



New Mode of Cinema: How Digital Technologies are Changing Aesthetics and Style

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Abstract

This article delves intrinsically into how the characteristics of digital cinema, its equipment, software and processes, differ from film and therefore afford new aesthetic and stylistic modes, changing the nature of mise-en-scène and the language of cinema as it has been defined in the past. Innovative filmmakers are exploring new aesthetic and stylistic possibilities as the encumbrances of film, which delimited a certain mode of cinema, are released. The article makes the case that the camera as part of a computer system has enabled a more cooperative relationship with the filmmaker going beyond Alexandre Astruc's prediction of the camera-pen (*camère-stylo*) to become a camera-computer. The technology of digital cinema makes the natural indexicality of film and the cut simply options amongst others and permits new forms of visual aesthetics not premised on filmic norms, but based on other familiar audiovisual forms like video games and computer interface.

Voir le résumé français à la fin de l'article

“We see in them, if you like, something of the prophetic. That's why I am talking about *avant-garde*. There is always an *avant-garde* when something new takes place . . .” (Astruc, 1948, 17)

In this article, I will examine some of the material qualities and characteristics of the equipment, software and processes of digital cinema production and propose how these afford a new aesthetics and style for cinema. Of course, many styles are available, including the status quo. Which styles are

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chosen involves not only the ease and capability, but also the most appropriate representations of reality. I hope to present how innovative filmmakers are using digital cinematic technologies to develop new “means of expression,” to quote Alexandre Astruc, better suited to the contemporary digital culture (1948, 17).

Film provides a number of aesthetic restrictions. Film is hard to work with: it requires extensive lighting set-ups, the camera can be large and unwieldy compared to the digital camera and for high-quality capture is quite expensive as is the recording material film. The film reel must be switched every ten or so minutes while recording. Film is rather difficult to manipulate within the shot, so photographic realism and indexicality come naturally (1). These restrictions and limitations of film have helped define the mode of cinema for the last one hundred years. Digital technologies, on the other hand, do not necessarily suffer from any of these particular limitations: recording material is cheap to free with the advent of reusable disk storage and can record for extended periods of time, cameras are smaller, lighter and easier to mobilize and hide, video requires less light for exposure and is easily transferred to computer and manipulated.

The rather difficult film camera and irascibility of celluloid limited “recording thresholds,” using Friedrich Kittler’s term, thus affecting the language of cinema (1990, 284). This is the idea that what we can record and store and how easy it is to do so affects society’s cultural products. The extended thresholds and different characteristics of recording provided by the digital camera make certain styles more likely because they are so readily available. Along these lines of argument, as Lev Manovich has explored, the software and the processes it allows or makes available cannot help but influence the art objects produced through it (2001, 116-35). Our editing software determines how images are put together, influencing how we create cinema through montage. Manipulation within the frame, compositing as Manovich terms it, has become a common part of the digital post-production process encouraging new non-filmic representations and changing the potential nature of cinematic visuality (2001, 136-60).

A second theoretical strand at work in this article follows from media historians who have described the interplay of various technologies and visualizations in shaping expectations of and representations in cinema. In his essay, “Fritz Lang Calling: The Telephone and Circuits of Modernity” (2004), media historian Tom Gunning describes how the interplay of other technologies of modernity, in this case the telephone, helped shape style in cinema, influencing the means of representation, and particularly parallel editing. As Gunning writes,

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Lang's style would not be possible without the common experience of the telephone: "If the telephone had not existed, film would have had to invent it" (2004, 23). Similarly, I will present below how interactions with computer technologies have afforded a more complex cinematic style involving multiple windows, algorithmic and architectural mise-en-scène, and a combination of text, information and audiovisual immersion.

As the camera goes beyond the pen to become part of a computer system, the camera can become more of a collaborator than simply a tool and a computer aesthetic emerges. In this, I look to Sean Cubitt's use of the term "collaborate" in examining vector films in *The Cinema Effect*. In contrast to Marshall McLuhan's (1964) description of the tool as an extension of the hand where the relationship between the human and machine is one of control, Cubitt argues for a new relation with the computer, which, as he says, is "capable of a rich and complex relationship with humans" (2004, 88). He writes, ". . . the machine is free to collaborate in the creation of the work . . ." (88). Montage can expand from a purely juxtapositional action and becomes a matter of choice with other options available such as the non-cut and multiple simultaneous-action windows combined with text or animation, where the screen is not purely representational but fulfills a number of roles such as remix surface, textual and graphical information table, and map.

This article will present some methods and movies that act as harbingers. Of course many movies continue in the same traditional mode, but the examples below shine light in new directions and the fact that they have attracted the interest of audiences, critics and theorists indicates that their path has promise. I believe these represent the new avant-garde as Astruc sensed in Renoir, Welles and Bresson in 1948. Adrian Martin has noted that some of the styles of the current new mode have been prefigured in analog by farsighted filmmakers like those of the New Wave, the Neorealists and the Avant-Garde, who played with these digital conceptions and possibilities of cinema before they were aesthetic default options (2002). Lev Manovich stresses how computer technologies can make the avant-garde mainstream, for example taking a function like "cut and paste" and making it a default function as basic computer commands (2001, xxxi). So we move with inevitable ease from Stan Brakhage's fast cutting *Window Water Baby Moving* (1962) to Michael Bay's *Armageddon* (1998) with an average cut length of 1.5 seconds.

