the use of traditional composites.

Compositing is usually defined as a "special effect" consisting in the layering of two or more image-elements to produce the impression of a single visual field. Different techniques have been used throughout film history in both production and post-production to create composites, from superimposition to various sorts of mattes and optical printing. Today most composites are done on a computer, with the help of compositing software, and, if a print is required, eventually scanned onto the film negative. While composites don't rely on the linear or temporal juxtaposition of shots—the domain of editing, *per se*—they nonetheless require the juxtaposition of elements taken from at least two separate shots.

Now, just as traditional editing requires the ability to remove and/or insert frames from or into a strip of celluloid film, digital compositing requires the ability to remove and replace pixels from a digitized image. And in fact digital compositing may turn out to provide the best illustration of digital montage yet.

All electronic images break down into rows of pixels, or picture elements, which constitute the smallest units making up the visual field. With digital images, these elements are coded and stored in computer memory. As individual units they may then be subjected to manipulation with the appropriate software. Filmmakers can therefore literally "edit" the contents of each image, by selecting and then deleting or importing pixels or groups of pixels. Imported pixels may originate in a different section of the same overall image ("cloning") or in an altogether different image (compositing proper). This is how cables holding actors during stunts are now removed from the image and replaced by different pixels giving the impression of continuous background for the action, or how the Titanic can be seen to sail the ocean on its maiden voyage once more. Also, since the computer doesn't differentiate between pixels that come from a digitized film image, video image, or computer-generated image (CGI), digital compositing enables efficient "blending" of all

sorts of images such as the layering of CGI graphics with images gathered photographically through a standard camera. Such flexibility is one of the principal reasons why filmmakers have adopted digital compositing over the traditional methods of image layering such as optical printing. And though the technique may be used in several ways, mainstream cinema, it would appear, has for the most part opted to integrate it into its aesthetic of invisibility (*Terminator 2*, *Jurassic Park*, *Titanic*, *Forrest Gump*, *Twister*, *Mission: Impossible*, *The Perfect Storm*, *Gladiator*, *Planet of the Apes, A.I.*, etc.). But how exactly do such digitally composited shots situate themselves with regard to the montage versus *mise en scène* debate? Do they constitute, using Bazin's term, a form of "forbidden montage"?

Of course, within the context of Bazin's thought, the ambiguity of digitally composited shots seems to be that they can give viewers the impression of an event unfolding within a continuous and seamless space, when in fact the space in question is the product of digital editing (compositing or cloning). Let us consider an example Bazin uses.

In developing his argument, Bazin refers to a rather undistinguished British film (*Where No Vultures Fly*) in which he nonetheless discovers what according to him amounts to a perfect moment of cinema. At one point during the film, a young boy holding a lion cub comes face to face with its mother. Here is what Bazin (1967, pp. 49-50) writes in an important footnote worth quoting at some length since it perfectly summarizes his position:

> Up to this point everything has been shown in parallel montage and the somewhat naive attempt at suspense has seemed quite conventional. Then, suddenly, to our horror, the director abandons his montage of separate [close] shots that has kept the protagonists apart and gives us instead parents, child, and lioness all [simultaneously seen] *in the same full shot*. [This single framing where trickery becomes inconceivable] gives immediate and retroactive authenticity to the very banal montage that has preceded it. From then on, and always in the same full shot we see the father order his son to stand still—the lion has halted a few yards

> away—then to put the cub down on the ground and to start forward again without hurrying. Whereupon the [lioness] comes quietly forward, picks up the cub and moves off into the bush while overjoyed parents rush toward the child.
>
> It is obvious that, considered from the point of view of the [narrative], this sequence would have had the same [conspicuous] meaning if it had been shot entirely in montage or by "process" work. But in neither event would the scene have unfolded before the camera in its physical and spatial reality. Hence in spite of the concrete nature of each shot, it would have had the impact only of a story and not of a real event. There would have been no [fundamental] difference between the scene as shot and the chapter in a novel which recounted the same imaginary episode. Hence the dramatic and moral value of the episode would be [extremely] mediocre. On the other hand, the final framing which involved putting the characters in a real situation carries us at once to the heights of cinematographic emotion. Naturally the feat was made possible by the fact that the lioness was half tamed and had been living in close contact with the family. This is not the point. The question is not whether the child really ran the risk it seemed to run but that the episode was shot with due respect for its spatial unity. Realism here resides in the homogeneity of space. Thus we see that there are cases in which montage far from being the essence of cinema is indeed its negation. The same scene then can be poor literature or great cinema according to whether montage or a full shot is used.

Bazin, in short, is telling us that it is not so much the narrative of a film *per se* that is important, but the emotional experience of cinema as a system or mode of belief in the "fictional reality" of narrative events. Let us now contrast Bazin's description of *Where No Vultures Fly* with a scene from Ridley Scott's *Gladiator* which is somewhat reminiscent of Bazin's example. This, of course, is the scene that takes place in Rome's coliseum and where Maximus (Russell Crowe) must fight a fellow gladiator as well as several tigers. Again, various full and even close shots show actors and animals in single framings. However, unlike the tame lionesses of Bazin's example, this time the tigers

are in very close proximity to the characters and are attacking them. Of course, the actors themselves have nothing to fear since the tigers have been composited next to them (as has much of the coliseum itself for that matter). The film's editor, Pietro Scalia (in McGrath 1998, p. 143), explains how the effect was achieved:

> The fight involves the gladiator fighting a champion while surrounded by tigers on chains. The fight has been fixed so that the tigers will attack and kill Maximus, so the crew needed to shoot tigers being very aggressive and ferocious right near the two fighters—but the tigers wouldn't do that. They were trained tigers, not ferocious tigers so you had to entice them to jump aggressively. I knew what was needed from the storyboards and I knew I was not getting this from the dailies. I was struggling to put that scene together. I had to go to the special effects team and tell them that I needed a tiger to jump in a certain way and swipe with its paws. They said we could shoot the tiger behind a blue screen, cut it out and place it between the two fighters. So I went to the set with the stunt-coordinator and told them exactly what shots of the tiger I needed and from what angle. We had to be careful that these shots of the tiger would match the live action shots that I already had. The special effects (CGI) house than took all the elements, composited the tigers on to the shot with the actors, created new shots and gave them back to me to cut into the film. As with all composite effects, we fine-tuned for weeks and weeks—the shot going back and forth between the cutting room and the special effects house until we were happy.

