Chapter 17

Ghosts in the Machine:

The Body in Digital Animation

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An Animated Debate

From its very beginning, cinema has been haunted by animation. After all, some of the earliest examples of moving pictures were created from strips of drawings, and resembled cartoons much more than the live-action recordings we have come to associate with traditional film. By the time the first moving pictures were astonishing modern audiences with visions of celluloid crowds and trains, pioneer animators were already playing with cinematic reality through editing, stop-motion photography, and other techniques that exploited the magical qualities of cinema. Perhaps the growing discipline of film studies was helped to maturity by proclaiming a separation from its magical roots, for despite its spectacular beginnings, animation has largely been marginalized (albeit with some nostalgia) by traditional media theory. This is the sentiment of Tom Gunning's essay on the occasion of cinema's centenary, in which he describes animation as film history's forgotten and unfulfilled potential.[1] Alan Cholodenko goes so far as to argue that all cinema is a subset of animation, since both live-action film and animation are suspended between the stillness of individual frames and the artificial movement of the projector – between realism and fantasy, between life and death.[2]

As digital video manipulation becomes the norm in film production, former boundaries between live-action and animation no longer seem relevant in the contemporary landscape of hybrid moving images. Most digital films combine elements of the filmed with elements of the hand-made, and demand a re-examination of how reality is re-presented on the screen. Animation is becoming increasingly pervasive on the Internet, in public spaces, and on traditional screens of cinema and television. However, even though

animation has supposedly triumphed in the digital age, it is also undergoing a crisis. We might characterize this as a crisis of identity, for at its heart lies a question of definition: *what* is animation? Realizing the difficulty of placing contemporary films into different categories, animator Keith Lango wistfully writes: "Let's just call it all animation and be done with it."[3] When live-action, animation, and special effects are all fused into seamless CGI photorealism, it becomes difficult to distinguish the contributions of the different components. In the entangled web of computer effects and "motion capture" technologies, the traditional role of the animator has also become uncertain. The new landscape of virtual simulation threatens to marginalize the figure of the animator, or at least replace the hand of the artist or actor with computer rendering software.[4]

Instead of waving farewell to traditional models of animation, I wish to examine this internal conflict in digital cinema. In this essay, I investigate how the animator's presence, which was so central to early cinema, has been brought into question by the technological developments of digital media. In keeping with the theme of this collection, it is important to note that the term *presence*, which refers to embodied proximity, can also be used as a synonym for a ghost or apparition. In this sense, my discussion of a material and corporeal foundation for animated realms already evokes the haunting interplay of reality and illusion, or embodiment and simulation, which characterizes cinema and digital media.

A major claim of this essay is that dominant accounts of animation neglect the significance of the animator's presence in the frame of cinema history.[5] These accounts divorce the process of animation from the physical figure of the animator, and place the emphasis on the technological marvels of the cinematic apparatus. The development of digital media in the past few decades has led to a tendency of privileging technology, language, and information over corporeal presence and embodied creative imagination. In line with this tendency, scholars like Lev Manovich, Mark Langer, and Dave Clark, among others, focus on digital technology's ability to simulate photo-indexical reality, transform life and motion into malleable data, and offer animators an unprecedented amount of mediated control. Within these dominant frameworks, the artist's actual body is seen as a fleeting and accidental curiosity in animation, irrelevant in the grander scheme of moving image technology. This disregard for the body returns to haunt the figure of the animator in digital cinema, as digital technology struggles to erase or replace all traces of the artist. By downplaying the role of the body in animation history, digital cinema theorists dismiss an important site of creative expression and corporeal resistance to technological control.

I argue that embodied performance is a central, albeit overlooked, feature of traditional animation. By incorporating their own bodies and the bodies of human actors into early hybrid films, pioneer animators drew attention to their physical connection to the motion on the screen. This connection has remained vital

to a diverse range of animation artists throughout the twentieth century.[6] In considering the effacement of the animator's presence in animation history, I hope to illuminate the source of contemporary anxieties surrounding the disembodying visions of digital cinema.