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Medium-Specificity

The medium-specificity of cinema has always been rather hard to define. D.N. Rodowick, in *The Virtual Life of Film*, traces how what he calls “the classical period of film aesthetics” consisted of a series of debates over the identity of film in medium-specific arguments (2007, 9-24). Walter Benjamin, Siegfried Kracauer and André Bazin all took part in such argumentation on the nature of film, attempting to define how cinema differed from the other arts. As Rodowick sees it, the difficulty lay in the hybrid nature of cinema: combining “moving photographic images, sounds, and music as well as speech and writing” (2007, 13). In the early days of video, a similar theoretical tactic was applied. Theorist and critic Amy Taubin described how early video artists, led by Nam June Paik, tried to emphasize the medium specificity of video such as electronic distortions, low-definition images, and the flow of video images in opposition to the transition of film frames (2007). Taubin refers to this as a “false separation,” emphasized by video artists because at that time video could not compete on technical and artistic grounds with avant-garde film. In order to get funding and space in the museum, video artists had to fetishize the difference (Taubin 2007). This purposeful distinction exaggerated the differences at a time when the making of video art was still difficult and messy and focused the argument on the ontology of the medium.

As video converged with film in terms of quality, the distinction began to lose importance in the popular discourse. Film critic Manohla Dargis, writing in 2005, notes how the New York Video Festival renamed itself Scanners and how film critics rarely mention anymore if a movie was shot on film or video. As film theorist John Belton points out, unlike the introduction of sound, color and widescreen, the introduction of digital technologies has been, on the level of visual representation, largely imperceptible (2002, 103-5). Without outside or technical knowledge, an audience may not necessarily perceive whether what they are watching was shot, manipulated, edited or distributed digitally. For this reason, and perhaps in reaction to some of the revolutionary proclamations for the effects of digital technologies in cinema, Belton has labeled this a false revolution (2002). He cautions that we must not be blindsided by economic factors, but must take a closer look at what is really different about creating movies with digital technologies. He argues that digital technologies simply provide a better tool for certain functions, but he warns against assuming that this constitutes a new aesthetics (114).

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Shooting Digital for Film

Until recently, Belton has been mostly correct. In the beginning, digital technologies were principally used as a tool to create film-looking art objects more cheaply. The Bazinian ideal of total realism has been translated with the dawn of digital video into an ideal of total *filmic* realism. In the popular cinema press one often reads, “As soon as digital looks as good as film, and that time is coming, then . . .”. Software like Magic Bullet has been developed to make digital video look more filmic by adding grain and in other ways degrading the image. As a British software reviewer writes, “You’ve filmed on the latest and greatest digital camera. You’ve edited in the latest version of Adobe Premier, running on your state of the art PC system. Quality doesn’t get much better than this. Or does it? You’ve never had it so good, yet your ‘film’ doesn’t quite have that edge. That edge is the holy grail of digital video: the film look” (Peters, 2005). Only lately has digital cinema begun to develop an independent aesthetic and style.

Filmmaker Stephanie Argy, whose film *Ghandi at Bat* (2006) recreates a fictional incident where Ghandi pinch hits for the New York Yankees in 1933 in Yankee Stadium, writes in *American Cinematographer*, “DV’s [digital video] initial attraction for many filmmakers lay in its lower upfront production cost, but over the last seven years, it has matured into a format that offers aesthetic options and means for technical innovation” (Argy 2005) (2). Director Danny Boyle (*Trainspotting* [1996], *28 Days Later* [2002], *Slumdog Millionaire* [2008]) says that digital video transcribes better the experience of the 21st Century:

I mean if you can raise the money to shoot something on film, why use DV? The answer to that is the way the aesthetic of digital video mimics the way we receive information in the 21st century. People are getting imagery projected at them through their cell phones and over their computers – they’re accustomed to the grainy, pixilated look (Fear 2005).

As Boyle notes, the aesthetics of digital cinema were introduced before the cinema technology became prevalent. From interactions with computer technologies, viewers have developed a cultural knowledge and familiarity with a certain digital aesthetic; blogs, Quicktime movies, moving icons, cell phone

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pictures, pirated dvds, and viral videos trained viewers in a representational aesthetic in advance of ubiquitous web video and digital video cameras. This is not to say that these forms are not based on analog cinema models; Lev Manovich has traced in *The Language of New Media* (2001) the vector from cinema to new media. He uses the history and theory of cinema to map out the logic driving the technical and stylistic developments of new media. The second vector, which he only sketches and which I hope to fill in some focal features, reverses this, examining how the logics of new media in turn affect cinema.

Digital video has two contradictory aspects. On the one hand in the “contemporary experience” — video cell phones, web video, surveillance video — it appears as Danny Boyle described, “grainy and pixilated.” On the other hand, digital video is too perfect and too sharp in comparison to film, which is why software and special techniques are necessary to produce “filmic artifacts” (Prince, 2004). Digital video has a clarity and depth of field that film does not. Everything is deep focus by auto-default, so videographers often strive through other means to blur the background thus creating a filmic look. Film can retain detail in brightly lit areas where digital video “blows up,” but video can see into the shadows in a way that film cannot, thus requiring less elaborate lighting schemes. Video lacks grain, which you can reintroduce through software or by exporting digital video onto film stock.

