The Parallel Development of Film and Video Game Technologies: History and Implications

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Abstract

This paper examines the parallel evolutions of film and video game technologies. Several key dimensions of similarity in the histories of the two mediums are identified, including commonalities in origins, visionaries, exhibition, and aesthetics. The ultimate goals of this work are twofold. First, it reveals how similar lessons may be learned from the histories of film and games, affecting the future development of entertainment technologies. Drawing on Rogers' (2003) diffusion of innovations perspective, the paper considers how comparable advancements in form and content helped both technologies meet human needs, resulting in commercialization and adoption. Second, the paper plants seeds for the creation of new methodologies for the study of film and video games rooted in the common language of the moving image. It explains how popular films and video games are new, visual ways of experiencing myths and archetypes and calls for a common perspective for studying moving image media.

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The crossed fortunes and linked histories of film and video gaming might be seen in two parallel visual jokes presented during the 2008 Academy Awards show. Host Jon Stewart noted how films are getting smaller, while watching a tiny version of *Lawrence of Arabia* on his cell phone, and later, how video games are bigger than ever, while playing a gigantic game of Wii on a screen above the stage. This cross-equivalency (i.e., films might be handheld like a game; games might be big screen attractions) may alternately be viewed as reaffirmation that both film and video games enjoy robustness as entertainment. Both can survive shrinkage or over-inflation—we'll still watch or play.

Both have their origins in "exciting spaces" that promised more than the simple innovation could deliver alone. And, these spaces continue to excite. The early Kinetoscope parlors, the movie palaces of the 1920s and the movie multiplexes of the late 20th century have much in common with the video arcades of the 1970s and the Dave and Busters/Gameworks-style amusement saloons of today. However, the number one space for viewers to experience both of these technologies has become the home, in large part due to a parallel mass diffusion of popular home viewing and playing technologies. This takeoff began in the 1980s with the smash success of videocassette recorders and the Nintendo Entertainment System (NES) and continues in the thriving home DVD and console gaming markets of today, both of which are the number one revenue source for their respective industries (Williams, 2002).

Although introduced more than a half century apart, film and video game technologies have followed very similar paths in their maturation and ascendance as popular media forms,

revolutionizing art and entertainment in the process. One brought moving images of real and fictional worlds to the masses, while the other allowed viewers to interact with those worlds, transforming them into "players." A fundamental similarity between the two forms of entertainment is that they are based on and capitalize on distinctive human perceptual-motor characteristics. The history of film is marked by an elaboration on the phenomenon of *persistence of vision*, and for video gaming, a major basis is the dedication to challenges to *manual dexterity*. Both technologies have also attempted in various ways to makes audiences feel increased senses of *presence*, "the perceptual illusion of nonmediation" (Lombard & Ditton, 1997). Film innovations designed to facilitate this type of sensation include sound, color, widescreen, 3-D, and surround sound (Author, 2008), while games have relied on such innovations as improved graphics and more natural control devices (Author, 2006). As a result of these types of advances and the core engaging qualities of each medium, film and video games remain hugely popular today.

Indeed, the historical rise and continued success of film and video gaming technologies shares many striking parallels, which are the focus of the present investigation. A comprehensive and detailed consideration of these similarities is beyond the scope of a single paper; therefore, this work presents selected parallels in the development of film and video games, using Rogers' (2003) diffusion of innovations perspective as a guide.

Diffusion of Innovations Theory and Early History

Both film and video gaming may be fruitfully examined from Rogers' (2003) model of the generation of innovations. In particular, the innovation-development process specified by Rogers provides a useful framework for understanding how innovations like film and video

games grew from the seed of an idea into viable commercial entities ripe for mass adoption. It is a portion of diffusion of innovations perspective, which explains the process by which an innovation is created, communicated through certain channels over time among members of a social system, and ultimately adopted or rejected by potential adopters (Rogers, 2003). Diffusion of innovations theory has a strong empirical basis and the innovation-development process model is rooted in "tracer studies" of successful and unsuccessful innovations. These are typically based on archival records such as histories, and in that sense the present work may be considered a form of "tracer study" documenting similarities in the successful development and acceptance of film and video game technologies.

Rogers (2003) lists six steps in the innovation-development process: (1) identification of needs/problems, (2) basic and applied research, (3) development, (4) commercialization, (5) diffusion and adoption, and (6) consequences. Importantly, he suggests that the six steps do not always occur in exact order, nor do they always have to be present in the development of a particular innovation. And indeed, it might be the *exceptions* to the linear model that make the development of film and video games unique. First, neither film nor video gaming developed to intentionally meet identified needs/problems. Rather, fairly generalized "needs" such as persistence of vision and manual dexterity were addressed during the development of film and video gaming. Eventually, the technologies were adapted by artists and entrepreneurs who saw their potential to gratify broader (and more lucrative) human needs, in line with uses and gratifications theory (Sherry, Lucas, Greenberg, & Lachlan, 2006), thereby fueling their diffusion. Clearly, film and video games are technologies that traveled complex paths to commercialization and adoption.