Digital Cinema as Animation

Although animation has been widely neglected by twentieth-century film studies, the development of digital technology has significantly changed this attitude. As computer-generated special effects, immersive 3D games, and animated web banners become commonplace, the inseparable links between cinema and animation are difficult to ignore. Techniques traditionally associated with animation (frame-byframe construction of movement, character modeling, color and shape manipulation, etc.) are now deeply entrenched in most mainstream moving image production. Even the latest thematic trend in Hollywood cinema – blockbuster films based on fantasy novels or comic book heroes – borrows from marginalized narrative genres that have traditionally been associated with animated production.

Reflecting on the blurring lines between animation and live-action, numerous scholars have pointed out the futility of separating animation from other modes of film production and of establishing hierarchies between them. Mark Langer has gone so far as to call digital cinema the "end of animation history."[7] Langer does not claim that animation techniques will cease to exist; however, he argues that since the discipline was primarily defined by comparisons with live-action film, its chief defining element, for all intents and purposes, has become obsolete. For Langer, this historical development presents an opportunity to recognize all moving images as hybrid constructions, to be subjected to common methods of analysis. Although Langer proclaims the end of animation history, I suggest he actually means to argue for the end of cinema history, since his vision of the digital hybrid belongs neither to the realm of animation, nor to that of live-action. Instead, digital films can appeal to the realism of live-action, while employing the construction techniques of animation. Thus, for Langer, the internal contradictions of cinema history have been resolved in the labyrinth of special effects, 3D modeling algorithms, and other ways of constructing reality.

Lev Manovich comes to a similar conclusion, when he defines digital cinema as the ultimate triumph of the "super-genre" of animation.[8] Like Langer, Manovich looks at historical connections between live-action and animation. By defining "animation" as the manual construction of moving images, he argues that cinema began as animation. Early pre-cinematic experiments, such as the zoetrope or the praxinoscope, were composed entirely of painted sequences and some of the earliest films included frame-by-frame slicing and matting techniques. These manual constructions of the moving image were later

hidden during the twentieth century's reliance on live-action realism. With the exception of a few artists, most pre-digital filmmakers treated the camera as an objective observer, which offered glimpses of reality. The indexical properties of cinema established traditional live-action film as somehow more "honest" than the visibly constructed animated film.

In digital film, almost every project relies on significant post-production construction. Digital technology translates images into uniform data (pixels), which are easily open to manipulation. Even traditional film projects undergo digital postproduction, and it is common to significantly alter the images. The high degree of construction, which is applied to all footage, aligns digital cinema with traditional animation techniques. This has led Manovich to his often-quoted assertion that "digital cinema is a particular case of animation that uses live-action footage as one of its many elements … born from animation, cinema pushes animation to its periphery, only in the end to become one particular case of animation" (302). Liveaction becomes merely one option among a diverse range of effects, along with various algorithms, filters, and image generators. Eschewing the "bluntness, sterility, and banality" of recorded footage, Manovich privileges the hyper-realism or collage compositions of 3D computer animation (294).

Both Langer and Manovich believe that digital cinema has brought to light what has been historically understated in film studies – that all moving images are constructed, that all film presents an illusion of life, and that digital technology fulfills cinema's destiny to create a fully malleable, infinitely transformable visual landscape. Both theorists see this destiny as incompatible with traditional models of film and continuous with the historical development of animation. If cinema has, as Cholodenko claims, always been haunted by animation, then recent work in animation theory marks the return and potential triumph of the specter.[9]

Powers and Marvels

While cinema theory has often overlooked animation, traditional animation theory has strived to compensate for the neglect by extolling the art form. In earlier writings on live-action and animation distinctions, animators are often seen as magicians or gods – introducing viewers to the marvels of film technology, or bringing forth new worlds with the help of the cinema apparatus. Such metaphors for animation are often traced back to early animated films, which repeatedly featured the figure of the animator in a self-reflexive act of producing a magical trick or imbuing objects with life.[10] These early self-reflexive cartoons, which shared a common iconography of "the hand of the artist," showed the animators as they encountered the new moving drawings and often engaged in a battle with the created characters.

The animated and the live-action ("real") worlds would often collide, and the animator would become entangled in the wondrous show.