Director Michael Mann, who shot action movies *Collateral* (2004), *Miami Vice* (2006), and *Public Enemies* (2009) digitally, says that his is the first “photo-real use of digital.” He says: “In the nightscapes in *Collateral*, you’re seeing buildings a mile away. You’re seeing clouds in the sky four or five miles away. On film that would all just be black” (Corliss 2006). He argues that this photo-real use of digital, i.e. not degrading the image to copy the look of film, will be rapidly catching on as the number of directors who grew up with computers and have no “nostalgic attachment to film,” come of age (Corliss 2006).

CAMÉRA STYLO

Not only does video differ from film in the medium-specific characteristics like the information in light, the clarity of detail and the depth of field as mentioned above, but also, and I believe more significantly, the *processes* of digital moviemaking encourage different aesthetic pathways. In

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1948, Alexandre Astruc in France coined the term “caméra-stylo” or camera-pen to describe the more intimate and individual style of filming that he foresaw would be enabled by smaller, more mobile, 16mm film camera technology. He ended his manifesto “The Caméra Stylo” (1948) with this quote, “. . . for although we know what we want, we do not know whether, when, and how we will be able to do it” (1948, 22). That time is now. Cameras are light and cheap enough and ambient lighting is often sufficient for digital capture. The camera can function increasingly as a pen, writing spontaneously in the moment without the industrial process of film. Progressive directors and cinematographers are taking advantage of the new flexibility of the camera to capture images and situations that were previously either impossible or prohibitively expensive.

Using the “pen” qualities of the digital camera — spontaneity, flexibility, unobtrusiveness and intimacy – Director Danny Boyle and cinematographer Anthony Dod Mantle captured a small miracle for zombie movie *28 Days Later* (2002). They had to stop weekday traffic at four in the morning in busy Trafalgar Square in order to portray an empty post-plague London.



28 days Later (2002), Fox Searchlight Pictures ©

They had only minutes before angry commuters infiltrated the set and so they distributed handheld digital cameras to numerous members of the crew, thus capturing the shot from many angles, simultaneously, so that they would minimize time spent in the area. Dod Mantle said, “In those particular instances, of course, we would not have been allowed to shoot and take up so much space [in 35mm] for two weeks at such a delicate time before early-morning rush

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hour” (Bankston 2005, 83). For *Slumdog Millionaire* (2008), Boyle and Dod Mantle used a similar technique when they shot in Dharavi, Mumbai’s largest slum, using a multitude of handheld digital cameras shooting action simultaneously. Thus, what would have been possible only for a big-budget Hollywood movie becomes a more readily available means of expression with creative use of technology.

Director Fernando Meirelles and director of photography César Charlone filmed in the favelas of Rio de Janeiro and used local boys for the 2002 movie, *City of God*. Charlone used video goggles that allowed him to separate himself from the camera and yet still see the image. He could attach the camera to the end of a sound boom for high and low angle shots, thus minimizing the need for an expensive and intrusive crane, which would be too cumbersome for the tight alleys and hills of the favela. He said that he had “long envisaged a camera that would act like a microphone, one you could slip into tight spaces or carry on your body like a backpack, maybe with an optical fiber you could hold in your hands to move the lens around” (Oppenheimer 2005). Since Charlone shot in real favelas in Brazil for *City of God*, and markets in Africa for *The Constant Gardener* (2005), the flexibility of the camera gave him great potential to capture the live and unpredictable environments. Cranes and elaborate lighting set ups would make the level of intimacy and spontaneity which Meirelles and Charlone can capture in these scenes unattainable.

Interestingly, while Astruc focused on the increased power of the auteur, who with the camera-pen could, like a writer, create a movie alone as an individual artistic vision, the camera-pen has actually enabled the filmmaker to collaborate with actors and environments thus releasing a measure of control. As the examples of Boyle and Dod Mantle and Meirelles and Charlone demonstrate, the camera-pen allows intimate and spontaneous interaction with real environments and situations, creating a collaboration between filmmaker and environment.

This ability of digital capture to shoot long takes without motion-limiting lighting set-ups is particularly conducive to the use of non-actors who can benefit from long, multiple and flexible takes to capture a multitude of performances. Directors like Steven Soderbergh on his digitally shot *Bubble* (2005) are able to use non-professional actors and shoot a plenitude of material with many, slightly different, improvised takes, shooting simultaneously with a few cameras. He calls his work on *Bubble* “site-specific” cinema because he

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goes to the place and collects the stories organically. Many of the scenes were shot in the actors' actual houses (Jardin 2005). For *The Class* (2008), director Laurent Cantet used non-actor students, teachers, and administrators from a school very similar to the one being represented. He conducted a yearlong series of workshops with the students and then shot with three high-definition (HD) cameras simultaneously: one camera was on the teacher, one on the students, and one was mobile reacting to the interaction as it happened spontaneously (Taubin 2009) (3). Thus digital technologies make accessible a way of production that can be organic to both the place and people of that place, producing an innovative, spontaneous and intimate aesthetic.

