The *Camera* as Camera: How CGI Changes the World as We Know It

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"I am a camera," wrote Christopher Isherwood, famously giving voice to the narrative connection between camera and subjectivity.[1] With technological changes brought about by CGI and increasingly complex special effects, 3D virtual worlds technology necessarily changes what we mean by the word "camera". These worlds generate "virtual camera" technology, such as is famously seen in the "bullet time" of the *Matrix* trilogy and other special effects films.[2] I am interested in a new subjectivity which is emerging from these technologies.

No longer delimited as a mechanical device, the *virtual* camera is predicated upon intricacies of calculation which render any point in a given digitized space *as if* it were a camera. With every point in space capable of camera-like reportage, each pixel is newly possessed of agency and authorship. I call this the "*camera* as camera" argument, because now the very space itself - what I am taking the slightest liberty in calling by the Latin '*camera*' for room or chamber – this space is now literally a camera.

[Matrix clips 2 & 3] [3] Looking at John Gaeta's initial forays into the creation of "bullet time", it is clear that there is a deliberate connection between Muybridge and the arrays of still cameras Gaeta sets up to facilitate this dramatic effect. But beyond this, Gaeta further innovates a 'virtual camera' in which the entire space is digitized in a

technological trope which allows him to generate imagery for the audience from any POV he chooses. Without the impediments normally associated with the physical realities of making a film, such as camera booms, giant lighting sails, extraneous crew members and so on, the director and cinematographer have a new freedom to place and choreograph the so-called 'camera' as never before. This has tremendous impact on the final presentation of the film, with interesting psychoanalytic and philosophical consequences.

Taking a step backward to an earlier point in cinema history, it is Andre Bazin who wonders, in his seminal 1946 essay *The Myth of Total Cinema*, why it took so long for cinema to arise, as many of its constituent components had already been available for some time.[4] Similarly, I wonder why no one invented the "bullet time" effect prior to 1999. Most, if not all, of the technologies for these remarkable effects have been available for at least sixty years, and in some cases even longer.

"Bullet time" relies on choreographed arrays of high speed still cameras with shutter abilities of up to 1500 frames per second.[5] John Gaeta invented the "bullet time effect" for motion pictures in 1999 by blending various shutter technologies for still cameras first invented in 1878 by Eadweard Muybridge, then expanded by Sherman Fairchild for aerial photography in 1920, and finally patented at 1,000 frames per second by Kodak in 1941.[6] This was followed shortly by Gaeta's highly digitized "Flo-Mo System", which points in new directions for the use of a purely virtual camera.[7]

Special effects films give us opportunities to consider the practical dynamics of the *camera* as camera argument. While most films, such as the *Lord Of The Rings* (*LOTR*) and the *Star Wars* epics, blend traditional and virtual photography with a variety of other image materials and techniques such as previsualizations, motion capture, scanning, matte paintings, digital animation and miniature photography, I want to temporarily stay within an all digital framework, such as may be seen in Robert Zemeckis' virtual creation, *The Polar Express*, which was produced without any film at all.[8]

Many special effects and CGI dominated films have what could be called a "roller coaster" component which can be reliably counted upon to entertain and thrill the commercial audience. Although such "ride" sequences are often economically motivated, that is they function as part of a cross-platform merchandising program for studio derived theme parks, they are also particularly useful for thinking about the virtual camera. *The Polar Express* has a particularly fun one, seen as the train careens off the tracks and skids across a frozen lake on the way to the North Pole, but such sequences are evident in many other fims such as *The Fellowship of the Rings*, the *Mummy* movies and *King Kong*.

What is actually taking place in such a ride moment in a sequence produced by a virtual camera? It is worth repeating that there is no actual light falling upon an actual object; in its place is calculation. In CG effects, there is a factual absence of the camera piercing and penetrating through space as it moves. In its stead, we have a virtual camera for which the pixels comprising the dense digital space described by the x, y and z axes of a

traditional Cartesian cube are actually performing *as if* the audience POV were a camera. The pixels are regrouping and reformulating themselves for the benefit of the fourth wall as POV's in space for the placement of a virtual camera. It is as if the baton of agency, the "talking stick" if you will, is being passed among the pixels as they regroup and reformulate according to the needs of the viewer and director.[9]