Most often, theorists analyze these self-reflexive cartoons through the lens of technological exploration. For example, Thelma Schenkel writes that early animators seemed like magicians playing with "the new toy they were helping invent, and the more elaborate the games they could devise, the more appealing they would be to the audience."[11] Within such a framework, the early hybrid films present a step in the innovation process, as the artist introduces viewers to the technology of the cinema. Donald Crafton also argues that the artist's corporeal presence is not a significant part of early animation.[12] Crafton writes that spectators were less interested in the figure of the magician than in the attractions and curiosities of cinema. In his analysis of Emile Cohl's animated films, he notes that "the viewer's attention was being diverted from the magician toward the mechanism of the trick" (88). This framework of animation as magic and spectacle establishes it as a process of technical discovery. It also ties animation to special effects, under the common banner of "trick film."[13] Prolonging the magic in all these cases requires continuous innovation, and the animator-asmagician becomes invested in the ownership of the trick. Some animation histories thus set up entire timelines of technical progress, charting filmmakers' competition for new technological illusions.[14] At the heart of this illusion, the animator was featured as a uniquely self-reflexive and powerful master, who could create life, put together broken characters, or bring the action to an end.[15] Examining the presence of the animator in early films, Crafton argues that "[p]art of the animation game consisted of developing mythologies that gave the animator some sort of special status. Usually these were very flattering, for he was pictured (or implied to be) a demigod, a purveyor of life itself."[16]

Dominant contemporary perspectives of digital cinema clearly align animation with such interpretive models of technological artifice and draw on the mythologies of magic and creation that surround the early self-reflexive cartoons. By celebrating digital animation's perfected illusion and malleability, established theorists like Langer and Manovich define animation history as ajourney toward the artificial re-creation of life. Both thinkers are more concerned with the range of available techniques and the visual veracity of the digitally animated image than with any changes in the process of animation. Their analyses of digital cinema have the underlying assumption that animation's chief "struggle" throughout the twentieth century was its inability to faithfully imitate reality. Once this hurdle was surmounted by computer technology, the animated realm could fulfill the narrative of the early self-reflexive cartoon and jump out of the frame to launch its assault on the real world.

As such, animation's apparent triumph in the digital age is not tied to any particular aesthetic traditions, but rather to techno-centric destinies, which many theorists attribute to cinema history. Manovich champions animation theory almost entirely through a framework of technological emancipation. He admires animation's hand-crafted tradition, and yet his vision of digital cinema does not foreground the constructed character of the early animated image. Although he stresses that digital cinema allows artists to manipulate every frame of footage "by hand" (300), his models of digital production are more concerned with computer algorithms and image-capturing technology. In this network of digital techniques, the hand of the animator is seen as an antiquated curiosity, which has been rendered obsolete by faster, more powerful machines.

Animator Dave Clark adds that computer technology has made the hand (and, by extension, the presence) of the artist outdated and unnecessary.[17] First, digital technology assimilates the animator's presence into its own design, by including an interface that can be triggered by any user: "The viewer is brought into the animation process as the creator of the objects, but it is the virtual world – the frame around the object – that animates them" (146). Eventually, the hand of the user is also removed in generative animation (animation created entirely through programmed algorithms). Digital software becomes an animator in itself, entirely independent of the human artist.

At first glance, this model of digital cinema offers exciting self-fulfillment for the magicians and creators of animation. Virtual simulations open up a horizon for new techniques and skills. Sophisticated image-capturing technology, as well as a growing range of software tricks, are allowing for more cost-effective and visually impressive projects. Moreover, the technology is accessible to a wide range of aspiring illusionists. It is thus unsurprising that numerous transformative (one might say magical) properties have been ascribed to digital cinema: limitless interactivity, instant accessibility, and transcendence of time and place.