Some of these styles and methods were prefigured and anticipated by the filmmakers of the Nouvelle Vague and the Neorealists. With the introduction of the Arriflex camera in the 1960's, which was lighter and more portable, filmmakers were able to go out on the street into spontaneous environments, capture everyday life and use non-actors (Corrigan 1991, 101). For example, in *The Battle of Algiers* (1966), the director, Gillo Pontecorvo, had to formerly declare that not a foot of the film was documentary because his use of available light, newsreel filmstock, actual locations and non-actors made his feature of the Algerian revolution against the French so convincing that viewers thought they were watching documentary footage. Media theorist Adrian Martin writes how filmmakers like John Cassavetes, Ken Loach and Maurice Pialat, over thirty years ago, were "simply letting the camera run on across different takes or stopping and starting it without letting the actors know," in other words using what is now a "digital style" in order to create more emotional realism (2002). The recently deceased American director Robert Altman in movies like *Nashville* (1975) used ambient sound and lighting and spontaneous, non-choreographed situations to create an aesthetic and style that would favor the attributes of digital technologies far before he had access to them (Honeycutt, 2006). But, what is new here is the extent to which creative filmmakers can take this style and the ease with which it can be used. The extent of organic integration of reality could only be aimed at by these ambitious directors.

The examples above are from well-established filmmakers making popular films, but even more innovations are being done in low-budget independent and documentary film. In documentaries like *Bad Boys of Summer* (Loren Mendell and Tiller Russell, 2007) about the San Quentin Prison baseball team, *Twist of Faith* (Kirby Dick 2004) about a father who moves in with his

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family up the street from a priest who allegedly molested him as a child, and *Baghdad High* (Ivan O'Mahoney and Laura Winter, 2007) about four Iraqi high school students, filmmakers gave the cameras over to their subjects to film events which were off limits to the filmmakers due to legal issues, intimacy, and danger. Some filmmakers are using the clandestine aspects of the camera to shoot in live environments. For *Day Night Day Night* (2006), Julie Loktev needed to shoot a character as a terrorist near the Port Authority in New York City. Rather than trying to get clearance from the city for such a delicate subject, they shot live using small handheld cameras to stay under the radar of authorities. Lebanese director, Philippe Aractingi both conceived of and began shooting his movie, *Under the Bombs* (2006) within two days of the beginning of the Israeli bombings of Lebanon in the summer of 2006. He says, "I wanted to put real actors into a real war" (Jaafar 2006). He did, shooting in Beirut and on a warship evacuating people. Besides the few professional actors, everyone else featured in the movie is a real person in the real situation of a war. Aractingi says, "There's an amazing energy and emotion in all the scenes. We had to be spontaneous and use the first take. . . ." (Jaafar 2006).

These are all examples of independent filmmakers working with very small budgets who are innovatively developing an aesthetic that takes advantage of the new technology. Competing with reality television and web video, filmmakers are working with environments rather than controlling them. Astruc's vision of the camera-pen has been fulfilled and even exceeded as filmmakers cede power to characters, environments, and even algorithms enabled by the camera-computer, as I hope to demonstrate below.

MONTAGE AND MISE-EN-SCÈNE

The Long Take

Cinema has traditionally been defined by montage. Film theorist André Bazin refers to editing and framing as the alpha and omega of cinema (quoted in Deleuze 87). Kittler reminds us that cinema began as a series of still shots spliced together by Etienne-Jules Marey and Eadweard Muybridge (1999, 122-4). As he says, "The medium's possibilities for cutting and splicing assail its own historiography" (Kittler 1999, 116-17). Thus montage from the very beginning became the visual grammar of cinema. Film reels are about ten minutes long, so chopping and splicing is a format-driven necessity. This has

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defined the form of cinema — recording thresholds.

Computer editing has made cutting and pasting easy and irresistible, so the initial reaction to digital editing was to have rapid cutting, the MTV aesthetic (so named for the rapid cutting to the beat of pop songs in music videos), popular in big-budget action movies (Dickinson 2001). These rapid cutting movies, although perhaps requiring an adjusted way of viewing to prevent headaches and dizziness, only changed style in terms of excess. The movies work in the same aesthetic and style mode as Sergei Eisenstein and D.W. Griffith, simply sped up like the zombies in *28 Days Later*. Increasingly, I would like to propose, the more transgressive aesthetic afforded by digital technologies is the non-cut. The indexicality of this real time, meaning its direct physical and existential relationship with the temporality in front of the camera, can pose as a substitute link to reality and authenticity as the necessary indexicality of the analog image is lost with digital and computer technologies where light no longer creates a direct imprint on film and information is instead encoded.

Russian Ark (2003) provides the most exaggerated example to date of this aesthetic. The entire 87-minute movie is one continuous shot. Director Aleksandr Sokurov shot very formally in the St. Petersburg Hermitage Museum, specifically not in a hand-held, realistic style, but instead uses digital for “its new ability to render time in a single, unbroken flow” (Martin, 2002). Sokurov says:

The idea was for a film shot, as it were, in a single breath. The screen format, cinematography — everything depends on the scissors, on the knife. Editors and producers accumulate then edit using time according to their whims. And I wanted to try and fit myself into the very flowing of time, without remaking it according to my wishes” (Greer 2003).