As a second example of an exception to the typical step-wise innovation-development process, the stage of basic and applied research is less well-defined for film and video games than in most other cases. There was no organized effort, led by industry leaders; rather, in each case the core innovation came from scientists/engineers who were generally unaware of the widespread commercialization possibilities of the technologies they created. In that sense, both film and video games might be considered "inadvertent" art forms. While the precise moment of invention of the video game can be traced with a much higher degree of certainty than that of the motion picture, what is undeniable is the fact that in both cases the inception of these new communication and entertainment media was not the conscious purpose of those doing the initial experimental work but was rather a byproduct of their broader technological and scientific enquiries.

The first attempts to dissect motion in time, referred to as chronophotography, were made by Edweard Muybridge in the United States and Etienne Jules Marey in France with the specific objective of understanding the movements of animals that occurred too rapidly in nature to be perceived accurately by the unaided eye. In 1882, to aid in his study of animal locomotion (or "zoopraxography" as it was known to its practitioners), Marey developed a camera that looked very much like a rifle and could expose a series of photographs at the rate of 12 per second on a disc shaped photographic plate that revolved in the mechanism. For Muybridge's experiments (which preceded those of Marey by several years), he relied on a series of 12 stereoscopic still cameras wired together with shutters set to the then remarkable speed of 1/1000th of a second. Of the two Muybridge was perhaps the better known due to his famous experiment analyzing the gait of a horse at full gallop under the patronage of Leland Stanford, the former Governor of California who believed that at some point in a horse's stride all four legs left the ground (Cook,

2004). The widely publicized results proved Stanford correct and earned Muybridge notoriety beyond the narrow realms of art and science in which his earlier discoveries had already created significant interest (Muybridge, 1955; 1979).

It should be noted that neither Marey nor Muybridge were particularly concerned with reconstituting the dissected motion produced by their chronophotography, though the lecture tours Muybridge undertook after the Stanford experiment to capitalize on his growing fame encouraged him (due to audience demand) to replay his series photographs in rapid enough succession so as to create a kind of proto-cinema. Muybridge's work might not have been the true reproduction of lifelike motion that the cinema would soon become, but it was without question a decisive move towards that eventuality. It was on the basis of Muybridge and Marey's experiments, which were extremely well-known in the scientific community, that the next wave of inventors, including Thomas Edison and W.K.L. Dickson (who was the lead engineer on Edison's motion picture project), Auguste Le Prince, William Friese-Greene, as well as several other lesser known figures, worked to develop the photographed and reconstructed motion that would form the basis of the movies. Of this group only the Edison-Dickson team are known to have been thinking in terms of commercial exploitation for entertainment purposes, so the focus of moving image development was still on the scientific and technological value of the discoveries. As Musser (2005) notes in his essay *A Cornucopia of Images*, "If Muybridge served as a catalyst for creating the crisis between artistic and scientific truth, both through his work and his aggressive proselytizing, he also helped to create the basis for a successful resolution then a further alternative, a third way: the cinema" (p. 24).

Similarly, the first video game, *Spacewar!*, was developed by the members of the MIT Model Train Club led by Steve Russell in 1962 for the specific purpose of testing and demonstrating the Digital Equipment Corporation's PDP-1 computer and Type 30 Precision CRT Display. One of the earliest popular discussions of the computer game can be found in *Rolling Stone* magazine from 1972 in which Stewart Brand quotes Steve Russell,

> We had this brand new PDP-l. It was the first minicomputer, ridiculously inexpensive for its time. And it was just sitting there…. Somebody had built some little pattern-generating programs which made interesting patterns like a kaleidoscope. Not a very good demonstration. Here was this display that could do all sorts of good things! So we started talking about it, figuring what would be interesting displays. We decided that probably you could make a two-dimensional maneuvering sort of thing, and decided that naturally the obvious thing to do was spaceships.

The early distribution of *Spacewar!* was largely driven by DEC's (who hired Russell soon after the development of the game) loading the game in the core memory of all PDP-1s and several subsequent models for use as a field testing and diagnostic tool. Here again the entertainment value of the game was secondary to a technological or scientific concern, but the growth in popularity of *Spacewar!* and the introduction of the video game as a form was due to its being ported to later models of DEC mainframes, particularly the PDP-10s and 11s that were the elite computers at cutting edge schools like MIT and Stanford. Like the cinema's opening a window onto a new way of seeing and understanding the world, the video game from its beginnings was recognized as having a significance beyond its basic role as a means of entertainment. In his early article on the video game and the computer Stewart Brand (1972) wrote,

> Until computers come to the people we will have no real idea of their most natural functions. Up to the present their cost and size has kept them in the province of rich and powerful institutions, who, understandably, have developed them primarily as bookkeeping, sorting and control devices. The computers have been a priceless aid in

> keeping the lid on top-down organization. They are splendidly impressive as oracles of (programmable) Truth, the lofty voice of unchangeable authority.

Video games, Brand suggested in the opening of his essay, were the means by which "Ready or not, computers are coming to the people." And indeed Brand was correct. Before most people outside of the military-industrial-academia complex had ever seen a computer in action they could find *Pong*, *Breakou*t, and other games in their local amusement arcades and pizza parlors. In this way both the motion picture and the video game moved from the realm of science into the popular culture, bringing with them not merely a novel form of entertainment, but an entirely new epistemology, a different way of seeing the world.