What is obvious here is that the only reason for going through the trouble of compositing these shots is to make the action believable in a way that parallel montage—or any other form of spatial discontinuity—would not. And in that sense, one could say that Ridley Scott follows to the letter the aesthetic dictate of Bazin. As the illustrations show (Figures 1 and 2), the digitally composited shot gives the viewer the impression of absolute spatial unity in perfect photo-realistic fashion.

Figure 1. Tiger with blue screen

Figure 2. Final composited shot

Digital composite from *Gladiator*, Ridley Scott, 2000, reprinted from *Editing and Post-Production*, Boston, © Focal Press, 1998 (courtesy of Focal Press)

The effect, in other words, is sufficiently believable to warrant its use. Yet with regards to Bazin's views, the situation is somewhat more complicated than that.

For one thing, notice that Bazin does indeed mention the possibility of using a composite instead of breaking the space up with editing. In fact, composites are mentioned twice in his essay, and both times their use is severely criticized and equated with "forbidden editing." In the first instance he works with a fictive example, which finds in *Gladiator* an even stronger echo than the preceding one:

> It is a fact that other devices such as process shots make it possible for two objects, say the star and a tiger, to be seen together [within the same framing], a proximity which if it were real might cause some problems. The illusion here is [closer to perfection], but it can be detected and in any case, the important thing is not [that] the trick be [invisible] but whether or not trickery is used, just as the beauty of a copy is no substitute for the authenticity of a Vermeer (Bazin 1967, p. 46).

Though Bazin's rejection of composite shots is on moral rather than technical grounds—put simply, the composite is a post-production "lie" equal in that regard to a montage effect—the argument, at least when considered in the light of "invisible" and "perfect" simulations of unified space, flies in the face of the previously noted aesthetic requirement that the spectator believe in the fictional reality of the film's events. For should the effect indeed be invisible and perfect there would be no way of telling it apart from a regular shot showing the unfolding of an event in keeping with its spatial integrity. The resulting "cinematographic emotion" would therefore most likely be similar.[15] Moreover, narrative-film events themselves are purely fictitious, even though they typically have real world "counterparts," and even though the structure and existence of the real world is what ultimately gives them meaning. Believability, one could argue, requires only that the fictional world mimic the existing one in a number of ways which likely includes spatial integrity. However, the issue of how such mimicry is achieved seems to be

an altogether different matter. In fact, by refusing to integrate "invisible" and "perfect" simulations of unified space into his aesthetic, Bazin is confusing realism with reality. For surely the moral charge of deceit should also be brought to bear on all other forms of trickery, including those used during production. Yet Bazin unambiguously refuses to do so. He sees no problem with Lamorisse using different animals in *Crin blanc* or several balloons in *Ballon rouge*. "Some will object," he wrote regarding the latter film, "that there is trickery in the handling of Lamorisse's balloon. Of course there is, *otherwise we would be watching the documentary of a miracle or of a fakir at work and that would be quite another kind of film"* (Bazin 1967, p. 46, our emphasis). What is at stake, clearly, is the fictional status of the film. The deception is used to make it believable though, paradoxically, it must not interfere with the film's "documentary value." In effect, Bazin's position forces him to recognize that the believability of such fictional works—their realism—first resides in their documentary value, i.e. the very value he denies them.[16]

In Bazin's views, then, digital compositing's moral corruption would most certainly reside in its use deceitfully to create, by way of montage, a fake documentary value akin to that which he ascribes to realist works. The paradox, of course, is that the technique is often used to ensure or heighten believability in cases where the "acceptable" forms of deceit outlined by Bazin with regard to Lamorisse's films either cannot be used at all or cannot be used without interfering with it, as traditional montage would. This is obviously the case in the above mentioned scene from *Gladiator*, but also in films such as *Forrest Gump*, *The Perfect Storm*, or *Twister*. A scene from *Forrest Gump* further illustrates the point. When Lieutenant Dan (Gary Sinise), a Vietnam veteran who has lost both of his legs in combat, falls from his wheelchair, digital compositing is used to erase the actor's legs and fill the empty space with background as he hoists himself back to his chair. Moreover, a table has been composited into the frame at the exact location where the actor's legs would lay (if we were to see them) as he swivels to approach his chair. The effect, achieved through a combination of digital

montage and long take, is mesmerisingly realistic and believable—though, of course, the audience *knows* that Gary Sinise did not have his legs amputated for the part! Neither the use of a body double (say, an actual amputee whose identity would require hiding through framing or props) or of montage could have provided the scene with the same "documentary value"—even though the latter is entirely fake.