Sokurov refers to the autonomy of the camera, an idea that has long been valued by film theorists as a desirable goal.

Bazin valued the objectivity of the automatic machine and what he called the “impassive lens” (1971, 15). He writes in “The Ontology of the Photographic Image,” “For the first time, the image of the world is formed automatically, without the creative intervention of man” (1971, 15). Yet, as

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Peter Matthews remarks, this remained an impossible quest as long as “individual films and filmmakers carve up the unbroken plenitude of the real, imposing on it style and meaning” (Matthews 1999). Similarly, in *Cinema Effect*, Sean Cubitt explains his concept of pixel, cut and vector. According to Cubitt, the purity and truthfulness of the pixel, the cinema of the Lumières’ *Sortie des Usines* (1895), is undone by the cut, which introduces “predestination.” As he says, “The cut splits apart the elements of the apparatus so that one — the self — can take possession of the other — the camera-projector — as object” (Cubitt 2004, 67). Following this logic, while the cut institutes a relation of control between the filmmaker and the machine, the non-cut frees the camera from this imposition and can help fulfill Bazin’s vision of the objective machine, where the preconceptions of the filmmaker are minimized. Below I hope to demonstrate how this relationship between filmmaker and camera can morph with digital and computer technologies, taking on aspects that exceed Bazin’s vision where the relationship rotates even more, so that the lens becomes less “passive” and more collaborative.

Although Sukorov carefully orchestrated the long shot, he could not control all the factors. In fact, he had time in the Hermitage for only three takes and the first two takes did not work out. He had to accept the third take even though there were small errors to his plan. The architecture of the Hermitage provided its own mise-en-scène and indexical link. Sokurov also had less control over the course of the spectacle as to where the viewer is looking and focusing. There is no “cut to close up of face”; viewers are free to roam the long take as they please. I believe that this inevitably creates an alternative style for cinema that is less controlling and more interactive with the viewer.

Computer-Camera as Collaborator

“In a historical loop, the computer has returned to its origins. No longer just an Analytical Engine, suitable only for crunching numbers, it has become Jacquard’s loom — a media synthesizer and manipulator” (Manovich 2001, 26).

Behind the scenes, the camera has moved beyond the pen — the camera is now a computer. Gilles Deleuze refers to a “camera autonomy” as a stylistic trope in

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Michelangelo Antonioni's *Story of a Love Affair* (1950) (1989, 24). By this he means that the camera appears to look where it wants, unaffected by strict narrative norms. When it should be giving us a close up of a gun, it is wandering off to look at a model's ankles. But, this seeming "camera autonomy" fulfills its potential with the camera-computer alliance. Increasingly, innovative directors empowered with digital and computer technologies are letting the machine write itself. The aesthetic is that of an algorithm, an initial set of conditions structured by an auteur but then allowed to play out unsupervised. Some progressive filmmakers have experimented with the independence of the computer/camera, opening up new opportunities for mise-en-scène by minimizing the subjectivity of the auteur and exploring algorithmic and architectural forms.

Iranian director Abbas Kiarostami experiments with the mobile, uncontrolled camera in *Ten* (2002) where he mounts two small cameras in the front of his main character's car and every scene, a series of ten conversations, is from the viewpoint of these fixed, mounted cameras. So, although the camera moves about Tehran, the machinery of the car and the traffic of Tehran control the camera movements and mise-en-scène, not the director or cinematographer, and in fact they are not even present. Even Kiarostami's editing follows a distinct algorithm between camera viewpoints. As Alex Munt demonstrates in his article "Digital Kiarostami," shots are put together according to a strict, pattern of repetition and variation both of the camera shots within the ten "modules" and between modules (Munt, 2006). This form of stylistic and aesthetic playfulness is enabled by the ease and low cost of the digital technology, encouraging spontaneity and experiment and new combinations of machine-human cooperation.

Always cutting edge, Danish director Lars von Trier has experimented with a robot cinematographer, a new camera system called Automavision. The machine is part of von Trier's stated goal "to reduce the scope of productions" (Felperin 2006). Automavision gets the sole credit for cinematography listed for von Trier's movie, *The Boss of It All* (2006) (with an inventor credit for Peter Hjorth). A computer algorithm randomly changes the camera's tilt, pan, focal length and/or positioning as well as the sound recording. As *Variety* reviewer Leslie Felperin writes, "Result is a lot of off-kilter compositions, sometimes with subjects' heads at the bottom or side of the screen. This just about fits the material, creating a comic, world-out-of-joint atmosphere" (Felperin 2006). The movie's concept is to question power, control and networks, thus mimicking the

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mechanism of production.

