

THE VIDEO GAME EXPLOSION

A History from PONG to PlayStation® and Beyond

Edited by Mark J.P. Wolf



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- 1976 General Instruments's AY-3-8500 chip is released, which had all the circuitry necessary for a video game on a single chip. The Fairchild/Zircon Channel F, the first cartridge-based home game system, is released. Atari's *Night Driver* is the first game to simulate a first-person perspective, though it did not have true 3-D graphics. Atari's *Breakout* is released.
- 1977 The home video game industry suffers its first crash, and many companies quit the industry. Atari's VCS home console system (later renamed the 2600) is released. In Japan, Nintendo releases its first home video game, Color TV Game 6. Kee Games's arcade game *Super Bug* introduces 4-directional scrolling.
- 1978 Taito's *Space Invaders* appears and becomes the inspiration for many vertical shooting games to follow. Atari's arcade game *Football* introduces 2-directional scrolling.
- 1979 Vectorbeam releases *Warrior*, the first one-on-one fighting game. Atari's *Asteroids* and *Lunar Lander*, both vector graphics games, are released. Namco's *Galaxian* is the first game to have 100 percent of its graphics in RGB color (a standard used for color video using red, green, and blue signals). Namco's *Puck-Man* (later renamed *Pac-Man*) is released in Japan.
- 1980 *Pac-Man* is released in North America, and other influential games *Battlezone*, *Defender* also appear. Atari's *Battlezone* is the first arcade game to feature a true 3-D environment. *Ultima* becomes the first home computer game with 4-directional scrolling. *Star Fire* is the first cockpit game, and the first arcade game to feature a high-score table using players' initials.
- 1981 Nintendo's *Donkey Kong* and Atari's *Tempest* are released. The United States arcade game industry reaches \$5 billion.
- 1982 Gottlieb's *Q*bert* is released. Sega's arcade game *Zaxxon* becomes the first arcade game to be advertised on television. Late in the year, arcade game income drops, and it appears that another video game industry crash is coming, one that is larger than the 1977 crash.
- 1983 The video game industry crash affects the home video game industry. Nintendo's Famicom system is released in Japan. Atari's *I, Robot* is the first raster video game with filled-polygon three-dimensional graphics. Atari's vector game *Star Wars* is released.
- 1984 The video game industry crash continues. Nintendo releases the Famicom system in Japan. RDI releases the Halcyon, a laserdisc-based home video game system.
- 1985 Nintendo releases a new version of its Famicom, renamed the Nintendo Entertainment System (NES), in America. Its popularity helps to bring an end to the industry crash. Nintendo also releases *Super Mario Bros.*, which becomes one of the best-selling games of all time. Alex Pajitnov designs *Tetris*.

- 1986 *The Legend of Zelda* appears (for the Nintendo Famicom), the first in a long series of Zelda games. Taito's *Arkanoid* and *Bubble Bobble* appear in arcades. Sega releases the Sega Master System (SMS).
- 1987 Cyan's *The Manhole* becomes the first computer game to be released on CD-ROM. Yokai Douchuuki, the first 16-bit arcade game, is released in Japan. LucasArts's *Maniac Mansion* is the first adventure game with a point-and-click interface. Incentive Software releases *Driller*, a home computer game with breakthrough 3-D graphics. Taito's arcade game *Double Dragon* is released.
- 1988 Namco's *Assault* is released. Williams's *NARC* is the first game to use a 32-bit processor. Nintendo releases *Super Mario Bros. 2*.
- 1989 Atari releases the arcade games *Hard Drivin'* and *S.T.U.N. Runner*. Gottlieb's *Exterminator* is the first game to use all digitized imagery for its backgrounds. Two handheld video game consoles are released: Nintendo's Game Boy and Atari's Lynx. The Sega Genesis home console system appears.
- 1990 Maxis releases Will Wright's *SimCity*, the first in a long line of Sim games. Nintendo releases *Super Mario Bros. 3*. Sega Game Gear is released in Japan. Squaresoft's *Final Fantasy* series is introduced to North America.
- 1991 Nintendo releases the Super Nintendo Entertainment System (SNES) in North America. Capcom releases *Street Fighter II*. Sega releases the home video game *Sonic the Hedgehog*, the main character of which would go on to become Sega's mascot. Philips Electronics releases the CD-i (compact disc interactive) system which uses compact discs.
- 1992 Midway releases the arcade game *Mortal Kombat*. Virgin Games's *The 7th Guest* is released and becomes the best-selling home computer game. Sega releases *Virtua Racing*, a 3-D racing game. id Software releases *Wolfenstein 3D*, a 3-D home computer game. Virtuality releases *Dactyl Nightmare*, an arcade game with a VR (virtual reality) headset and gun interface.
- 1993 Cyan's *Myst* is released and becomes the best-selling home computer game of all time, a title it will hold until 2002. id Software releases *Doom*. The World Wide Web goes worldwide. Sega releases *Virtua Fighter*, a 3-D fighting game. New home systems include the Pioneer LaserActive CLD-A100 and the Atari Jaguar.
- 1994 Nintendo releases the home game *Donkey Kong Country*. The Sega Saturn and the Sony PlayStation are released in Japan. Ernest Adams forms the Computer Game Developers Association. Blizzard releases the real-time strategy game *Warcraft*. Sega releases the arcade game *Daytona USA*, a racing game with texture-mapping. SNK's Neo•Geo home console system appears.