There is, moreover, a further paradox in all of this, namely the fact that these montage effects, as believable as they may be, are used in ways that call attention to themselves. The tension between *knowing* that something is not the case (e.g., Russell Crowe's fight with tigers, Gary Sinise's amputation) and seeing otherwise leaves the spectator asking "How did they do that?" Such digital montage effects belong to the *attractions* of contemporary cinema—offering us a veritable *montage of digital attractions*, to pastiche Eisenstein. To be sure, Eisenstein advocated different types of montage, for which the juxtaposition of shots (editing proper) was only one out of many. Other types of filmic montage would include acting or shot composition. In fact, Eisenstein went so far as to conceive of montage as the basic principle of film composition altogether. At its highest level of generalization montage for him represented nothing less than the very essence of cinema. And in true materialist spirit, he posited the origin of this "essence" in the basic material conditions or technical/optical infrastructure of film: the production of movement by way of the succession (or "collision") of still frames on a strip of celluloid. Thus it is possible, he wrote in 1929, to "derive the whole essence, the stylistic principle and the character of film from its technical (-optical) foundations" (Eisenstein 1988, p. 164). Yet Eisenstein's many definitions of montage often alternate between formal considerations (the *process* of associating filmic elements, including, but not limited to, shots) and prescriptive-aesthetic ones (the *principles* by which given filmic elements ought to be associated in the hope of producing certain effects considered relevant within Eisenstein's Marxist—and modernist—aesthetic, e.g. shock, pathos, ecstasy, imaginicity, organicity, etc.). In light of the latter, it is clear that while the manipulation of pixels opens up a

new site for Eisensteinian montage, as used in all of the above mentioned films, Eisenstein would be no more satisfied than Bazin, though obviously on different aesthetic and ideological grounds.

Digital montage has yet to find its theorists. One thing is clear though: confronted with the montage-filled long takes of digital cinema—which belong neither to Bazinian long takes nor to Eisensteinian montage, but instead offer a synthesis of elements belonging to both of them[17]—film scholars will soon be forced to review and rethink models of film style that have dominated the discipline for at least half a century.

III. Film and the Index: an Anxious Discourse[18]

Digital montage, understood either in terms of compositing, cloning, or morphing,[19] along with the production and integration into films of photo-realistic CGI visuals, has led in recent years to a debate far greater reaching than—though connected with—that of film style. An anxious discourse has risen with regards to digital technology and imagery with, at issue, the very "documentary value" of film as understood for instance by Bazin, or better yet, its *direct* connection to the physical world. What is at stake, it would seem, is nothing short of the passing of the "ontology of the photographic image" on which the cinema as we knew it before the digital age was founded. The cinema, many now argue, no longer possesses the sort of link it once had to reality. As Winston Wheeler Dixon (1998, p. 183) puts it, we are experiencing the "digital replacement of the real." Such a loss is understood to have profound consequences. The cinema, Dixon goes on to say, had once offered viewers at least a minimum access to the real, had once guaranteed some basic reality as an anchor for its images, but has now foregone such anchorage. It has become unmoored, and now offers fundamentally unreliable imagery, which is produced synthetically by computer. "Gradually introduced over the last five years," he writes, "digital special effects have transformed the landscape of the visual in film, transporting the viewer into a synthetic world where computer animation, morphing, and digital effects blend the actual with the fantastic" (Dixon 1998, pp. 22-23). Such a

distinction, moreover, between the real and the synthetic, the true and the false, has itself become untenable, as the fantastic digital images are sometimes indistinguishable from the photographic representations of the actual. "Perhaps one of the most disturbing aspects of the new wave of digital effects films," suggests Dixon (*ibid.*), "is that they do not seem—at first glance—to contain effects at all."[20] As the two become impossible to differentiate, as the photograph loses its specific value and identity, our capacity to access reality, to acquire reliable knowledge, to establish certainties, is eroded. We are confronted, Dixon insists (1998, p. 22), by "the unreliability of the manufactured image," by essentially duplicitous images that increasingly mediate our reality and obscure it from us, and that simultaneously, and insidiously, obscure their own unreliability.

As theorists search, however, for the means with which to resist what is understood as the politically, ethically and aesthetically insidious character of digital imagery, they have increasingly had recourse to a melancholy language of loss, describing the links to the real that the photograph seems, after all, to have always had, but which now appear to have finally been cut. Descriptions are offered of what digitization seems to have replaced, what it has destroyed. Digital technologies are understood to have finally and irrevocably severed the photograph's link to the world. They are the tools, it is now widely argued, with which images may be made to lie, while, significantly, not appearing to do so. In the past, it is argued, the very nature of photographs, their directness and immediacy, had made it relatively difficult to produce duplicitous images. Such difficulties have, it seems, been effectively overcome, and what values had adhered in the photographic image, basic probative and evidentiary values, the values of truth and reliability, have evaporated.

It is worth noting, in passing, how utterly strange this anxious discourse sounds after decades of hard conventionalism, which insisted that the film image was a "semiotic construct," to be examined with the tools developed to study conventionalized notational systems such as natural languages. The cinema's images were understood, in other words, to have been intentionally produced according to specific aesthetic and semiotic

protocols. Rather than referring to any independent reality, the cinema thus construed was understood to create its *own* autonomous reality. The world seen in film was the world *of* film, generated according to specific ideological, cultural, aesthetic and semiotic codes, and analyzable without reference to an independent, anterior reality (which itself, moreover, amounted to nothing more than a *text*). Apparatus theory, for instance, posited that "rather than simply recording reality, the camera conveys the world already filtered through a bourgeois ideology which makes the presumably free and unique individual subject the focus and origin of meaning" (Stam *et al.*, 1992, p. 187). For years, conventionalism was to be the starting point for virtually all theoretical accounts of the cinema. Dudley Andrew, for example, in his survey of the basic concepts of contemporary film theory, invokes the name of one of the strictest conventionalists of the last several decades, Nelson Goodman, who, he says, "advises us not to measure the adequacy of our representations against some supposed 'reality' existing beyond representation but to isolate and analyze the peculiarities that make up the representational system of the cinema and that make its effects distinctive" (Andrew 1984, pp. 40-41). Behind such an injunction there is a set of specific philosophical assumptions, assumptions about reality and the impossibility of its representation, and therefore of its very existence, assumptions that comprise an effectively nominalist position. Though Andrew himself was never ready to argue for an absolute conventionalism, carefully adding that "in every case representation establishes a relation between a text and something outside the text, our sense of that which is constitutive of the representation" (Andrew 1984, p. 51), still he considered whatever lay outside the text as unrepresentable and beyond evaluation. From the prison-house of signs we can neither confirm the existence of an independent reality nor can we valorize an ostensibly primary world over the secondary or subsequent representations. "Though it is not for us to decide," writes Andrew (1984, p. 51), explicitly stating the nominalist and sceptical philosophical assumptions of contemporary film theory, "about the priority of one world over another, and certainly not to insist on a real