For aspiring creators, this realm seems to provide an unprecedented amount of power. A recent article by Manovich, which praises emerging technology, includes a description of digital animators as deities: "Every time you want to make a still image or an animation of some object or scene, the story of creation from the Bible is being replayed."[18] Manovich continues the analogy by imagining God creating a new universe with the help of a computer. Speaking about the digital animator's ability to not only create from scratch, but also to sample reality in "infinite" ways, he goes so far as to write that "we are in a somewhat better position than God was."[19] By converting all input into pure information – a binary code of ones and zeroes – digital networks can replicate and alter the material world through this interchangeable data. This

process might take longer than filming live-action footage, but, according to Pixar Animation director Andrew Stanton, "the winning side of [computer] animation is that you have a godlike control of everything. You can basically tweak till the last second."[20]

Seductive visions of digital immortality are common in discussions of new media. The most radical support for digital creation comes from artificial intelligence proponents like self-proclaimed "futurist" Ray Kurzweil, who projects that the human brain could be mapped and "downloaded" onto a computer within the next fifty years.[21] Kurzweil has already created a sophisticated digital alter ego, and often attends functions through this digital interface. In mainstream cinema, another notable advocate of digital simulation is *Star Wars* creator George Lucas, who has repeatedly stated his wish to dispense with real sets and actors in favor of creating films entirely with CGI. While few other directors have expressed as much fervor for digital technologies as Lucas, a growing range of filmmakers are looking to motion capture technology and computer animation software to "bring life" to their visions.

Enthusiastic discussions of the liberating powers of digital technology take for granted that the animator's or actor's corporeal presence is irrelevant (or entirely absent) in contemporary cinema. The animator becomes featured as a shapeshifting, ghostly character that dissolves her body into infinite configurations. The figure of the animator is no longer a stable presence that refers to a material realm behind the cinematic apparatus. Instead, the digital filmmaker is an absent "posthuman" animator – a controlling force without a traceable source.

The Posthuman Animator

The figure of the animator has always been intertwined with the technology of the cinema. Individual artists may have manipulated successive images or planned out the movements, but the projector brought those images to life. Nevertheless, in the early films, the animator's hand was always involved in the production. In the early selfreflexive cartoon, the image of the hand insistently testified to a corporeal presence beyond the frame. Within the digital circuit, however, it "is no longer possible to distinguish meaningfully between the biological organism, and the informational circuits in which the organism is enmeshed."[22] N. Katherine Hayles writes that digital networks replace concepts of presence and absence with a series of patterns and noise. In the depth of the animation studio, the animator selects among a diverse range of possible codes and filters, and creates recognizable patterns for the audience. Animators become disembodied – "the very code they punch" (45).

It is no wonder, then, that contemporary CGI animation elicits mixed reactions among animators. Beyond the loss of control that animators may feel in the face of powerful new technology, there is also the

anxiety that the magic trick has gotten out of hand, has wreaked havoc on the "real," and has played its last joke by turning the animator into a puppet of the apparatus. To a certain extent, these anxieties are related to economic concerns (worries about job status) or old work habits. However, it would be a mistake to characterize the uneasy reactions to computer animation as a passing phase or growing pains. These reactions point to an important concern over contemporary technological challenges to embodied presence – challenges that have been noted by scholars from a growing range of disciplines.[23]

The digital vision of re-creating the material world through virtual reanimation exemplifies the Cartesian tradition of separating consciousness from corporeal presence. The dualism of mind and body has become especially evident in discussions of new media, which treat virtual reality as a realm where human subjectivity can leave behind its burdensome body. What links this discourse to traditional animation theory is the belief that technology will transform the mundane everyday world into a marvellous realm, in which the creator (user) can refashion reality at will. For instance, users can enter the animated online world of *Second Life* and become the animators of their own virtual destinies.

Kevin Robins argues that these models of digital media, which propound utopian virtual realities, ignore the material realities on which they depend.[24] By turning attention away from real bodies, new media enthusiasts overlook existing social, political, and environmental influences. As Hayles reminds us, the virtual is always inseparable from the material infrastructure that it supposedly erases. In fact, "[t]his illusion of erasure should be the subject of inquiry, not a presupposition that inquiry takes for granted" (28). The disappearance of the body from digital cinema is itself an illusion that needs to be explored. Behind the virtual interface of animated bodies, the actual material bodies are left to be reanimated according to a variety of networks of control.

The rhetoric of empowerment and liberation surrounding digital technology neglects the networks of power within which that technology is embedded. As several theorists, including Manovich, acknowledge, the development of animation has long ago left the animator's workshop, and entered the complex web of military-industrial interests.[25] Many current video game engines, 3D texture algorithms, and motion capture techniques are developed by companies that have ties to military initiatives. The technology behind many current special effects – especially CGI animation – is also used to improve military surveillance and training programs. In recent years, partnerships between the government and the entertainment industry have also been forged.[26] In this light, computer modeling software is inseparable from war simulations and the military mapping of bodies and territories.