Von Trier's experiment toys with the idea of auteur cinema, automating with a randomizing computer program the very aspects of style that would characteristically identify the auteur. The computerized randomness of the Automavision provides a greater machine autonomy as it removes the power of the director to dictate where we look and gives the power to the algorithm. The digital camera can become a part of a system, whether it be a computer system or an urban traffic system, and is thus able to follow algorithms and have a level of artificial intelligence. Although not mainstream, these movies by well-known directors indicate the potential to use the camera as co-collaborator, co-director, co-cinematographer, and co-editor in a way not possible with the film camera where the relationship due to factors like reel length, size, and inability to program was one of control between filmmaker and camera. I believe these examples are the harbingers of a new mode of cinema fulfilling and then going beyond the individual cinema of Astruc's vision and beyond the "passive lens" of Bazin's to a new cyborg montage and mise-en-scène with different formal properties more suited to the computer than the film camera machine.

Web Browser Aesthetic

Film grammar has traditionally been based on "transitions between fully formed photographic objects called frames, done through a collision of frames called the cut," whereas as Gene Youngblood points out, "In electronic cinema the frame is not an object but a time segment" (quoted in Shaw and Weibel 2003, 156). As such, time segments need not transition by transposition/juxtaposition, the aspects of traditional montage. Computers do not so much operate by montage and juxtaposition. On the computer one can hold more than one window open, can multi-task and follow a complicated, non-causal order. These everyday processes represent a change in mode of viewing and experiencing audiovisual culture and communication. New modes of montage are made facile with computer editing where manipulation within the frame is easily done. Although possible before by split screen and back projection, these processes were much more involved and so remained as "special effects" or gimmicks as opposed to an organic style. Thus the web browser aesthetic is intrinsically facilitated by the software of non-linear editing as well as extrinsically called for by viewers' experience with digital audiovisual

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culture.

Deleuze describes this way of viewing as a changing function of the screen. He writes:

But, when the frame or the screen functions as an instrument panel, printing or computing table, the image is constantly being cut into another image, being printed through a visible mesh, sliding over other images in an “incessant stream of messages”, and the shot itself is less like an eye than an overloaded brain endlessly absorbing information . . . (1989, 267)

The mind must put together the different visual, textual and graphical information. I believe that the cognitive work this form entails creates a less a purely visual experience and more of a thinking and linking experience, where the purpose of the screen is partly to “show” or “represent” but also to communicate information. New-media theorist Alexander Galloway discusses what he sees as the waning of in-time montage as a hegemonic style. He discusses the increased use of alternative types of montage, what he terms “proleptic” montage, for example, where the actual screen is divided into quadrants (2007). He mentions the popular television show *24* (Fox 2001–), which uses this technique going into and out of every advertising break, as well as Mike Figgis’ *Time Code* (2000).



Time Code (2000), Columbia Pictures©

Figgis shot real time in four locations and the movie shows each sub-

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movie simultaneously on a screen divided into four quadrants. The sound goes back and forth between the quadrants, directing the viewer's focus to some extent from one story to another. On the DVD, users with multi-unit stereo equipment can manipulate the sound of the movie, thus choosing which quadrant to focus on and which conversation to overhear when. This form of cinema takes a step beyond Bazin's concept of "personal choice" and the possibility of "ambiguity" introduced by depth of focus (Bazin 1971, 36). Instead, proleptic montage creates a necessarily interactive aesthetic of cinema and a new experience of diegetic time and immersion in that the viewer *must* decide at each moment where to look and what to hear. As electronic media artist Toni Dove notes, "In film, the cut moves you through time while the interactive experience contains some rupture within it" (as quoted in Shaw and Weibel 2003, 236). It is impossible to be completely involved in any one screen as attention drifts and shifts to the others. The mind is forced to *mise-en-scène* cognitively, not simply through vision.

This style simulates our experience of new media and particularly video games where the screen might be divided into sections or have overlays with different simultaneous viewpoints or information. One sector might show the first person perspective, another might show action in another location or list treasures, kills, points, timeline, overhead view, map etc.



Dungeons and Dragons Online (2009), Eberron Unlimited©

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Manovich, who refers to the aesthetic of multi-window cinema as macro-cinema, cites certain cultural forms like the computer-user interface, news, financial and sports broadcasts as participating in this multi-window, multiple information source format (Manovich 2005). Galloway feels this style might be better than in-time montage at representing our current environment of “synchronic, rhizomatic information networks.” He calls this “the distributed network as an aesthetic construction” (Galloway 2007). In order to represent the search, hypertext and multiple windows of our contemporary audio-visual environment, creative filmmakers have developed new modes of putting moving images, sound, graphics and text together. The proleptic montage enables a hybrid function of the screen combining the screen of the cinema with the interface of the computer.

HYBRID CINEMA

“Born from animation, cinema pushed animation to its boundary, only to become one particular case of animation in the end” (Manovich 1999).

Digital editing and the use of a digital intermediary (DI) have become ubiquitous. With the DI, filmmakers digitize any capture medium and then can manipulate the images on a computer, changing the color and other image characteristics. This is used most often not for traditional special effects but just to change colors for feel, match different light scenarios, or to remove a safety line or scratch. Increasingly manipulating movies and compositing within the frame is becoming as common, as Manovich has predicted, as montage between frames (2001, 136-60). Compositing allows animation to be mixed with live-action and live-action to be captured and taken apart and recombined easily, like animation, creating a hybrid moving image (Manovich 2001, 136-60).