world against which all representations are pale copies, nevertheless we are entitled to demand of a version that it be better, more instructive, richer, more useful than an earlier version." Representations may be compared and evaluated, that is, relatively, in relation to one another, but they cannot be measured or analysed in terms of their relationship with a "real world." Thus Robert Stam, Robert Burgoyne and Sandy Flitterman-Lewis, in their lexicon of film semiotics, emphasizing the degree to which film studies and film theory are deeply indebted to and influenced by the developments especially of continental semiology, describe the historical "trajectory" of film theory as having moved from "an 'ontological' interest in cinema as the phenomenal depiction of real-life 'existents,' to an analysis of filmic realism as a matter of aesthetic convention and choice." Film theory, they argue, has

> gradually transformed itself from a meditation on the film object as the reproduction of pro-filmic phenomena into a critique of the very idea of mimetic reproduction. Film came to be seen as text, utterance, speech act, not a depiction of an event but rather an event in itself, one which participated in the production of a certain kind of subject (Stam *et al.* 1992, p. 184).

Today, however, with the emergence of digital cinema, this trajectory seems to have ironically come full circle. Of particular interest to us here is how the Peircean semiotic concept of *indexicality* has been enlisted in this anxious discourse over the loss of the real and its replacement by digital simulations.

The index belongs to that best known of Peirce's many classifications of signs that also includes the icon and the symbol. This trichotomy concerns itself with the sign's relation to what Peirce called its (dynamic) object, which is what the sign is about and also what causes or determines it. Although central, this trichotomy does not stand alone nor does it describe the sign from every relevant semiotic aspect. In 1903, Peirce added two more trichotomies and, later, he added seven more. Peirce gave many definitions of the index, though all of them stress that the indexical character of a sign rests on its ability to denote

its object by way of a real connection with it. Examples given by Peirce include a weathercock indicating the direction and velocity of the wind and, of course, photography. "A photograph," wrote Peirce (1931-1958, 4.447), "not only excites an image, has an appearance, but, owing to its optical connexion with the object, is evidence that that appearance corresponds to a reality."

Since then, a majority of photography and film scholars have adopted the idea that both media are indexical. An idea all the more acceptable for them in that it was often understood as a mere semiotic variation on Bazin's "ontological" claim. Peter Wollen (1972, p. 125), who first introduced Peirce to English speaking film scholars, thus noted that Bazin's "conclusions are remarkably close to Peirce's." "Bazin," wrote Wollen (1972, pp. 125-126), "repeatedly stresses the existential bond between sign and object which, for Peirce was the determining characteristic of the indexical sign. But whereas Peirce made his observation in order to found a logic, Bazin wished to found an aesthetic." As a result of this confusion between the metaphysical (Bazin) and the logical (Peirce) scholars faced with the rise of digital imagery now find themselves forced to consider that "the photograph," in Nicholas Mirzoeff's terms (1999, p. 88), "is no longer an index of reality."[21] Understanding the fundamental flaw in this characterization of digital imagery may help film theory clarify some aspects of the cinema's relation to reality.

Though the few film scholars who have mentioned Peirce's icon, index and symbol trichotomy generally, and correctly, add that these three classes are not mutually exclusive and that they "frequently—or… invariably—overlap and are co-present," (Wollen 1972, p. 123)[22] the logical principles and implications of this "non exclusivity" are usually not taken into consideration and often simply not understood.[23]

When approaching Peirce's classification of signs,[24] the first thing to consider is that each of its 9 sub-classes and 10 classes of signs constitute different logical *functionalities* of the complete (or genuine) sign. A genuine sign—which is always symbolic—is one that is "fit to serve as such *simply because it will be so interpreted"* (Peirce 1998, p. 307, our emphasis). In other words, the symbol is related to its object by virtue simply of its

being interpreted so. In turn, however, the icon and the index, *though they require interpretation to act as signs*, relate to their objects irrespectively of any interpretant—the icon because it is a likeness of its object, and the index because it is really connected to it. *It is important to keep in mind that these well-known definitions correspond to logical types—not to objects of experience, such as paintings, photographs or films.* Peirce's phenomenology points out that every such object, indeed everything that can be present to some mind, must be so according to the three categories of First, Second, and Third and therefore possesses monadic, dyadic and triadic properties.[25] Consequently, any given object is capable of signhood based on any one of these properties and may therefore represent iconically (through a likeness to some quality it possesses), indexically (through some real connection it has to something), or symbolically (by being so interpreted). Now, all three representative functions must be found for a sign to genuinely stand for its object: the icon insures that the sign connotes its object; the index insures that the sign denotes its object; and the symbol insures that the sign be interpreted as representing its object by determining another, more elaborate sign (the interpretant sign), to also represent it.