- 1995 The Sony PlayStation and Sega Saturn make their North American debut. Nintendo releases *Donkey Kong Country 2: Diddy's Kong Quest*. Blizzard releases *Warcraft II*.
- 1996 The Nintendo 64 appears in Japan and North America. Nintendo also releases the Virtual Boy, a portable game system with a separate screen for each eye which when combined creates a three-dimensional image. Digipen Institute of Technology becomes the first school to offer college degrees in video game development.
- 1997 The Nintendo 64 is released in Europe and Australia. DreamWorks, Sega, and Universal open the first GameWorks arcade in Seattle. Bandai's Tamagotchi appears. Cyan's *Riven*, the sequel to *Myst*, appears. Sega releases *Top Skater*, an arcade game with a skateboard interface. Nintendo releases *Mario Kart 64*. The MMORPG *Ultima Online* begins.
- 1998 Konami releases *Dance Dance Revolution* and the first games in its *Beatmania* series and *GuitarFreaks* series. The Nintendo Game Boy Color appears. Sierra Studios releases *Half-Life*. SNK releases the Neo•Geo Pocket handheld video game system. Rockstar Games releases *Grand Theft Auto*.
- 1999 The Sega Dreamcast is released. The MMORPG *EverQuest* begins. Nintendo releases *Donkey Kong 64*. The Game Developers Conference holds the first Independent Games Festival. *Tony Hawk's Pro Skater* is released. The MMORPG *Asheron's Call* begins.
- 2000 Sony's PlayStation 2 appears. Nintendo sells its 100 millionth Game Boy console. Maxis's *The Sims* is released. The United States Post Office issues a stamp depicting video games.
- 2001 Microsoft's Xbox and the Nintendo GameCube appear. Midway Games leaves the arcade video game industry. Bungie Studios's *Halo: Combat Evolved* appears. Sega announces that it will no longer develop home video game consoles.
- 2002 *The Sims* overtakes *Myst*, and becomes the best-selling home computer game of all time. The MMORPG *Sims Online* begins. Sega releases *Rez* for the PlayStation 2. Microsoft's Xbox Live online gaming service begins.
- 2003 The MMORPG *Star Wars Galaxies* begins. Nintendo stops production of the NES and SNES. Atari's *Enter the Matrix* is released. Cell phone company Nokia releases the N-Gage handheld video game system.
- 2004 Sony releases the PlayStation Portable in Japan, and the PlayStation 2 in China. Nintendo releases the Nintendo DS (dual screen) handheld video game system. Bungie releases *Halo 2*.
- 2005 Sony releases the PlayStation Portable in North America. Nintendo releases the Game Boy Micro. Microsoft releases the Xbox 360. Tiger

Telematics releases the Gizmondo in England and North America. *The Sims* appears on postage stamps in France.