Before these digital techniques, for the most part, live-action images on the screen looked as they did in front of the camera, but the composite digital image no longer has to represent vision of a real time and place and thus the traditional delineations between animation and live-action blur. As Lev Manovich describes the camera no longer necessarily “functions as a material object, co-existing spatially and temporally, with the world it [is] showing us”

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(Manovich 1997). Below, I will give some examples to demonstrate how new aesthetic styles are emerging, which use the hybridity of digital images to transcend filmic visuality, employing styles more familiar from other types of digital moving images.

The Virtual Moving Image – the Unfilmic

In defining the language of cinema through semiotics, the shot was considered the smallest unit and yet the modularity of digital images processed by computer allows even the shot to be put together of different component parts, uncountable parts. Director David Fincher (*Fight Club* [1999], *Zodiac* [2004], *The Curious Case of Benjamin Button* [2008]) has used a process called photogrammetry to record and then manipulate space. The method was initially developed in nineteenth century France to create topographical maps. The technique uses multiple overlapping photographs to build a three-dimensional photographic image. This digital information can then be manipulated in combination with computer-generated imagery [CGI]. One can then virtually zoom across and take different viewpoints in the hybrid space (Dussere, 2006). Paul Debevec, as a PhD student, first utilized photogrammetry to create a short film called *Campanile* of the campus of UC Berkeley in 1997 (4). This film inspired John Gaeda of ESC digital effects company who improved on the technique for *The Matrix* (1999), applying the image based modeling and rendering to moving actors (5).

French theorist Edmond Couchot describes these digital 3D images as “images to the power of image,” meaning that from one 3D image can be created uncountable images of different points of view (Couchot 1984) (6). Film theorist Erik Dussere writes, “*Fight Club* employs this capacity for a wholly virtual camera gaze – in which the distinction between cinematography and mise-en-scène disappears entirely . . .” (Dussere 2006). As he stresses, this mimics our use of computer technologies; he focuses on catalogue and Internet shopping as per the plot, but I would add the use of video games, Google maps and virtual reality worlds. The use of photogrammetry demonstrates a blurring of video game design and viewpoints, computer user interface and traditional cinematic forms.

The hybridity of the image is common in video games and some of the more stylized Asian cinema of the past few years has taken parts of anime and

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video games and combined them with live action. *House of Flying Daggers* (Yimou Zhang, 2004), *Hero* (Yimou Zhang, 2002) and *Kung-Fu Hustle* (Stephen Chow, 2004) are some of the more prominent examples.



Hero (2002), Miramax Films©

What is different about these films is the way characters and objects move through the environment, flouting the rules of gravity or traditional camera lens perspective. These movies are increasingly using the viewpoints and means of motion in virtual or hybrid space characteristic of video games. Korean director, Park Chan-wook (*Oldboy* [2003], *Lady Vengeance* [2005]) uses this hybrid style. As Asian film specialist Ian Buruma writes, “Bending reality through digital effects, which allows the camera to jump around and move through space at dizzying speeds or to cut out an entire side of a building to follow the hero in a fight sequence in one continuous take, a technique common to side-scrolling video games, are just some of the things that make Park’s films resemble computer games” (Buruma 2006). This style is very different from a classical filmic style and demonstrates a new visual aesthetic, which would be almost impossible to achieve with film. As D.N. Rodowick points out this demonstrates a changing frame of reference. As he notes, the “reality” to which movies must adhere is increasingly a paradigm of computer-generated images, not the perceptual realism of physical space, or, I would add, not the perceptual

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realism of film (2007, 104-105).

Virtual Cinema for the Masses

Digital animation has traditionally been a very expensive process, carried out only by Disney/Pixar and DreamWorks on big projects costing over \$100 million. But increasingly as new techniques are developed and storage capacity falls in price, independents have been jumping into the fray. Director Richard Linklater has used a process called rotoscoping on two films *The Waking Life* (2001) and an adaptation of Philip K. Dick's book, *A Scanner Darkly* (2006). Animator Bob Sabiston had developed the process, which allowed for rapid animation of live action digital video on a personal Macintosh computer as opposed to a professional mainframe network (Minor 2004). The rotoscoping technique involves the separation of images into layers that could be painted, manipulated, and moved from frame to frame. For *A Scanner Darkly* the process creates a color and shapeshifting type of image with artifacts of live action. A computer algorithm controls the rotating colors and shapes. This fits very well with the story, which involves drug addicts in the near future who have delusions and difficulties separating the real from the imagined. Film theorist Kyle Minor has referred to rotoscoping as "a psychedelic dreamscape" and "a kind of marriage between high and low tech" (Minor 2004).



A Scanner Darkly (2006), Warner Independent Pictures©

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Robert La Franco of *Wired* says of *A Scanner Darkly*'s use of rotoscoping that it "suggests animation is becoming a tool — like greenscreens and digital effects — and not a stand-alone genre. It's just a method of telling stories in a different way" (La Franco 2006). As hybridity and virtual worlds become an everyday part of audiovisual culture, the aesthetic becomes increasingly a stylistic choice that can be used across genres and for various aesthetic and stylistic purposes.