Since much of this is abstract, let's consider an example. Imagine a realist-style painting depicting a house in such a way that we are led to conceive of it—to interpret it—as a sign of domesticity. It may be a quaint little house of the kind found in well-to-do residential neighbourhoods with a perfectly trimmed yard and a freshly painted white picket fence around it, all brightly lit and framed against a deep blue sky, for instance. As a sign of domesticity the painting appears under the guise of a *symbol* simply because it is so interpreted.[26] Thus we wouldn't be surprised to find the painting reproduced on the cover of a cultural studies book on the history and concept of domesticity: what is at stake in such usage is not the singularity of the house being depicted, but rather the way it—understood as the manifestation or replica of a representational type[27]—stands for some general concept. Yet Peirce contends that in order for a symbol (the painted house) to ensure the interpretation of some determinate object (domesticity), the object in question must be

referred to (or denoted) more or less indirectly by some index. In other words, the symbol requires an index for it to be about something—that is, if it is to be about something more determinate than the vague possibility of some thing. *Simply put, without an index a sign cannot denote or indicate any thing and therefore can be neither true nor false*. Moreover, whatever thing is denoted by the sign possesses some character which can only be represented or signified if the index involves some icon. *In other words, without an icon a sign cannot characterize or give information about its object.*[28] How then are the index and the icon involved in this semeiotic process? Answering the question requires that we consider how it is that the painting can bring about, say in the mind of its interpreters, the idea (or interpretant sign) of domesticity. In this case, a hypothesis is likely made which involves an index. The hypothesis is that houses of this sort really belong to our concept of domesticity. The house in the picture is thus conceived as belonging to a class of *experiential objects*, i.e., as being *indexically* "connected" to that class by contiguity. Moreover, if the house really exists, then the painting can be seen to have been *determined* by the *existence* of a house belonging to the class of objects falling under the concept of domesticity. If, on the contrary, it is a mere figment of the painter's imagination, still it is its *connection* to other *existing* houses belonging to the class of objects falling under the concept of domesticity that has partly *determined* it.[29] As one can see, the hypothesis (interpretant sign) by way of which the painting is interpreted requires that it be existentially determined by its object (domesticity) so as to denote it through one of its type-embodying particulars (the house depicted). Now while domesticity is understood—at least hypothetically—to existentially determine the painting, an index will also be informative by involving an icon. For not only does the hypothesis of the house's domesticity—i.e., the hypothesis of its contiguous relation to the other members of a class—enable it to point to domesticity as its denoted object, it also involves in this case a certain idea or image of domesticity. And it is by way of this image or icon that we may come to know something about the sign's object. For surely domesticity is not depicted here in all of

its aspects, but rather only through such characters as the painting shows by depicting the house. Those characters which the house is seen to possess are required for its inclusion under the concept of domesticity, which is to say that the painting must be seen to possess certain qualities that its object need also possess for it to be represented by the sign. In short, the painting is also a likeness—or icon—of its object.

The above example was provided to illustrate that every sign, whether it be about some individual existent thing or about a general type, requires indexicality. Reference to painting was made to demonstrate that indexicality is not specific to photographic-based media—or to any medium for that matter. *Indexicality is simply how signs indicate what it is that they are about.* The example, moreover, also shows that through indexicality signs denote objects of experience to which they are really connected, i.e. real, existing things now understood as facts.[30] Now, Peirce defined Reality as that which exists independently of any of us, and the Truth as the conformity of a sign to that Reality. If this is the case, then, the claim made earlier that, as a result of the advent of the digital, "the photograph [and the film] is no longer an index of reality" (Mirzoeff 1999), appears to be both simplistic and theoretically unfounded. In short, all signs, including digital images and cinematic fictions should they mean anything, are to be understood ultimately as (among other things) indexically connected to reality. This is how signs begin to fulfill their epistemological role of ensuring the intelligibility of the "entire Universe of being" ("New Elements," in Peirce 1998, p. 303). For it is through signs that we can hope to come to know *Reality* as *Truth*. This is why, as a whole, the fictions of literature, painting, drama, or film are significant to us. For, in order to be intelligible, the imaginary worlds of fiction must somehow relate to our world. A work of fiction that would be totally unrelated—or better yet "unrelatable"—to our world is not only an impossibility, it would be entirely beyond intelligibility. Thus the ultimate object of fiction can only be reality (of which there is only one), which implies that the expression "fictional truth" is not entirely a contradiction in terms.

We can now turn to some of the consequences of this semeiotic conception for film theory with regards especially to digital imagery and technology, and to the claims that are currently made about them.

Now if, as we have endeavoured to show by reference to painting,[31] all representations—including therefore digital representations such as CGI or composites—are, in a sense, as much about reality as are "traditional" photographic and cinematographic representations, does this mean that there is no difference between them semiotically speaking, or at least as far as the index goes?

Indexicality, as we have seen, is the semiotic function by which a sign indicates or points to its object. In all cases of indexicality, the very existence of the object is that which determines the sign to represent it. As we shall soon see, what we call indices are signs whose indexicality plays a major role with regards to some *purpose*. Well-known examples, we have already seen, include a weathercock turning in the wind, a photograph, a scar indicating a wound, footprints or fingerprints, smoke as a sign of fire, *but also* proper names, relative pronouns, indefinite pronouns, adverbs of time or space, prepositions and prepositional phrases, and pointing fingers. Now, any given object, whether it be a photograph, a film, a painting, or a CGI is connected with the world (or Reality) in an unlimited number of ways, all of which are ways in which it can serve as an index. Thus it makes no sense to say, for instance, that a traditional photograph is more (or less) indexical than a digital image since one cannot quantify the number of ways in which a given thing can serve as a sign. But if this is so, how can we account for the fact that a photograph is likely to appear to us as more intimately connected with its object than a painting (or a pointing finger)? It is precisely this feeling which is responsible for the so-called "waning of indexicality" of digital cinema which, according to many, is producing a paradigm shift in our experience of films. The answer resides in the fact that though any given thing is connected in myriad ways with Reality, it may be so in varying degrees of directness. For example, take that which is *pictured* (say, a person or a landscape) to be the object of a