2006 The Nintendo Wii and Sony's PlayStation 3 are released. Microsoft releases the Xbox 360 in Australia.

2007 The MMORPG *World of Warcraft* is estimated to have more than 9 million players worldwide.

SOUND IN VIDEO GAMES

Eric Pidkamery

The origin of video game sound design can be traced to one of the most popular video games of all time, Atari's *PONG*. The game's signature sound effect, the "sonar ping" of the ball ricocheting off the paddles (created by Atari engineer Al Alcorn, from an amplified waveform from the game's own circuitry¹), was the first of its kind. Taito's *Space Invaders* went beyond sound effects and featured an actual soundtrack, a constant, marching background rhythm. Whether its soundtrack was technically music or not is debatable, but *Space Invaders* was the first widely played game with persistent sound that was also interactive (as the player destroyed the invaders, those remaining would move faster, and the soundtrack's tempo would increase). Namco's *Pac-Man* fused all the elements of sound design into a compelling whole. Sound designer Toshio Kai's soundtrack featured constant and varied effects, musical interludes at the start of every level, additional music during the between-level cut-scenes, and a distinctive musical flourish whenever Pac-Man died. In the early days of video games, the computer was still in its infancy; every improvement in hardware or software was a move into uncharted territory, with developers leapfrogging over each other's advances. Several arcade games experimented with digital speech [such as Stern's *Berzerk* and Williams's *Sinistar* (1982)], while Cinematronics's *Dragon's Lair* took advantage of the game's laserdisc format to provide digital audio along with full motion video, though the format's technical sophistication came at the expense of limited interactivity in its gameplay.² Synthesized speech and full-motion video may have seemed like mere novelties at the time, but their presence in the world of games contributed to the development of the medium as a whole.

Few early home games had continuous musical soundtracks, largely due to memory and sound output limitations. The first consoles and personal computers [such as the Magnavox Odyssey² (1978) and IBM's PC XT (1983)] had less than one megabyte of RAM and could play only one simple tone at a time, with no volume control. Games were programmed in assembly language, which meant that the sound designer needed advanced programming knowledge—the "sound designer" was usually just one of the programmers working on the game's code. The Atari VCS console (1977), also known as the 2600, had two audio channels, but the sound chip's pseudo-random counting procedure meant that

the different possible waveforms (square, sine, saw, etc.) were tuned differently; the same note played in two different waveforms could be off by as much as half a semitone.³ Later machines like the Colecovision (1982) and Commodore 64 (1982) had sound chips capable of three and four sounds at once, along with increased storage capacity, but space was always at a premium. The Atari VCS, for example, had 128 bytes of internal RAM, with a four kilobyte maximum capacity on its cartridges. Compared to the current home consoles (Sony's PlayStation 2, Nintendo's GameCube, and Microsoft's Xbox), with RAM in the 40–60 megabyte range, more than 64 sound channels, and disc storage capacity of several gigabytes, the computers of the late 1970s and early 1980s were extremely constrained in their sound capabilities.

Beyond purely technical limitations, the music and sound effects of early video games were also hindered by the nature of the games themselves. The first arcade games were designed to appeal to a public who knew nothing about video games or computers. As designer Richard Rouse III explained,

The thought was to get players to easily understand a game, so that by the end of their very first game they had a good sense of how the game worked and what was necessary for success. Second, the players' game, even the game of an expert, could not last very long, since any one player had only paid a quarter, and if the game only earned a single quarter in a half hour, it would not be profitable to operate.⁴

Players were impressed primarily by the technology. As video games grew in popularity, however, players began to expect a higher level of innovation from their gaming experiences. A game with the newest sound chip or the most realistic effects would not succeed over a less advanced game if the newer game lacked compelling gameplay. By the mid-1980s, home consoles and personal computers had brought video games out of the arcade and into the living room, and with this transition the emphasis of the games shifted. Rather than designing games primarily to catch a player's eye and ear, developers began to use sound to expand the scope of their games' narratives. Whereas arcade games were intended to be played repeatedly for an average of 2.5 minutes per quarter, home console and computer games could take hours, days, or months for the player to fully experience once.⁵ As the storytelling aspect of games became more integral to the player's experience, the musical accompaniment became more closely entwined with the story; the composers aspired to make music an essential part of the game, rather than something extra or unnecessary.⁶

Two home gaming platforms in particular were at the heart of game sound development in the 1980s: the Commodore 64 and the NES. The Commodore 64 computer contained a dedicated SID (sound interface device) chip, designed by engineer Robert Yannes. The SID chip could produce three channels of sound with four available waveforms and multiple filters.⁷ Compared with the other 8-bit consoles (such as the Atari 2600 and 5200, the Colecovision, and the Intellivision) and home computers (such as the Atari 800, Apple II and ZX Spectrum) available at the time, its sound capabilities were unmatched. Both the Commodore 64 and its successor, the Amiga (one of the first computers that utilized sampled sounds instead of standard waveforms), remain popular today as a platform for chiptune and demoscene composers. (Composers of chiptune and demoscene music practice the art of game music *in vitro*, with no particular commercial endeavor, writing instead to show off their skill and to pay tribute to the games of the past. Using programs that emulate the sound quality of old consoles and computers, they produce original works and covers that are at once both nostalgic and futuristic.)⁸