Of course, it would be unfair and premature to accuse the filmmaking industry of active participation in current political tactics. It would also be a mistake to evoke sentimental memories of the "golden" days of

cinema or animation. Many opponents of CGI technology are prone to exaggerate the contrast between the "pure" days of traditional film and the dark days of digital technology. For instance, Jean-Pierre Geuens's bitter critiques of digital media are full of nostalgia for the preciousness of celluloid,[27] and contempt for the "nihilistic tendencies" of digital film.[28] Negative responses such as his ignore the continuities between various modes of filmmaking and neglect to consider the expressive potential of various media. Still, such anxieties about the attitudes that underlie current applications of digital technology should not be dismissed entirely. The drive for creative power and virtual immortality that fuels contemporary discussions of digital animation is not too dissimilar from the ethos of control in contemporary global politics. In their celebration of digital technology, many CGI enthusiasts mirror the same attitude that characterizes modern science, medicine, and warfare. In all these spheres, human life and its material reality are increasingly treated as "standing reserve," a term coined by Martin Heidegger in his discussion of the totalizing impulse of modern technology.[29] To view something as "standing reserve" is to treat it as raw and undifferentiated energy, made available for exploitation. For example, the modern term "human resources" reflects contemporary models of work that treat human labor as a stream of manageable and interchangeable energy.

One can find similar models of human labor in current digital cinema techniques. Digital animation converts the work of the animator into code, information, and statistical data. The latest development in animation, motion capture technology, is invested in seizing (capturing) the energy of human life (movement). Motion capture grabs the gestures of a moving body, strips the information of any unwanted fleshly "material," and stores the data for reconfiguration. Movements can then be tweaked, replaced, and modified at will. For example, in the recent adaptation of *Beowulf* (Zemeckis, 2007), Angelina Jolie's pregnant body was captured for the film, stripped of clothes and the visible signs of her pregnancy, and then combined with an entire catalogue of digital body parts. The infringement of the star's unwanted real body (her pregnancy) was resolved through a kind of digital abortion, until only the desired traits and details were left in the frame. The final composite in the film is a hybrid of Jolie's body and digital modifications, although the alterations are invisible to the audience.

In addition to capturing and storing human motion, CGI developers are also working on reproducing the movements and imperfections that are produced by an artist's hand. Even the hand-drawn approach to animation, which in the past referred to a human presence, can soon just as easily be designed by a rendering program. The gestures of an artist, like the motions of an actor, can be mapped and stored for computer simulation. For example, a recent study investigates hand drawings of thirty artists and proposes algorithms that will be able to calculate how an "average" artist will draw the outline of any object.[30] This

information will allow computer programmers to simulate hand-drawn effects by running algorithms that try to imitate the gestures of a human animator.

These non-photorealistic filters are being added to the growing bag of digital tricks. Formerly, the central mark of animation was the trace of artistic construction (doodles, erasures, clay fingerprints, etc.). Currently, these traces can either be removed as unnecessary by-products, or added through computer code. With the disappearance of these traces, the presence of the animator also disappears from the frame of the project. Digital animation thus both fulfills and destroys the myth of the animator as "god" or creator.

An Animated Defense

Although the mass-production of animation is not new to the digital age, the loss of any traces of an animator is something that could only be facilitated by the computer image. Digital cinema throws the animator's presence into question and challenges conventional myths about the importance of the artist in animation. In the entertainment industry, a number of new models have attempted to defend these myths against the onslaught of sophisticated CGI technology. I will outline the two most common models that are prevalent in animation discussions, seminars, and training manuals. In both models, animators defend their position in digital cinema by appealing to the same tropes of magic and creation that have characterized traditional discourses on animation.