photograph or a painting. While it will be easily understood that the photograph is physically tied to the existence of this object which at one point stood in front of the camera and which it now indicates, the painting may more readily appear to point towards its object rather than be existentially tied to it and causally affected by it (the same could be said of a finger pointing to the distant horizon, an adverb of time or space, or a CGI picture). Yet, as we have intimated earlier, a painted portrait equally requires the existence of the person portrayed as a determining factor for the existence of the picture as a sign of *that* person. The difference is that instead of there being a *direct* contact between object and sign—as is the case with the photograph—both are now *indirectly* connected through another sign (i.e. the painter) which is in direct contact with the painting and in either direct or indirect contact with the object. Whence a long standing tendency to look at paintings as (among other things) indices of artistry and photographs as indices of the physical world.[32] Of course, photos and films also eventually came to be regarded as indices of artistry, the camera angles or camera movements seen as *indicating* a particular stylistic signature, say that of Welles or Hitchcock. Conversely, the more indirect indexicality of painting with regards to the pictured object has not prevented historians from looking at centuries old paintings as evidence or indices of earlier aspects of the existential world, such as dress codes for instance.

Like paintings, CGI visuals are less directly connected to the pictured object than traditional photographs. Yet the computer-generated Roman coliseum of *Gladiator*, ship and waves of *Titanic*, storm of *The Perfect Storm*, or tornadoes of *Twister*, are all necessarily indexical of Reality in an unlimited number of ways, *including* in their connections to the existing coliseum, the Titanic, waves and tornadoes. What is fascinating, however, is that they sometimes sufficiently resemble photographic images to be mistaken for them. In a sense, they are made in the hope of being *interpreted* as photographic on the basis of their likeness to photographs, and in this regard they, along with photo-realist paintings, also stand to function *iconically* (but also *indexically* and *symbolically*) with respect to photography. As

for composites, though they may integrate CGI visuals with photographic material, the more realistically convincing effects involve the digital montage of *photographic* material. Here, as in the tiger fight from *Gladiator*, each individual photographic element is indexical to a high degree of directness with whatever stood at one point in front of the camera. However, this is not the case for the situation depicted which is directly produced by digital montage. The result, then, even more so if what is depicted is a fictional universe, is only remotely connected to the pictured event and its space-time configuration.

But the real question is whether or not these new technologies fundamentally change our relation to films.

At this point, we need to consider the issue of *purpose* to which we alluded to earlier, and distinguish between, on the one hand, iconicity, indexicality and symbolicity, and on the other, icons, indices, and symbols. In Peirce's phenomenologically-based semiotic theory of knowledge, everything that is subject to being known can only be so with respect to signs. Peirce wrote that "the entire universe—not merely the universe of existents, but all that wider universe, embracing the universe of existents as a part, the universe which we are all accustomed to refer to as 'the truth'—that all this universe is perfused with signs, if it is not composed exclusively of signs" (Peirce 1931-1958, 5.448). And since, as we have said before, every object of experience possesses monadic, dyadic and triadic properties, it may be known iconically, indexically or symbolically—that is, through its resemblance to some (possible) thing, through its real connection to some (existing) thing, or by way of its being interpreted (through its possible, actual, or predictable outcome or consequences). The general purpose of signs is to ensure knowledge and the different semeiotic functions just outlined are precisely different "ways of knowing" something either as a possibility, an existent, or a general law or habit. Now when we discuss actual signs as being either icons, indices or symbols, that is, when we substantiate the sign's functions, we engage in the practical process of singling out or privileging a particular semiotic function of the sign in view of a specific epistemological purpose, i.e. in view of a specific way of knowing the object of the sign.

With this in mind, it becomes possible to relativize somewhat the discourse of loss that accompanies the emergence of digital cinema. Indices, to be sure, while they point to their objects, are still distinguishable from them. Thus no index can represent every aspect of the entire truth. A finger pointing in the direction of the moon, for instance, cannot substitute for the moon in all respects; it merely helps one to know something about the moon by pointing in its direction. But to acknowledge that the finger is pointing to the moon—to acknowledge that it is a sign of the moon—one already needs to possess some idea of the moon, if only to know that it is something that can be pointed to in this fashion. The pointing finger may thus add to that knowledge by indicating in what direction one needs to go to find this celestial body. But even though the pointed finger is compelled by the existence of the moon to represent it, it offers no other guarantee than that of representing its existence, should it turn out to actually exist, i.e. it may turn out to be something else than the moon that is being pointed to. Now there are plenty of cases where the indexical value of the photographic image with regards to what once stood in front of the camera is central to the experience of films. This is typically the case for documentary as well as pornographic films whose efficacy (rhetorical and psychological) requires knowledge of the direct causal connection between the images and what they show to be facts—other examples might include martial arts fight scenes starring Bruce Lee or Jackie Chan, as well as dance numbers with Fred Astaire or Gene Kelly.[33] Yet we believe we can reasonably argue that, with regards to fiction at least, the privileging of indexicality for the purpose of acquiring knowledge about a thing (or person, or event) by way of its existential relation to the camera is rather marginal. In other words, neither filmmakers nor spectators of fiction films tend, *as a whole*, to use films as they do pointing fingers, weathercocks, or footprints, i.e. *as evidence or indices that some thing actually stood in front of the camera while it was recording*. For example, this would amount to using a given shot of the *Maltese Falcon* as indicating the existence, during filming, of a small black bird-like statuette by way of its existential connection with the printed