When the NES was first released in the United States in 1985, its five-channel sound system was unprecedented in home consoles, and its cartridges (up to 512 kilobytes in capacity, more if memory management chips were used) allowed more space to be devoted to sound. The success of the system's flagship game, *Super Mario Bros.*, ushered in a new era of video game sound, thanks in no small part to the game's composer, Koji Kondo. Kondo's innovative sound design, both laid-back and energized at the same time, was unique in the extent of its adaptation to the gameplay; it followed the player's movement through the game's environments (becoming low and percussive in an underground area or light and bubbly when underwater) and reflected changes in the player's status (increasing in tempo when the player's time was about to run out or playing a special melody while an invincibility power-up was in effect), making it a precursor to the adaptive soundtracks of later games such as LucasArts's *Star Wars: X-Wing* (1993) and Nintendo's *The Legend of Zelda: Ocarina of Time* (1998).⁹ Kondo, along with fellow composer Hirokazu "Hip" Tanaka [composer for Nintendo games *Metroid* (1987), *Dr. Mario* (1990), and *Earthbound* (1994)], provided the music for the earliest iterations of some of Nintendo's most popular franchises.¹⁰

With the arrival of *Super Mario Bros.* and games like it, the compositional complexity of video game music grew considerably, even if the sounds themselves were still relatively primitive. In 1986, Sega released the Master System, with sound capabilities comparable to the NES; however, it was not until the release of the Sega Genesis (1989), Super Nintendo (1991), and other 16-bit consoles that game sound design truly began to resemble what it is today. With six sound channels in the Genesis and eight in the SNES, game soundtracks had the potential to have twice the texture and depth of their predecessors. Waveform synthesis was replaced by FM (frequency modulated) and wavetable (sample) synthesis, both of which sounded more realistic and could be tweaked easily by a composer for volume and effects (such as vibrato, reverb, panning, and fade). With larger memory capacities (SNES cartridges had from 0.25 to 6 megabytes of space), games could be of much greater length; they became more cinematic in their presentation, and they began to have soundtracks that changed to reflect the mood of the story. A well-known example of this trend is Square's *Final Fantasy 3* (1994), whose composer, Nobuo Uematsu, was one of the first game sound designers to achieve international recognition for his work.¹¹ In *Final Fantasy 3*, each hero and villain in the game had his or her own musical leitmotif, which played whenever that character became the focus of the story. The musical accompaniment was a form of wordless narration, giving insight on the game's characters and events in a way that text alone could not.

At the same time as console game sound was evolving, home computer games were also undergoing a major transformation. Prior to the advent of compact discs in the mid-1990s, game sound designers pioneered the widespread use of the versatile MIDI format. MIDI (musical instrument digital interface), proposed as a protocol in 1981 by engineer David Smith, published as a standard in 1983, and standardized as "General MIDI" in 1991 by the MIDI Manufacturers Association, was inspired by electronic musicians' interest in linking together banks of synthesizers to simplify the logistics of live performances.¹² MIDI files were relatively high quality compared to consoles of the time (boasting a sound bank of 128 possible "instruments" playing in up to 16 separate channels) but still compact enough to meet the size restrictions of 3.5-inch floppy disks (1.44 megabytes apiece). The release of Roland's General MIDI-compliant sound card Sound Canvas in 1991 allowed game composers to embrace MIDI as a viable format.¹³ Since MIDI files only contained

instructions for what notes were to be played, rather than the actual synthesized instruments themselves, and their size was a fraction of what it would be in other formats, such as WAV or AIFF files. MIDI's strength was its universality, since the files could be read by any computer with MIDI capability, a feature which became ubiquitous in computers of the early 1990s and which has since remained so. This strength, however, has also proven to be a liability; since a MIDI file depends on the computer's sound card to perform the sound synthesis, the music quality of a MIDI soundtrack will vary from computer to computer according to the sound card installed, sometimes drastically so. According to Aaron Marks, "Internal instruments gradually became better as sound card manufacturers included high-grade synthesizer chips, but because this quality differed greatly between manufacturers, what sounded good on one card sounded like a train wreck on another."¹⁴ Despite this drawback, MIDI remains in use as a compositional format because of its versatility; a piece of music is often composed with a MIDI sequencer or keyboard, and then translated to a more sophisticated file format using a sample library.¹⁵