The first model can be described as the "labor defence." Animators point to the painstaking labor that digital animation demands. For instance, frame-by-frame touch-ups are required even in the case of motion capture. Also, the combination of various elements onto a single layer (known as compositing) is a difficult process that requires a skilled eye and an ability to produce a seamless final project. Mainstream animation productions employ entire teams of animators, some of whom specialize in particular areas like hair, plants, or character joints. Animators are needed to direct actors in motion-capture production, as well as to configure the appropriate computer codes. Without the practiced touch of the human, argue industry analysts, the final project would lack any life or soul. While this argument keeps professional animators temporarily secure in their jobs, it reduces animation to a skilled trade that happens to be commercially viable for the entertainment industry. For now, teams of animators are needed in order to maintain the illusions. In the future, their presence will depend on industry changes and technological developments.

The second defence, which I will call the "story defence," is more concerned with long-term prospects for animators. According to this defence, even the most sophisticated technology cannot produce a compelling and engaging story for the audience. The success of animation depends on the believability of the characters, their ability to suggest human personalities and evoke emotional responses in viewers. According to such a model, animators are defined as storytellers and animation is defined as the range of

techniques that are used to deliver the plot. The affinity between this story model and the myth of the "absolute creator" is clear. It is as though animators have relinquished control over the process of animation and transferred it to narrative control. The goal of creation is thus disconnected from any essential qualities of animation and is linked to the creation of narrative. This defence poses another challenge for supporters of animation. Undoubtedly, animation can be used to convey narratives; however, the same is true for film, theater, literature, stand-up comedy, etc. What would motivate a storyteller to choose animation as her medium? What makes some techniques preferable to others? The discussion will inevitably have to come back to myths of control and the powers of technology.

Both defences are inadequate in recuperating the presence of the animator in digital simulation. The first defence casts the animator as a technician, because it emphasizes the cinematic apparatus over the presence of the artist. The animator is featured as a technician or laborer – an operator of the machine. The second model appears to bestow onto the animator a unique creative power. However, it ties that creative power to technological progress. As such, it too succumbs to visions of simulated reality. Traditional accounts of animation emphasize the magical properties of moving image technology, or construct a narrative about the animator's super-human abilities. As I have argued in this essay, these models of animation are reflective of broader contemporary discourses on technological supremacy and material recreation. Within the framework of digital cinema, these models become prophetic, as the apparatus threatens to displace, replace, or radically modify the presence of the animator. The "posthuman" digital animator thus becomes ever more reliant on technology and its attached political strings.

It is not my intention to make foreboding prognoses about animation or digital technology. Rather, this essay notes the challenge that the cybernetics of information poses for the self-defined magicians and creators of animated cinema. Within this ambiguous and often problematic context, animation, perhaps more than traditional film, presents a chance to explore more corporeally grounded relationships with the moving image. After all, the bodies of the animators are inscribed in the very origins of cinema. This is why in spite of numerous predictions of the triumph of simulation – predictions that can be traced for well over a century – the body continues to haunt the virtual networks of digital animation. Early animated films are haunted by the figure of the animator (or the figure of the actor), whose movement serves as the mold or model for the animated character. The presence of the artist in the frame of the film, or behind the frame of the traced animated image, continues to add what Joanna Bouldin called a kind of ontological *thickness* to the image.[31] Animation continues to require the movements of the animator and the actor not only for economic reasons, but also for the body's unruly complex motion (and, by extension, its claims to life). Despite attempts to foreground the sophisticated and developing marvels of digital technology, contemporary animation maintains an uneasy alliance with the bodies that inhabit its virtual networks. The

space of digital media, from *Second Life* and video games to CGI blockbusters and scientific animated models, therefore, remains haunted by the material body.