film, or again, to using some other shot of the film to indicate that Humphrey Bogart actually stood in front of a camera at the time of filming. Though both represent a perfectly logical and legitimate way of using the film—and, in the latter example, one that could be used, for instance, by biographers of Bogart—it is unlikely that John Huston made the film for its spectators to ascertain the truth-value of such facts or that spectators would single out the film's indexicality for that specific purpose. In other words, we believe that as far as fiction is concerned, the use of film as indicating the actual existence of some object at the moment of filming is greatly overemphasized by anxious discourses over the death of the "ontology of the photographic image." Surely, the tiger fight in *Gladiator* is not meant to represent the actor Russell Crowe fighting off tigers, but gladiator Maximus fighting tigers in Ancient Rome. It used to be that the only way of realistically portraying the latter was for film to be seen as directly indexical of the former. Digital compositing changes the situation by rendering both events fictitious, *though still necessarily connected to Reality*. There is no doubt, moreover, that the effectiveness of the scene comes from its seeming photo-realism, and digital editors go to great lengths to mimic the photographic quality of images, even artificially reproducing the grain of film stock. This might suggest that far from working at destroying the traditional understanding of the photographic as being intimately tied with the "universe of existents," digital cinema is in fact currently thriving from it.

Of course, it may be that, in the long run, digital manipulations will change the psychology of the cinema and affect either our tendency or our desire to believe in the authenticity of its images. Should this come to pass film will indeed come to be experienced as an equivalent to painting and its images will acquire, in good measure, the status of its fictions. Yet while we may insist that the pre-digital cinema, as a result of the photo-mechanical processes by which it produced an image, provided us with an index, one that pointed to the material facts of its production in a relatively direct manner, we would argue that the cultural and aesthetic significance of the cinema ultimately lies in the subsequent alterations and modifications made to

that basic material, which provide the viewer with the means to generalize and abstract the particular imagery of the cinema. We may, that is, look at the traditional film image as an index of whatever stood in front of the camera, but we may also look at it as a symbol of some idea or concept.

To the degree that the cinema has often elaborated its imagery in light of the indexicality of its basic material, with reference, that is, to the photo-mechanics of the production of cinematic imagery, the advent and addition of digital modes of production and reproduction to the cinematic repertoire will undoubtedly have an effect. We have in this essay attempted to suggest what some of those effects may be, and speculated about some of the changes that will inevitably take place in the cinema and in our understanding of it. Already the cinema is becoming as preoccupied with the specific characteristics of digital image production, thematizing and generalizing those characteristics, as it has long been with the particular mechanics of photography.[34] Films such as René Clair's *Paris qui dort*, Michelangelo Antonioni's *Blow-Up*, even Orson Welles' *Citizen Kane* and François Truffaut's *Les 400 coups*, each of which was interested to some extent in generalizing from the photographic materiality of the cinema, are finding their digital counterparts in films like the Wachowski brothers' *The Matrix*, Peter Weir's *The Truman Show*, and in Eric Rohmer's recent *L'Anglaise et le duc*. In very different ways these films are meditations on the new facts of digitization, but they proceed in a manner that is effectively no different from Clair's, Antonioni's, Welles' and Truffaut's—that is, by becoming genuine signs, i.e. by achieving the status of the symbol. As Peirce (1931-1958, 4.531) reminds us, "Symbols afford the means of thinking about thoughts in ways we could not otherwise think them. They enable us, for example, to create Abstractions, without which we should lack a great engine of discovery."

The cinema is different, it has changed. Digitization has had very real consequences on the production, distribution, exhibition and reception of cinematic imagery. But it is still a means of representing, and as such, it is at once symbolic, indexical and iconic. Confronted by the cinematic image, we do not stop,

as Robinson Crusoe could have, seeing the footprint in the sand, at the level of the imprint. We are driven to follow up on the connections we see in footprints, pictures, words and movies, to move into the realm of imagination and abstraction, *to think about our thoughts.*

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NOTES

1. As Christian Vandendorpe (1997, p. 275) writes: "Un bond essentiel a été franchi lorsqu'on est passé du papyrus au *codex*. À partir du moment où est apparu le potentiel de cette unité de forme et de contenu qu'est la page, on a vu se mettre en place à la surface du livre divers types de repères conçus pour aider le lecteur à s'orienter toujours plus facilement dans la masse textuelle, pour qu'il puisse en faire une lecture plus commode et efficace."

2. Such an argument has indeed been made by Daniel Vaillancourt in a private conversation.

3. See Salt 1992.

4. Of course, the very idea of shot count is rendered dubious in the digital environment where shots can be imperceptibly "composited", "cloned" and "morphed" together. Section II of this paper will consider some of the implications of this form of image manipulation.

5. For the purposes of this article we will not take into consideration the process of sound editing.

6. For practical reasons that concern the projectionist's work (repairing breaks in the film, threading the projector, etc.), most modern projectors can run backward and some have varying speeds (24 fps and 18 fps, for the projection of both sound and silent-era films). Though today neither contributes to the usual theatrical experience of watching a film.

7. The pragmatic maxim proposed by Charles S. Peirce in 1878 reads: "Consider what effects, that might conceivably have practical bearings, we conceive the object of our conception to have. Then, our conception of these effects is the whole of our conception of the object." This was to be the foundational statement of American pragmatism. In quoting from the *Collected Papers* we will follow the standard method of reference in Peirce studies according to which the digit to the left of the decimal indicates the volume and the numbers to the right of it the paragraph. In this particular case: Peirce 1931-1958 (5.402).

8. Most of the early "textual analyses" of Raymond Bellour, Thierry Kuntzel, Ben Brewster, Stephen Heath and others were made from prints screened using editing facilities. Other instances include the classroom: for example, at Concordia University during the late seventies and early eighties, film analysis seminars were taught with the use of a Steenbeck and, in large classes, with the help [sic] of an analytical stop-motion projector.