An example is *Chicago 10*, the Sundance Film Festival opening night film in January 2007. This documentary blends historical film footage with animation to tell a story about the 1968 Democratic National Convention. Filmmaker Brett Morgen said that he did so in order to update the events for a younger audience (2007). 2008 Academy Award nominee *Waltz With Bashir* (Ari Folman) mixed animation drawn from video interview images with pure animation and finally television images to create a documentary of the memory of trauma. Again the mix of animation and live-action is not new, there are examples going back to the early twentieth century, but the increasing ease, the use across genres and the true hybrid mix of animation and live-action, where the lines become increasingly blurred, portends a way of filmmaking that affiliates itself with a new mode of aesthetics not dependent on filmic realism and which coexists symbiotically with a world of video games, graphic novels, anime, and virtual worlds.

Conclusion

Cinema has been freed by digital and computer technologies from the necessity of certain aesthetic and stylistic tropes and languages inherent in film. Some of the aesthetic prophecies of theorists like Astruc and Bazin have been fulfilled, but then the camera-computer with innovative filmmakers has gone on in directions unforeseen by their philosophies. The camera as computer allows a collaboration between the filmmaker and the machine, which leads to new affordances more conducive to computer processes than filmic vision.

This is not to say that many of these aesthetics and styles discussed above were impossible with film, nor that the new mode completely parts with previous filmic styles. Certainly close to the majority of contemporary films do not vary from traditional modes at all and the examples given owe much to analog models. But, I hope to have given some insight into how certain

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tributaries are opening, which take advantage of the extended “recording thresholds” of digital technologies: the small size of the camera, the ability to record for extended periods of time, the ability to program the camera as part of a system and manipulate the image. New filmmaking processes are enabled, which although aimed at by previous innovative filmmakers, are made easy and increasingly irresistible by digital technologies. Astruc called what he (fore)saw not a school or a movement but, “a tendency; a new awareness, a desire to transform the cinema and hasten the advent of an exciting future” (1948, 22). I, too, see this tendency traced above not as a determining of aesthetic forms by technology, but as a great opening in the means of expression of filmmakers.

Notes

(1) Indexicality comes from the definition of Charles Sanders Peirce who said that in opposition to the “icon” whose relation to the object is resemblance, the “index” has a “physical” or “existential” relationship. He gives the examples of a footprint, thunder and the photograph. Image on film, because it is an impression of light coming off an object was considered to have an indexical relationship to the object, a topic discussed in early film theory by Siegfried Kracauer and taken up later by André Bazin. For in depth discussion please see Mary Ann Doane, “The Indexicality: Trace and Sign: Introduction” in *differences* 18.1 (2007): 1-6 and “The Indexical and the Concept of Medium Specificity,” 128-152.

(2) <<http://www.gandhiatthebat.com>> , accessed March 20, 2008.

(3) Expensive action shots, because of the limited takes, are often shot from more than one camera angle simultaneously, but digital video differs in that it allows for long takes with the option of spontaneous action and reaction.

(4) <<http://www.debevec.org/Campanile/>> , accessed February 20, 2009.

(5) For a history of Gaeda’s Method please see Lev Manovich’s article “Image Future”: <www.manovich.net/DOCS/image_future.doc> , accessed February 21, 2009

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(6) "C'est une *image à la puissance image*. Jamais visibles dans leur totalité, 'imprésentables' donc en même temps, ces images d'image n'appartiennent plus à l'ordre visuel de la représentation, elles ne sont plus soumises à sa topologie" (original emphasis, Couchot, 1984).

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Bio

Kristen Daly received her doctorate in Communications from Columbia University in New York where her research focused on technology, new media and cinema. She is currently working for Ciné Institute, a film education program in Haiti, and writing a chapter for forthcoming book *Transitioned Media: A Turning Point Into the Digital Realm*. Her writings have appeared in *Explorations in Media Ecology*, *Transformations Journal*, and *Peace Review*.

Key Words

digital cinema, cinema, aesthetics, mise-en-scène, auteur, montage, caméra-stylo, composit, long-take

Résumé

Cet article examine comment les modes de production spécifiques au cinéma numérique – tant sur le plan technique qu’au niveau des procédures – diffèrent des modes de production qui ont recours à la pellicule. Ainsi, on remarque comment ce nouvel esthétisme lié aux technologies numériques vient changer la donne en ce qui a trait à la mise en scène et au langage cinématographique, tel qu’ils ont été définis par le passé. Plusieurs cinéastes novateurs ont exploré les possibilités de ce nouvel esthétisme, se libérant des contraintes imposées par le tournage sur pellicule, qui délimita longtemps un mode de production spécifique. Cet article approche également l’idée de la caméra (virtuelle) comme un outil informatique qui permet une plus grande collaboration avec le cinéaste. De ce fait, la caméra deviendrait plus que la *caméra-stylo* tel qu’évoqué par Alexandre Astruc, mais également la *caméra-ordinateur* – *camera-computer*. L’indexicalité et la coupe franche propres aux techniques filmiques deviennent, avec le cinéma numérique, des options parmi d’autres. Ainsi, de nouvelles formes esthétiques visuelles émergent, non plus basées sur les formes filmiques traditionnelles, mais également sur de plus récentes, comme le jeu vidéo et les interfaces informatiques.