This enables the dramatically dynamic camera moves increasingly favored by directors such as George Lucas, Peter Jackson, Robert Zemeckis and the Wachowski brothers, Larry and Andy. Films such as the more recent *Star Wars* trilogy, the *Lord of the Rings* trilogy, the *Matrix* trilogy and *The Polar Express*, among many others, are advancing the technology of the virtual camera at an amazing rate. [10] Certainly a kind of cinephilia is at play in appreciation of the increasingly long and complex tracking sequences and visual effects shots created for these films.[11] (Polar Express clip: scene 9)

In the opening sequence of *Revenge of the Sith*, the "camera" never breaks away from two small ships in a tracking shot that lasts well over two minutes. We follow along with the two small flyers containing Obi Wan Kenobi and Anakin Skywalker as they cover an incredible amount of space, over and under and between other ships. It is an unbroken shot such as no physical camera and crane could ever provide, even assuming that the objects on screen were real objects, which of course they are not. In fact, it is practically pointless to speak of the "camera" as never breaking away, because what passes for the point in space designated as a 'camera' is in fact an agglomeration of visual materials, composited from at least a half dozen completely independent sources, much of it non-

photographic in origin. It is worth mentioning as an aside, that a sequence such as this one easily requires in excess of 100,00 manhours to produce from the combined labor of nearly a thousand people – no small feat.[12]

Like Bazin, I would suggest that we are still in the process of developing a desire to see a "total cinema". I propose that we are developing a new set of philosophical and aesthetic motivations which value the contributions, agency and authorship of every point in space. Certainly, an expanded subjectivity for every point in space challenges the traditional status quo, with implications familiar to scholars of post colonialism, feminism, psychoanalysis and the humanist/posthuman debates.

Unlike non-virtual cinematography, purely digital image capture is actually image generation. We are watching calculation masquerading as objects subject to spatial recession. The entire space functions as one fluid, amorphous camera. As philosophically and asethetically there is no longer *any* point in space, occupied or otherwise, which may be considered as *in*capable of authoring or agency, the moving image, already manufactured with false boundaries for presentation to the fourth wall for many decades, has now lost all boundaries. This has implications for the everday lived world around us, as by extension every single person, place or thing in the (real) world today is effectively become a camera, a point of calculation.

In *The Ontology of the Photographic Image*, Bazin says that the most important invention for the plastic arts is the invention of photography because photography is like Nature,

and can imitate not only life, but the artist as well. For Bazin, the photograph is not an exercise in human agency. Even at this early date, we have a critical sense that the camera itself possesses a form of agency.[13] My "*camera* as camera" argument sees the individual pixel, and indeed any calculable point in space, as a "camera", an authoring agent which simultaneously captures, transforms and reports 'reality', in this case, in service to a human artistic vision in the CGI realms of cinema.

But I think we would be wise to ask ourselves if the denizens of these virtual spaces will always function in service to a human need, or whether they might not have some voice of their own. What happens if we refuse to essentialize or ventriloquise for these putative subjectivities? What does it imply for there to be such a profound and fundamental shift in power relations between and among human and posthuman authors and subjects? When, in any given world, virtual or otherwise, the entire space and people in it are activated as potential cameras, that is, are seen as points in space with potential and valuable calculus attached to each one, and are additionally granted their own voice and not essentialized or ventriloquized as the Other, then we have a very different universe than the one articulated by traditional western science and western perspectives thus far.

In *The Myth of Total Cinema*, Bazin describes the birth of cinema as being intimately entwined with the idée fixe that art can produce a complete illusion of life, and on this basis, he states that cinema has not yet been invented. To my ears Bazin's mythic evocation of "a recreation of the world in its own image" goes beyond so-called virtual reality.[14] The search for the 'complete illusion of life' sounds like a description of

artificial intelligence (A. I.) or artificial life (A. L.), both of which are still in their infancies, and yet discernable on the horizon. Perhaps surprisingly, it is in the realm of special effects, with its 3D virtual worlds, sophisticated compositing techniques and intelligent agent software used to generate autonomous crowds, that we are witnessing a radical shift in what we traditionally think of as the "subject". I would not have guessed that it would be under the aegis of Jackson, Lucas, Zemeckis and the Wachowski brothers that the world would take on an entirely new meaning, but that is what appears to be happening.