An exemplary citizen of this haunted space is *Emily*, a virtual character produced and heavily promoted by digital animation company Image Metrics. *Emily* is a demo of the company's sophisticated animation capabilities; it (or "she") is often compared with earlier CGI failures, and featured as a more successful and realistic version.[32] The promotion trailer for *Emily* begins with the caption: "Emily is not real." Viewers are then introduced to an animated female actor, who proceeds to joke and muse about the company's ability to generate lifelike characters. The goal of the demo is to amaze potential users and clients with *Emily*s believable realism. However, *Emily*, as well as all other demos released by the company, is based entirely on sophisticated data captured from real actors and applied by animators. In *Emily's* case, the face and gestures of the virtual heroine are near exact doubles of actress Emily O'Brien. For the initial demo, O'Brien's hair was even left untouched, in live-action form, and only the face was remodelled in the computer. So what do Image Metrics creators mean when they claim that *Emily* is "not real"? After all, everything about the animated character that amazes viewers depends entirely on a "real" actor, whose body supports the virtual mesh. What is most peculiar is that behind-the-scenes footage of the process reveals the real O'Brien watching herself in animated form, and exclaiming with wonder that she was fooled into believed that the image "is me." It is as though O'Brien herself forgets that her body was scanned and digitized in order to create the final project. Instead, the digital *Emily* begins to take on a life of her own, with the real Emily O'Brien left behind as a shadow or specter. *Emily's* case is only of many examples of the way enthusiastic and critical analyses of CGI photorealism neglect the ongoing presence of an embodied participant in the development, production, and engagement with animated worlds and characters.

The title of this essay is a reference to the popular philosophical concept of the "ghost in the machine." Traditionally, the "ghost in the machine" refers to an elusive guiding spirit (i.e. the mind or soul) of an organism. In philosophy, this question of human spirit has haunted the Cartesian split of mind and body. Similarly, pop culture seems fascinated with mind/body separations (humanoid robots, lifeless automatons, to name a few). To a certain extent, animation reflects this tradition, since it offers visions of inanimate objects that come alive and seem to have a mind of their own. However, instead of the original image of a body haunted by a mind or spirit, digital animation offers a virtual reality (a "mind" of information) that is haunted by the missing bodies of actors and animators. Recent media scholarship has offered important critical analyses of new media production and cinematic spectatorship, in the hope of establishing embodied relationships with the rapidly developing technology. My intent here is to supplement these explorations by foregrounding the ways in which animation can participate in discussions of embodied

cinema. In Gunning's essay on the animated "ghost in the machine," the author argues that animation can expose and reveal the magical artifice and the creative potential of the technological apparatus. I argue that animation also has a long tradition of revealing living, breathing bodies, whose invisible presence moves between the frames of the cinematic mechanism. Instead of focusing solely on technological development, animation scholars should also acknowledge the complex relationship between digital worlds and their supporting material realms.

NOTES

1 Tom Gunning, "The Ghost in the Machine: Animated Pictures at the Haunted Hotel of Early Cinema," *Living Pictures: The Journal of Popular and Projected Image Before 1914* 1, no. 1 (2001): 3–17.

2 Alan Cholodenko, "Introduction," in *The Illusion of Life: Essays on Animation*, ed. Alan Cholodenko (Sydney: Powers, 1991), 1–45.

3 Keith Lango, "And the award for best rendered film goes to…:," blog entry, February 2007; http://www.keithlango.com/wordpress/?p=478. Lango wrote these lines in response to the 2007 Academy Award nominations in the Animation category. All but one of the nominated films relied heavily on motion capture technology in order to model characters after human actors. Many animators consider the use of motion capture to be a betrayal of traditional animation methods.

4 Moreover, industry excitement with computer-generated acting performances similarly leaves the traditional actor in a precarious position.

5 In recognition that animated landscapes and characters are often collaborations between animators and actors (whose movements contribute to the performance), many of the arguments may be extended to a discussion of actors in animation.

6 A broader discussion of animation as embodied filmmaking – the focus of my current research – remains outside the scope of this essay.

7 Mark Langer, "The End of Animation History," *Society for Animation Studies Newsletter* (2002), http://gertie.animationstudies.org/index.php. Langer borrows here from Francis Fukuyama's model of history, which, in turn, relies on a Hegelian model of historical progress.

8 Lev Manovich, *The Language of New Media* (Cambridge, MA: MIT Press, 2001).

9 Cholodenko, "Introduction."

10 Examples include the works of Stuart Blackton, Emile Cohl, the Fleischer brothers, and Walt Disney's *Alice Comedies* series.

11 Thelma Schenkel, "Exploring the Cinema of Figurative Animation," PhD diss., New York University, 1997, 74.

12 Donald Crafton, *Before Mickey: The Animated Film 1898–1928* (Cambridge, MA: MIT Press, 1987).

13 It remains a point of debate whether special effects strive to erase awareness of the trick, or whether effects are always wrapped up in elements of exhibition and informed astonishment. Did the haunted objects in early trick films alarm viewers' impressionable sensibilities, or was there always an understanding that the invisible ghost was in fact the filmmaker?