The experimentation by Muybridge and Marey in film and Russell in video gaming was a form of "basic research" (Rogers, 2003) that inspired other scientists to pick up where they left off—to combine these images in reconstructions of animal and human motion in applied research settings, or to modify *Spacewar!* and make it a more exciting product. Thus, the "inventors" of moving pictures and video games are more accurately a *network* of scientists and engineers who corresponded, competed, and sometimes collaborated to develop the basic hardware components necessary for eventual industries.

Rogers has identified a number of models of collaborative engagement that tend to foster innovation development (2003; Rogers & Larsen, 1984). First, Rogers (2003) describes "skunkworks" as "the small and often subversive units within a larger organization that are created in order to pioneer the development of a technological innovation" (p. 149). While the innovations of film and video games did not emerge from dedicated skunkworks, there are salient similarities. Many developers of film and of video games would have felt at home in skunkworks operations if such units had been available for the creation of their given innovation.

Indeed, it is important to note that these developers in essence did the job of skunkworks engineers, *without* the intellectual camaraderie and financial support of the typical skunkworks infrastructure. Like skunkworks team members, the developers of film and video games were creative, rather subversive, and dedicated to their challenge. And, secondly, like the denizens of the "culture of high technology" who created home computing in the Silicon Valley of the 1980s, they were "free-wheeling, high-energy" inventors (Rogers & Larsen, 1984).

Further, a distinctive commonality between the generation of the innovations of film and video gaming is the important role of serendipity (Rogers, 2003) in the transference from the basic research stage to the development stage. Again, early "film" was intended to stop motion, not create it—only through a series of encounters among innovative engineers and businessmen was the full potential of the moving image realized. And, early video gaming was created to demonstrate computer systems, as in the seminal case of *Spacewar!*. It took others to understand the commercial and creative potentials of the innovations.

Commercialization and Creative Visionaries: The Innovations Diffuse

The early appeal of film and video games can perhaps best be explained by the fact that they existed at all! Media audiences had never seen anything quite like film and video games when they first appeared on the scene, and this sheer novelty was undoubtedly a major contributor to their initial appeal. Rogers (2003) has defined an innovation as any software and/or hardware that is *perceived as new*; further, Blake, Perloff, Zenhausern, and Heslin (1973) have identified both *recency* and *novelty* to be two independent dimensions of newness important to the adoption process.

The motion picture and the video game share a developmental pattern that began with what Tom Gunning has called a "cinema of attractions" based on "an aesthetic of astonishment" (1989). The early films of the period 1894 to 1896 were generally a single shot lasting between 45 seconds and one minute and depicting some simple space or action without defined characters or a fully articulated narrative. Even as the movies became longer, joining together multiple shots to create a slightly more elaborated construct, the appeal of the medium was less in its ability to absorb the spectator in a story or involve them in character identification than in the phenomenon of motion, the most basic appeal of the form. As Gunning (1989) states in a discussion of the Lumieres' *Train Arriving at La Ciotat Station* (1895),

> The aesthetic of attraction addresses the audience directly, sometimes, as in these early train films, exaggerating this confrontation in an experience of assault. Rather than being an involvement with narrative action or empathy with character psychology, the cinema of attractions solicits a highly conscious awareness of the film image engaging the viewer's curiosity. The spectator does not get lost in a fictional world and its drama, but remains aware of the act of looking, the excitement of curiosity and its fulfillment. (p. 869)

The same can be said for the early video game in which it is the phenomenon of control rather than the simple observation of motion that serves as the primary attraction, and so the control of the paddles that propelled the electronic pulse forward in *Pong* and *Breakout* was enough to keep the player interested. In terms of analogous relation to the real world, *Pong* is the crudest imaginable representation of a table tennis game, however giving the spectator/player the power to determine the visual content of the screen is the fundamental point of interest. Gunning (1989) maintains that in terms of "attraction" the illusion of actuality is entirely secondary,

> Rather than mistaking the image for reality, the spectator is astonished by its transformation through the new illusion of projected motion. Far from credulity, it is the incredible nature of the illusion itself that renders the viewer speechless.

> What is displayed before the audience is less the impending speed of the train than the force of the cinematic apparatus … [t]he astonishment derives from a magical metamorphosis rather than a seamless reproduction of reality. (p. 866)

Likewise, the gaming apparatus "magically" enabled spectators to control and interact with images on a screen, thereby taking projected motion to another, fantastic level.

From a commercialization standpoint (Rogers, 2003), the original display devices of both forms, the kinetoscope for cinema and the arcade game for video games, were identical -- a standup console into which the spectator put a coin, standing over it peering at the images moving on the facing screen. While there is undoubtedly a way in which this physical arrangement results in a direct address with technology, a confrontation of sorts between human and machine, between experience and representation, a gazing into a future that is just arriving, it is perhaps the location of these machines that is most interesting for the parallel study of the two forms. Amusement arcades were among the earliest sites for both movies and video games with each serving as just one attraction out of many in these monuments to modernism. Though the Parisian shopping arcades of the 19th Century about which Walter Benjamin (1999) wrote in his "Arcades Project" were perhaps more like contemporary malls, his description of them as a crucible for the formation of modern identities is resonant with the amusement arcades that housed both the early cinema and video game. He refers to the arcades with their maze-like corridors offering every conceivable object, service, and entertainment as a "primordial landscape of consumption" (Benjamin, 1999, p. 827) while also referencing Theodor Adorno's idea that they at the same time reflect the "anticipation and imaginative expression of a new world" (Benjamin, 1999, p 637). In this way both films and video games function as commodities that produce a new form of cultural engagement, one predicated on choice, mobility, and imagination that transforms the relationship between artwork and spectator from

one in which the locus of power is in the uniqueness of the work and the expertise of the elite critic to the enjoyment and appreciation of the masses (see also Benjamin, 1936).