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[1] Christopher Isherwood. "Goodbye to Berlin". Berlin Stories. New Directions Publishing Corp., New York. 1963.

[2] For a walkthrough of John Gaeta's effect, please see the three short clips available at this url: http://whatisthematrix.warnerbros.com/cmp/sfx-bullet_videos2.html

[3] For a fascinating read on the life and times of Edwaerd Muybridge, Rebecca Solnit's book, River of Shadows: Eadweard Muybridge and the Technological Wild West, is highly recommended. Viking Books, New York. 2003.

[4] Andre Bazin,"The Myth of Total Cinema". What Is Cinema? Vol.1 University of California Press, Berkeley, CA. 1971. P 19.

[5] From an April 1999 American Cinematographer interview with John Gaeta by Ron Magid, , see - http://www.theasc.com/protect/apr99/trinity/pg1.htm

[6] While Sherman Fairchild developed a fast shutter speed camera in 1920, Kodak introduced a commercially viable camera with a shutter speed of 1,000 frames per second in 1941. Presumably such high rates of speed were available earlier, for military and other non-commercial purposes, but I have not yet located a more precise date.
On Fairchild Aviation and their historic contribution to the development of aerial photography, see – http://www.centennialofflight.gov/essay/Aerospace/Fairchild/Aero25.htm To quote from the Fairchild Imaging Corporation's website, on Sherman Fairchild: "More than 70 years ago, American scientist and industrialist Sherman Fairchild invented an efficient between-the-lens camera shutter and associated timing mechanism that enabled accurate aerial photography for the first time. Since then aerial photography has evolved into aerial surveillance of our earth for military and commercial needs as well as capturing the birth of other worlds in far off galaxies. We are justly proud of our heritage of providing extraordinary electronic imaging solutions for virtually every electronic imaging application." This connection of the virtual camera to global positioning satellite technology does not surprise me. It is my observation that the world and everything in it is becoming fodder for an enormous cultural act of calculation. My doctoral dissertation (forthcoming) addresses this topic in greater detail.

[7] Though Gaeta is not alone in his use of the virtual camera, he is surely one of its greatest innovators.

[8] Kehr, David, "A Face That Launched A Thousand Chips". New York Times. October 24, 2004.

[9] The talking stick was used in Native North American tribes at council meetings. Wikipedia notes that, "Nowadays it is used still by many groups, especially in groups of children or adults who need help preventing discussions from degenerating into cacophonies". In my paper for the Refresh! Conference held in September, 2005, entitled, "An Aesthetics of Play – Or How To Understand Interactive Fun", I suggest that learning to embrace an apparently more chaotic aesthetic is part of the challenges we face in embracing

interactive media. I believe that in the near future, the '*camera* as camera' aesthetic will provide us with a new opportunity to re-evaluate our reception of many voices simultaneously, rather than considering the orderely aesthetic which has so long dominated western European art history as the only mode of pleasing expression. Many media trends point in this direction.

[10] Jody Duncan, "Ring Masters". Cinefex 89. April, 2002. Riverside, CA. Cinefex editor Duncan writes in an article on *The Fellowship of the Ring*, that Peter Jackson's visual effects team lamented that, in the 8 years of shooting the *LOTR* trilogy back to back, the technology had already adavanced a couple of generations (p. 130), compounding their task as they assembled in excess of 1500 visual effects shots for the three films. (p.67)

[11] As further evidence of a cinephilic influence, I must note that these directors are well-known for their nostalgic embrace of the Saturday morning matinees of their childhoods and while no one will ever confuse that with the great art of *auteur* driven cinema, there is nonetheless a legitimate cinephilic undertone to their films in general.

[12] The *Revenge of the Sith* DVD contains an extended featurette about the making of a similar, less complex sequence and they cite statistics similar to these. Given the greater complexity of this sequence I have conservatively assigned 30% more manhours, though I think it could easily be more than that, given the number of models, ships and animations involved in this battle scene.

[13] Andre Bazin, "The Ontology of the Photographic Image". What Is Cinema? Vol.1 University of California Press, Berkeley, CA. 1971. I say early date here, because in terms of virtual technology, the year 1945 places this text at the dawn of cybernetics.

[14] Bazin, "The Myth of Total Cinema", p. 21.