14 See, for example, Michael Frierson, "Clay Animation Comes Out of the Inkwell: The Fleischer Brothers and Clay Animation," in *A Reader in Animation Studies*, ed. Jane Pilling (Sydney: John Libbey, 1997), 82–92.

15 See Donald Crafton, "Animation Iconography: The 'Hand of the Artist,'" *Quarterly Review of Film Studies* 4 (1979): 409–427; Donald Crafton, *Emile Cohl, Caricature and Film* (Princeton: Princeton University Press, 1990); Alan Cholodenko, "(The) Death (of) the Animator, or: the Felicity of Felix, Part II: A Difficulty in the Path of Animation Studies," *Animation Studies* 2 (2007): 9–16; Cholodenko, "Introduction"; Langer, "The End of Animation History."

16 Crafton, *Before Mickey*, 11.

17 Dave Clark, "The Discrete Charm of the Digital Image: Animation and New Media," in *The Sharpest Point: Animation at the End of Cinema*, ed. C. Gehman and S. Reinke (Toronto: YYZ, 2005), 138–151.

18 Lev Manovich, "Image Future," *Animation: An Interdisciplinary Journal* 1, no. 1 (2006): 30.

19 Ibid. Manovich's analogy echoes some of the enthusiasm that surrounded early film. For example, avant-garde filmmaker Dziga Vertov, whose writings influenced Manovich's work, proposed that cinema technology could help construct a new society (and a new human being). In some ways, Manovich's analogy makes a stronger case for digital media, since he argues that the digital creator can generate limitless permutations and simulations of reality, without necessarily having to sample anything.

20 Rick McGinnis, "Wall-E: A Five Year Labour of Love,"*Metro Toronto*, June 20, 2008, http://www.metronews.ca/toronto/Entertainment/article/722178.

21 http://www.kurzweilai.net/index.html?flash=l.

22 N. Katherine Hayles, *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics* (Chicago: University of Chicago Press, 1999), 35.

23 See Vivian Sobchack, *Carnal Thoughts: Embodiment and Moving Image Culture* (Berkeley: University of California Press, 2004); Mark Hansen, *New Philosophy for New Media* (Cambridge, MA: MIT Press,

2004); Anna Munster, *Materializing New Media: Embodiment and Information Aesthetics* (Lebanon, NH: University Press of New England, 2006); Lisa Bode, "From Shadow Citizens to Teflon Stars: Reception of the Transfiguring Effects of New Moving Image Technologies," *Animation: An Interdisciplinary Journal* 1, no. 2 (Spring 2006): 173–189. Jeffrey Sconce, *Haunted Media: Electronic Presence from Telegraphy to Television* (Durham: Duke University Press, 2000) also offers a fascinating, detailed analysis of the historical and cultural ambivalence surrounding virtual disembodiment.

24 Kevin Robins, *Into the Image: Culture and Politics in the Field of Vision* (London: Routledge, 1996).

25 See Lev Manovich, "Reality Effects in Computer Animation," in *A Reader in Animation Studies*, ed. Jane Pilling (Sydney: John Libbey, 1997), 5–15; W. Carlson, "A Critical History of Computer Graphics and Animation," 2003, http://design.osu.edu/carlson/history/lessons.html; Paul Crogan, "Logistical Space: Flight Simulation and Virtual Reality," in *The Illusion of Life II: More Essays on Animation*, ed. Alan Cholodenko (Sydney: Power, 2007), 368–399.

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30 Forrester Cole et al., "Where Do People Draw Lines?," *SIGGRAPH* Article 88, 2008, http://portal.acm.org/citation.cfm?id=1360687.

31 Joanna Bouldin, "Cadaver of the Real: Animation, Rotoscoping, and the Politics of the Body," *Animation Journal* 12 (2004): 7–31.

32 See http://technology.timesonline.co.uk/tol/news/tech_and_web/article4557935.ece; http://compscigail.blogspot.com/2008/09/emily-and-uncanny-valley.html; http://www.image-metrics.com/.