In the earliest video games as in so many of the films of the cinema's first decade, there is a conspicuous lack of concern for the traditional manipulation of form that characterizes artistic production across media, and Gunning (1989) states that, "the aesthetic of attractions developed in fairly conscious opposition to an orthodox identification of viewing pleasure with the contemplation of beauty" (p. 871). While many of the earliest Lumiere films undoubtedly reveal the trained eye of an artist, they are fairly unique in this regard, and it is only later in the development of the form that conventional ideas of verisimilitude and aesthetic appeal become important. As a result, the initial amazement over film and video game technologies started to wear off, and it took entrepreneurial and creative visionaries to sustain interest and elevate both forms to new heights of sophistication. Thus, a consideration of Rogers' (2003) five attributes of innovations that relate to rate of adoption necessarily comes into play: Relative advantage (over previous and alternative innovations), compatibility (with user needs, beliefs, and previous experiences), perceived complexity (a negative predictor of adoption), trialability (whether the innovation may be experienced on a limited, low commitment basis), and observability (how the innovation's use by others may be observed). Observability may be a major reason for the early diffusion of film and video game technologies, since both appeared in the public space of arcades. And, trialability has been a contributing factor to adoption throughout the histories of both media, with early individual-view kinetoscope parlors anchoring the early commercialization of film, and quarter-a-play games providing easy access to early video games. The interfaces for both media have emphasized ease of use, thus assuring a low perceived

complexity. Additionally, a number of elaborations in the systems of film and games may be seen as attempts to enhance their relative advantage.

First, during their next phases of development, films and games shifted towards a more complex narrative and character-based construction rooted in increasingly realistic representations. This transformation was driven by the interplay of technological innovation, increasing spectator sophistication, and the economic competition that characterizes both industries. In the case of film, the commercialization and diffusion of individual viewing machines in Kinetescope parlors had novel but waning appeal that was eventually replaced by more profitable theatrical exhibition, which shifted the focus of the filmic experience from quick fixes to more drawn out and compelling forms of engagement akin to live theater. These necessitated the incorporation of more developed narrative structures, which director D.W. Griffith helped pioneer. Griffith perfected many cinematic techniques that facilitated the telling of increasingly compelling stories, from the simple chase and rescue narratives that had been popular between 1902 and 1908 to more complicated forms of engagement and expression (Bordwell & Thompson, 2001). Just as the novelty of the early chase film (as practiced by Ferdinand Zecca at Pathé) was waning, Griffith invented or adapted a host of cinematic innovations that proved both artistically and commercially revolutionary. David Cook details these innovations as triangulated action, continuity editing, the alternation of shots of different spatial lengths, flashbacks, accelerated montage, the dramatic use of camera angle and camera movement, and optical printing effects (Cook 2004), all of which contributed to the move towards the longer and more narratively elaborate films that soon bolstered production in Hollywood and around the world.

With video games, the industry crash of 1983 signaled that novelty would not be enough to sustain the interactive entertainment industry (Kent, 2001). At the time, major game companies such as Atari along with numerous third party developers flooded the market with inferior, cliché-ridden products that annoyed and eventually bored consumers to the point of seeking entertainment elsewhere. Yet near the end of this golden age a figure emerged that would revolutionize the medium of the video game and help it rise from the ashes in the late 1980s. The video game's great artistic visionary and answer to D.W. Griffith was Shigeru Miyamoto, a young designer at Nintendo who saved the company's fledgling U.S. business by introducing a new type of gaming experience at arcades that would soon after make its way into homes (Kent, 2001).

In line with the use of simple stories by early film pioneers, Miyamoto took a simple narrative and included it in his first game, *Donkey Kong*, to spectacular results. Before *Donkey Kong*, games had implied stories (e.g., "aliens are invading from space") but they did not offer the beginning/middle/end structure that typifies the classical model of cinema, with cause and effect relationships leading to a closure of plot (Bordwell & Thompson, 2001). *Donkey Kong* changed this by incorporating an archetypal story structure fittingly adopted from film, chiefly *King Kong*. As soon as players dropped a quarter into *Donkey Kong*, they were treated to a non-interactive scene of a giant gorilla holding a woman and carrying her to the top of a skyscraper. The story then introduced a heroic everyman named Mario (in his first game) as her rescuer. If the player was able to successfully climb to the top of the skyscraper as Mario and remove rivets from the structure, the gorilla would come crashing down to the earth, defeating the menace of Donkey Kong and reuniting Mario with his love Pauline. This was the classic rescue plot in explicit and interactive form, and it introduced several innovations into gaming that would be

repeated into the present day, e.g., drawing the player in through narrative sequences separate from actual gameplay. These are sometimes called “cinematic cutscenes,” reifying the link between film and cinema in containing this important device (Kohler, 2005). Although film and video games typically have much more sophisticated narratives today, as a result of years of advances (mostly from film), they still share many of the same popular genres and conventions, e.g., action, adventure, fantasy, horror, and science fiction.