9. Bordwell and Thompson's (1998, p. 28) advice that "Ideally… film analysis should be done using a film print" flies in the face of the practicalities or impracticalities—especially financial ones—of using editing room facilities to study film. Though we agree that nothing can substitute for the theatrical film experience and

that video (either VHS, laser disc or DVD) is a poor replacement for a film in terms of visual quality (sometimes even distorting it by changes in format and pan and scan technique), etc., the fact of the matter is that very few students of film enjoy unlimited access to editing-like facilities for the study of 35 mm. prints. On a different matter, moreover, there is no doubt that video has been a fantastic tool for developing film culture. In towns where there are no cinémathèques, film enthusiasts may still view older films on video. Many students entering university are now more film conscious than their predecessors were, some having had the good idea of renting a video copy of *Citizen Kane* or *L'Avventura* at their local video store before entering school.

10. With video rentals and sales bringing in larger profits than movie theatre attendance, the VCR may very well be how most films are experienced today.

11. The term "interpretant" originates in Charles S. Peirce's semeiotic theory and refers to that aspect of a sign called its meaning. It is that which makes the world intelligible by turning it into a sign (or a perfusion of signs) and then ensuring its interpretation (or translation) into a more elaborate sign or system of signs. For example, the French word "homme" is an interpretant of the English word "man"; skyscrapers are interpretants of the ability to manufacture steel girders and large glass panes; effects are interpretants of their causes once they are interpreted, etc.

12. The best known example of the projectionist-as-editor concerns the medium close-up of the outlaw Barnes in Edwin S. Porter's *The Great Train Robbery* (1902), which could be edited into the film either as prologue or epilogue. Marc Furstenau would like to acknowledge Francesca Callow who, during a conversation about some of the issues in this article, helpfully reminded him of these aspects of early projection practices.

13. These two sections refer to the theatrical experience of films as briefly defined in the preceding section.

14. Emphasis on "believe" is found in the original French version. Where appropriate we have also slightly altered Hugh Gray's translation (in brackets) and paragraph break so that it is closer to the French text.

15. This probably explains why the documentary that accompanies the DVD release of *Gladiator* never mentions compositing with regards to the fight scene with the tigers. Quite the opposite, in fact. We are led to believe that both actors and tigers continually shared the same frame/space. In so doing the producers promote *Gladiator*'s "cinematographic emotion."

16. "It would be a betrayal of Lamorisse's films," Bazin wrote (1967, p. 47), "to call them works of pure fiction. Their believability is undoubtedly tied in with their documentary value." He then adds: "But it is precisely on this reality that a dialectic belonging to the realm of the imaginary, and interestingly symbolized by the use of doubles for *Crin blanc*, is founded. Thus *Crin blanc* is at one and the same time a real horse that grazes on the salty grass of the Camargue and a dream horse swimming eternally at the side of little Folco. Its cinematic reality could not do without its documentary reality, but if it is to become a truth of the imagination it must die and be born again of reality itself."

17. Another way of putting this, of course, is to say that Ridley Scott's tigers (*Gladiator*) are as much and as little Bazinian lionesses (*Where No Vultures Fly*) as they are Eisensteinian lions (*Potemkin*)…!

18. Martin Lefebvre wishes to thank François Latraverse and Benoît Favreault of the Groupe de recherche Peirce-Wittgenstein for stimulating conversations and for sharing their philosophical and semiotic insights on some of the matters discussed in this section.

19. For the latter, see the essays collected in Sobchack 2000.

20. A more moderate commentator, Philip Rosen, begins the chapter of his book devoted to digital cinema with a quote taken from a 1996 issue of *Variety* reminding us of how all-pervasive this technology is today: "A veteran of the special effects industry recently estimated that 80 percent of studio feature films made today utilize some form of digital image manipulation. It's not just films like *Jumanji*, *Babe*, or *Apollo 13* that rely on computer-generated streams of zeroes and ones to give them their look; *Jefferson in Paris* made extensive use of digital techniques to help the late 20th century masquerade as the 18th" (in Rosen 2001, p. 301).

21. See also Lunenfeld 1996 and Manovich 2001.

22. See also Silverman 1983.

23. See for example the treatment of Peircean semiotics in Stam *et al.* 1992.

24. For simplicity's sake we are confining ourselves to Peirce's 1903 classification which can be found in his "Syllabus of Certain Topics of Logic." Cf. "Sundry Logical Conceptions" and especially "Nomenclature and Divisions of Triadic Relations, as Far as They Are Determined," in Peirce 1998.

25. See "On a New List of Categories" (Peirce 1931-1958, 1.545-559).

26. One way of putting it is to say that such an interpretation is the result not of necessity but of accidental circumstances having to do with cultural developments.

27. It could be a stereotype, or an archetype, or any other rule-governed representational form of a definite character. This is what Peirce calls a *legisign*.

28. As Peirce writes: "… a symbol, if sufficiently complete, always involves an index, just as an index sufficiently complete involves an icon" ("New Elements," in Peirce 1998, p. 318).

29. However, neither of the two situations fundamentally changes the indexical function of the sign which consists, in both cases, in denoting domesticity.

30. "As to symbols of things not experienced," writes Peirce (1998, p. 321), "it is clear that these must describe their objects by means of their differences from things experienced."

31. Others have used the hand-made picture as the main paradigm for discussing digital images and image manipulation. Lev Manovich (2001, p. 295), for instance, writes that "as cinema enters the digital age… it is no longer an indexical media technology [sic] but, rather a subgenre of painting."

32. This view, as is well known, long prohibited the appreciation of photography and film as *bona fide* arts.

33. Discussing these genres in relation to indexicality would require a separate article altogether. Let us simply add that all the examples that come to mind relate to situations that "break through" the diegesis or narrative understanding of the film.

34. For an exhaustive and fascinating consideration of the cinema's long-standing efforts at representing and generalizing from its own photographic materiality, see Stewart 1999.

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