These genres are also among the most profitable, and some mention should be given to the entrepreneurial visionaries of film and video games who expanded their respective mediums into full-fledged industries. In both cases, these figures were separate from artistic talent like Griffith and Miyamoto and instead relied on keen business senses along with questionable business practices. The Pathe’ brothers in France began industrialized film production at the turn of the 20th century largely by aggressively acquiring patents and consolidating a virtual monopoly in Europe, thereby solidifying their domination over the new industry (Cook, 2004). Likewise, Nolan Bushnell stole the ideas for Pong and home video games in the 1970s and made his company Atari into the dominant force of gaming’s golden age (Kent, 2001).

Stars were another innovation that helped the commercialization and diffusion of film and video games via enhancement of their relative advantage. Film producers discovered early on that audiences would flock to see movies featuring the same talented stars, such as Florence Lawrence, Mary Pickford, and Charlie Chaplin. Likewise, it did not take video game producers long to adopt this model. *Pac-Man* was perhaps the first game with a recognizable, popular character, and he, his family, friends, and enemies became the stars of numerous sequel and spin-off games. The same has been true for Mario, Sonic the Hedgehog, and other game characters,

who appeared in sequels after achieving initial successes. In this sense, video games have a "star system," aligning them with films in that regard, only with fictional/digital "performers" rather than real people.

The artistic developments highlighted above spurred the commercialization of film and video games, resulting to their diffusion and adoption, in line with the predictions of Rogers' (2003) innovation adoption model. The two mediums were taken even further by parallel technical developments.

A Complex Adoption Model

Both film and video gaming rely on the creation of software, which accumulates and diversifies over time. In this regard, both media industries might be seen as innovation bundles that diffuse at two levels—at the collective level (i.e., the spread of availability and use of film or of video gaming) and at the specific content level (i.e., the "adoption" of a particular film or a specific video game). Additionally, there is an individual-level hardware component for each that has emerged in the "home version" stage—e.g., VCRs and DVD players for film, home gaming consoles for video games. This section examines parallels in the movement of film and video games into homes, for both the hardware and software components.

The ultimate adoption of a specific software unit is a complex interaction of the characteristics of the medium, the available hardwares for dissemination of software, the particular software content, the social environment of the time, and the predilections of the adopters. A full examination of this complex adoption process would necessarily go far beyond Tarde's early notion of innovation adoption as simple "imitation" (Tarde, 1903), or even Rogers' multistep but linear model of the innovation-decision process (2003, p. 170).

Layered on to this complex model is the possibility of various "bridge" innovations that have prepared potential adopters for each media innovation (Author, 2002). In the case of film, centuries of experience with Magic Lantern shows developed an expectation for spectacle and group interaction while viewing. For video gaming, a number of established media and other devices paved the way for adopter comfort—film itself offered a syntax of moving imagery and methods for narrative structure via its use. Other bridges included board games, indoor sports such as bowling, and of course, pinball and other mechanical precursors that established a norm of safe, controlled competition via feats of physical dexterity.

Necessarily, both film and video gaming were preceded by functionally equivalent mechanical devices such as the Zoetrope and the Phenakistoscope for film. For gaming, mechanical forebears may be found in penny arcade attractions such as the early bagatelle, skee-ball, shooting galleries, mechanical driving games such as the *Myers Double Road Test* competition game, fortune telling machines, and prize-filled crane boxes. In all cases, these mechanical devices presaged the full-blown, industrial-model medium, predicating its use on an appreciation of the inherent bases of its operation—notably, persistence of vision for film, and manual dexterity for gaming. Thus, the innovations to follow (i.e., film and video gaming) possessed an automatic degree of compatibility with past experiences that would facilitate their adoption (Rogers, 2003).

The Shift from Arcades to Homes

As arcades gradually declined in popularity as places for film and game diffusion, a major technological advance that affected both the distribution and exhibition segments of the movie and video game industries stemmed from the foresight and achievement of a mid-20th

century innovator, Ralph Baer, and later from engineers at Ampex (Rosenbloom & Cusumano, 1987). With televisions penetrating the home market at an incredible rate in the 1950s, Baer and visionaries at Ampex believed that the television might serve other functions besides receiving over-the-air broadcasts. These pioneers realized that the television could be utilized more fully by hooking devices through the television set receiver, which opened the door for the video cassette recorder and video game systems of the 1970s (Rosenbloom & Cusumano, 1987). Once again, the film industry and the video game industry would follow similar paths, this time in turning out software for the home. This parallel development of software in both industries would occur within the same decade, but with video games actually taking that first successful step into the home market before film.

In 1951, Ralph Baer, an early television and electronics engineer, envisioned making better use of television sets, which were only used for their broadcast-receiving capabilities. Baer contemplated the possibility that some sort of game could utilize this connection to the receiver and thus be played on the television set. By 1972, Baer's vision and work paid off for Magnavox, the company for whom he was working, with the release of The Odyssey game console. Although its success was eclipsed by the success of the Atari 2600 game system later in the decade, it remains the first home video game system, and more importantly, the beginning of the diffusion of video technology into homes (Kent, 2001).

For movies, the home video diffusion process began with the introduction of a core piece of hardware in the 1950s as well. Rosenbloom and Cusumano (1987) state that the history of the commercial video cassette recorder actually starts with a video tape recorder (VTR) that was developed in the 1950s by a California company named Ampex. The people at Ampex

envisioned just what Ralph Baer had imagined, but now for video playback and recording. Attempts as early as 1965 to diffuse VTR technology failed, however. It was not until the late 1970s that major Japanese firms successfully introduced two new formats of video cassette recorders (VCR) into the American marketplace—Betamax (Beta) and VHS—that actually did diffuse to the public (Rosenbloom & Cusumano, 1987). The movie industry was forever changed in terms of exhibition, with the ultimate first-round victor the VHS format.. A similar parallel has historically existed in gaming, where multiple competitors typically battle for market share at the hardware and software levels initially, leaving a few dominant players until new generations of game technology emerge.

Video rental stores are another interesting parallel between games and film that has helped facilitate diffusion and adoption. According to the Entertainment Merchant Association (2008b), as early as December 1977, video rental stores began popping up. By the late 1980s and early 1990s, the video rental business was firmly in place. If a consumer merely waited four to six months, the latest movie from the local theater could be rented at the local video store and watched in the convenience of the home, with subsequent windows (including pay-per-view and purchase) for software adoption available afterward. New avenues of distribution and exhibition were opened wide for Hollywood and the movie industry, and consumers now had the ability to rent or buy nearly any movie at any one of numerous video stores and bring it into the comfortable confines of their home. This trend has persisted past the initial success of VHS into DVD and the high-definition home video formats of today, and video remains the prime money maker for the film industry (Entertainment Merchant Association, 2008a).

Though interactive moving image technology for the home had been envisioned for home usage as early as 1951, and had already diffused into the home in 1972 with *The Odyssey*, a huge boom in business for video games occurred outside of the home with coin-op games such as *Space Invaders*, *Pac-Man*, *Donkey Kong* and others being introduced to arcades and other public venues in the late 1970s and early 1980s. This "Golden Age" of video games was not only confined to public spaces however, as several different companies brought video games into the home, but this time with games that required software, usually in the form of game cartridges. So, just as the film industry saw a chance to capitalize upon a new distribution and exhibition channel geared towards producing software for the home with both Beta and VHS, video game manufacturers did the same, with Atari leading the way (Kent, 2001).

Another similarity between the film and game industries is the opening up of the consumer market for independent producers of movies and games. Independent companies from each industry now had an outlet for their software that had not been readily available to them prior to the late 1970s and early 1980s. Small video companies such as Vestron Video could now release to video its own film productions or movies it had purchased from other production companies and sell them to rental stores or retail chains (The Internet Movie Database, 2008). Concurrently, on the video game front, some Atari engineers left Atari to form their own game software companies. Activision, to produce their own games for the Atari 2600 and other consoles, becoming the first independent video game publisher in the process (Kent, 2001).

Although the video game business crashed in 1983, the release of the Nintendo Entertainment System (NES) in 1985, along with the games that were individually released for it, revolutionized the industry (Entertainment Merchant Association, 2008b), and offered a new

product for rental video stores to place on their shelves. So, the video game industry again follows the lead of the film industry, finding their software now offered side by side for rent to the average consumer. Fittingly, home video and video games have shared space in video stores ever since. And even though the traditional rental industry appears to be on the brink of extinction, film and video game distribution share many parallels in the Internet age, including concern over piracy, streaming content, and Web-based rental services such as *Netflix* for movies and *Gamefly* for games.

Aesthetic Commonalities between Film and Games

Both film and video gaming have developed aesthetically along similar lines that may be seen as video games' reliance on perceived compatibility (Rogers, 2003) with film's expected norms, established over a century of audience familiarity with the characteristics of film production and modes of representation on film.

In the Prologue to his seminal work *The Language of New Media,* Manovich (2001) draws an intimate, and in many ways determinative, connection between the cinema and the computer: "A hundred years after cinema's birth, cinematic ways of seeing the world, of structuring time, of narrating a story, of linking one experience to the next, have become the basic means by which computer users access and interact with all cultural data" (p. xv). This fundamental property of the computer extends to one of its most economically and socially significant forms, the video game, pointing to an immediate and significant linkage between the motion picture and the computer based entertainment.

In looking at the relationship between the experimental cinema of Dziga Vertov's *Man With a Movie Camera* and the emergence of digital culture, Manovich observes that, "One

general effect of the digital revolution is that avant-garde aesthetic strategies came to be embedded in the commands and interface metaphors of computer software. In short, the avant-garde became materialized in a computer" (p. xxxi). It is not a far leap to extend Manovich's connection to the architecture of the video game in terms of its constant search for and adoption of new ways of engaging visual space and narrative time. The visual spaces of both early cinema and the first games were flat with a remarkable similarity between the tar-paper black backgrounds of Edison's Black Maria studios that were thought to most clearly show the action being photographed and the plain, dark backgrounds of *Pong* and *Breakout*. In the video game the reason for such backgrounds had to do with the technological limitations of the computer and graphic display and as a result the dark space phase of gaming lasted longer than in the cinema. Regardless, in both mediums the backgrounds worked to place the movement of the subject at the center of the representation, the fundamental attraction, even if that subject is a small dot of moving light careening across the screen. In both forms the visual spaces did not remain so unadorned for very long, and a remarkable degree of experimentation was fairly common from the vividly imagined mise-en-scene of Georges Melies and the experiments of Britain's Brighton School in cinema to the brightly colored, multi-textured worlds of *Super Mario Bros.* and *Sonic the Hedgehog* in the video game.

The aesthetic development of the cinema and the video game have also followed remarkably parallel lines with significant implications for both forms in terms of the creation of a heightened evocation of presence, an enhanced immersive power, and an increased spatial and visual complexity. In the early video games the virtual "camera" that controls the point of view of the action was static. *Pong, Space Invaders, Asteroids,* and *Pac-Man* all relied on a fixed perspective, a screen on which the objects moved whether manipulated by the player or by the

software but the boundaries of the frame, the space of the image did not. This quality echoes the early cinema of Edison and Lumiere with its immobile cameras that opened a vista onto a world that certainly revealed and reveled in its dynamism, from oncoming locomotives and crashing ocean waves to twirling fan dancers but was not itself similarly dynamic. Initially audiences were enthralled enough with this dimension of motion but very quickly in both game design and motion picture production, a different type of movement became important, that of the camera and so of space itself. The connection to issues of point of view are of central significance here, as the earliest moving camera films were filmed from either a boat or a train replicating the sensation for the viewer of actually being transported along the Chillicothe Pass or out of Jerusalem. To move the camera is in a perceptual sense literally to move the spectator, and the enthusiastic response to such films led to the development of such viscerally focused cinema-based attractions as *Hale's Tours* in and more contemporary manifestations like *Star Tours*.

Similarly, in the first games featuring a moving perspective, the movement of the virtual camera is controlled by the viewer both in order to maintain the necessary interactivity and also to create the first-person point of view that has been an immersive feature of the motion picture for over a century and continues to serve the same function in contemporary games, operating in fact as a defining convention of one of the most consistently popular genres of games, the "first-person shooter." The movements of the early "mobile camera" games like those of the early cinema were rather crude and could be disorienting, but the power to involve the spectator in the image was great, and soon motion in both forms would become more complex. The side-scrolling motion of *Super Mario Bros.* resulted in a different form of engagement that was not dependent on point of view identification but rather on the pleasure of controlling both the iconic figure on screen and the space that he moved within. Side-scrolling as much as first person

created a kind of video-game specific "suture" defined in cinematic terms by Dayan (1974) as the product of shot-reverse shot which creates the illusion of 360-degrees of cinematic space and positions the spectator vis-a-vis the representation. Working with ideas first postulated by Oudart (1969) in *La Suture, I and II*, Dayan observes that the shot-reverse shot system "orders the experience of the viewer" and through it, "his imaginary is sealed into the film" (p. 129). While many of the psychoanalytic underpinnings of the Oudart/Dayan model have been called into question, the idea that there are systematic codes through which the cinema or any moving image creates a sense of engagement and immersion is sound though these codes differ significantly between moving image forms. In the side-scrolling game model the "other space" postulated by Oudart and Dayan is occupied by the player whose presence in the game space is enacted through the control of the Mario character, and so is as real and tangible as the revelation of the opposite field in the traditional cinematic reverse shot. Here, the player *is* the reverse shot, as integral to the diegesis of the game as the represented icons on the screen in the construction of the mise-en-scene.

Parallel Consequences, Parallel Implications

We may also examine film and video gaming from the perspective of the end of the innovation adoption process--innovation consequences (Rogers, 2003). The plethora of intended and unintended consequences of film viewing and gaming, both positive and negative, points toward their complexity, deep social roots, and robustness across time and place. For film, unintended consequences include criminal imitation (Pennell & Brown, 1999) and learning (Singhal & Rogers, 1999); for video gaming, they range from violence (e.g., Author, 2004) to the acquiring of problem solving skills (Gee, 2003).

While it is clear that both film and video gaming are notably appropriate to examine through the lens of Rogers' diffusion of innovation perspective, it is equally clear that both are cases of complex networks of innovations, units and levels of adoption, and maturation and change over time, raising particular challenges for scholarly examination. A comprehensive examination of these two media forms may not be possible here, but the many similarities uncovered in this brief work point to the value of further dual examination. First, the findings of this paper streamline the histories of these two media forms into a unified model that treats them not as separate but as different chapters in the same history, i.e., the history of moving image media. Second, they point to the fact that similar lessons may be learned from the history of film and video games, which can affect their future development.

And finally, this work suggests that despite a few obvious differences (e.g., the interactivity of video games), film and video games are striking similar in many if not most ways, suggesting that their rooting in the common language of the moving image is a deep and powerful one. Essentially, motion pictures and video games are parallel forms of media that entertain audiences by allowing them to experience myths and archetypes (DeMaria, 2007). The structures of the two media may be different, with film typically offering more of a linear experience of time instead of the interactive exploration of space afforded by games (Newman, 2004). But these are merely different articulations of the same narratives with the power to delight, enlighten and transform audiences. And the distance between the two media forms seems to be narrowing over time. The experience of film has become markedly more interactive during the age of the video game as evidenced, for example, by the chapter stops and special features on DVDs that users freely manipulate via remote control. Future work should continue

to uncover commonalities between film and video games with the goal of creating a single, unified theory for understanding these and similar forms of moving image media.

References

Author (2002)

Author (2004)

Author (2006)

Author (2008)

Benjamin, W. (1999) *The Arcades Project* (H. Eiland and K. McLaughlin, trans.). Cambridge, MA: Belknap Press.

Benjamin, W. (1968) 'The Work of Art in the Age of Mechanical Reproduction', from *Illuminations.* New York: Harcourt, Brace, Jovanovich

Blake, B. F., R. Perloff, R. Zenhausern and R. Heslin (1973) 'The effect of intolerance of ambiguity upon product perceptions', *Journal of Applied Psychology* 58: 239-243.

Bordwell, D. and K. Thompson (2001) *Film Art: An Introduction.* New York: McGraw-Hill.

Brand, S. (1972, December 7) 'Spacewar: Fantastic Life and Symbolic Death among the Computer Bums', *Rolling Stone*, URL (consulted May 2008): http://www.wheels.org/spacewar/stone/rolling_stone.html

Cook, D. A. (2004) *A History of Narrative Film* (4th ed.). New York: W. W. Norton & Company.

Dayan, D. (1974) The Tutor-Code of Classical Cinema. *Film Quarterly* 28(1): 22-31.

DeMaria, R. (2007) *Reset: Changing the Way We Look at Video Games.* San Francisco: BK Inc.

Entertainment Merchant Association (2008a) *Facts About the Video and Video Game Industries* (n.d.), URL (consulted April 2008): http://www.entmerch.org/quick_facts.html

Entertainment Merchant Association (2008b) *A History of Home Video and Video Game Retailing* (n.d.), URL (consulted April 2008): http://www.entmerch.org/industry_history.html

Gee, J. P. (2003) *What Video Games Have to Teach Us about Learning and Literacy*. New York: Palgrave Macmillan. .

Gunning, T. (1989) 'The Aesthetic of Astonishment', *Art and Text* 34: 31–45.

Gunning, T. (1990) 'The Cinema of Attractions: Early Film, its Spectator, and the Avant Garde', in T. Elsaesser and A. Barker (eds.) *Early Cinema: Space, Frame, Narrative*, pp. 56-62. London: BFI Pub.

The Internet Movie Database (2008) *Vestron Video [us]* (n.d.), URL (consulted April 2008): http://www.imdb.com/company/co0030983/

Kent, S. L. (2001) *The Ultimate History of Video Games.* New York: Three Rivers Press.

Kohler, C. (2005) *Power-up: How Japanese Video Games Gave the World an Extra Life.* Indianapolis: Brady Games.

Lombard, M. and T. Ditton (1997) 'At the Heart of it All: The Concept of Presence', *Journal of Computer Mediated Communication* 3(2), URL (consulted Oct. 2005): http://www.ascusc.org/jcmc/vol3/issue2/lombard.html

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

Musser, C. (2005) 'A Cornucopia of Images: Comparison and Judgment Across Theater, Film, and Visual Arts during the Late Nineteenth Century', in N. M. Mathews with C. Musser *Moving Pictures: American Art and Early Film 1880-1910.* Manchester, VT: Hudson Hills Press.

Muybridge, E. (1955) *The Human Figure in Motion*. New York: Dover Publications.

Muybridge, E. (1979) *Animal Locomotion*. New York: Dover Publications.

Newman, J. (2004) *Videogames.* Mahwah, NJ: Routledge.

Oudart, J.-P. (1978) [1969] 'Cinema and Suture' (K. Hanet, trans.), *Screen* 18: 35-47.

Pennell, A. and K. Brown (1999) 'Film Violence and Young Offenders', *Aggression and Violent Behavior* 4(1): 13–28.

Rogers, E. M. (2003) *Diffusion of Innovations* (5th ed.). New York: Free Press.

Rogers, E. M. and J. K. Larsen (1984) *Silicon Valley Fever: Growth of High-Technology Culture*. New York: Basic Books, Inc., Publishers.

Rosenbloom, R. S. and M. A. Cusumano (1987) 'Technological Pioneering and Competitive Advantage: The Birth of the VCR Industry', *California Management Review* 29(4): 51-76.

Sherry, J., K. Lucas, B. Greenberg, and K. Lachlan (2006) 'Video Game Uses and Gratifications as Predictors of Use and Preference', In P. Vorderer and J. Bryant (eds.) *Playing Video*

Games: Motives, Responses, and Consequences, pp. 213-224. Mahwah, NJ: Lawrence Erlbaum Associates.

Singhal, A. and E. M. Rogers (1999) *Entertainment-Education: A Communication Strategy for Social Change*. Mahwah, NJ: Lawrence Erlbaum Associates.

Tarde, G. (1903/1969) *The Laws of Imitation* (E. C. Parsons, trans.). New York: Holt.

Williams, D. (2002) 'A Structural Analysis of Market Competition in the U.S. Home Video Game Industry', *International Journal on Media Management* 4(1): 41-54.