As data storage technology progressed beyond floppy disks, the technology of home computers and consoles began to merge. The CD-ROM format, first used in 1985, became the vehicle of choice for computer games of the mid-1990s.¹⁶ In the field of home consoles, the Sega CD (1992), Panasonic 3DO (1993), Atari Jaguar (1993), Sega Saturn (1995), and Sony PlayStation (1995) all stored their games on CD-ROMs, allowing them to utilize Red Book digital audio, the format of a standard music CD. (The Red Book format, first released in 1980 by Philips and Sony, has a sample rate of 44.1 kHz, compared to the SNES's 32 kHz, or the 28 kHz of the NES's pulse waves.) Both the PlayStation and Nintendo 64 (1996) could produce up to 24 sound channels. The Nintendo 64 was cartridge based, which meant less storage space (4–64 megabytes) compared to the PlayStation's CDs (650–700 megabytes). In 1998 Konami released the arcade game *Dance Dance Revolution*, notable for its incorporation of music and rhythm-based dancing into its gameplay mechanic. With the increased capacity of CDs and DVDs, it was perhaps inevitable that the next generation of consoles would all feature disc-based games. Sega's Dreamcast (1999), Sony's PlayStation 2 (2000), Nintendo's GameCube (2001), and Microsoft's Xbox (2001) were the new faces of gaming at the start of the twenty-first century, each with channel and sound bank capabilities many times greater than those of the 1980s consoles. In 2000, the National Academy of Arts and Sciences allowed video game soundtracks to compete for Grammy awards; as of 2007 no game has yet won an award. With the release of the next generation of consoles in 2005 and beyond, and the implementation in games of user-designated soundtracks [such as in EA's *The Sims 2* (2004) and Rockstar's *Grand Theft Auto: San Andreas*], the line between what is and what is not game music has been all but erased.

Music and Narrative—Adaptive Audio

Most games released today contain a mixture of diegetic and nondiegetic sound; the character of a game's sound can vary widely between the two extremes throughout the course of its narrative. This difference can be seen in comparing an earlier game like Williams's *Defender*, with its cacophony of laser blasts and explosions, and one like Square's *Chrono Trigger* (1995), which features a persistent soundtrack that abstractly reflects both the game's various locales throughout time and space and the emotional arc of the story. Almost all modern games have some degree of nondiegetic sound, just as most modern

films have some kind of musical score, though diegetic sound still plays a large role, both as short sound effects (gunfire, character voices) and as prolonged, ambient ones (wind in the trees, a roaring fire). In Valve's *Half-Life 2*, for example, diegetic sound makes up nearly the entire soundtrack, except for short musical cues when the player reaches a new area. The designers chose to forego the traditional use of cut-scenes, instead telling the story in-game through character dialogue and events that unfold with no significant pause in the action. The game's sound design reflects this choice, heightening the immersion with ambient sound that matches the game's dystopian battlefields.

The process of sound design for a video game can vary greatly from game to game, depending on what kind of game is being made, but it typically follows the course of game design process as a whole. A composer or sound design team is hired or assigned, based on the needs of the game and the resources available. As the cost of making games has grown in size, the budgets for game sound design have also increased proportionately, with some games incorporating soundtracks performed by classical ensembles and popular recording artists. However, the majority of game sound design is still done by small in-house teams or by freelance composers, and most games' music features synthesized instruments rather than real ones, for reasons of storage space and budget. After meeting with the rest of the design team, which can include artists, programmers and writers, the sound designer learns what is expected for the game and begins composing. Depending on the game's complexity, the sound design required can be no more than a handful of sound effects, or it can be several hours of fully orchestrated soundtrack. There may be a team of foley artists, composers, voice actors, and musicians, or one designer may perform all these roles himself. Whatever the scope of his work, the sound designer attempts to match the vision of the programmers while adhering to strict deadlines and hardware constraints. Throughout the process, the sound designer remains in constant contact with the rest of the design team to stay apprised of any changes. As in film scoring, video game sound designers are often tasked with doing a great deal of work near the end of a project's timeline, after most or all of the game's visuals have been finalized; last-minute alterations to the game can necessitate the reworking or rewriting of its soundtrack. No single aspect of a game can necessarily ensure its success, but high-quality sound design is fast becoming essential for any video game that hopes to do well, regardless of genre, system, or audience.¹⁷

Though film and game music share certain similarities, there is still a vital difference between them: interactivity. Films are viewed passively, and thus their scores must be passive. Video games are played interactively, and thus have the potential for interactive music. A game's story cannot progress without the player's input, and for that reason a game's music is inevitably tied to the player's actions. Game music must match the style of play: if a game allows a player a great deal of freedom to act and explore, the game's music must be able to keep pace with whatever use of that freedom the player makes. Fully interactive music (or adaptive music) has long been the goal of many designers in the games industry, and while some games have achieved various levels of success, the question of how to respond to and even anticipate a player's actions still remains. As author Alexander Brandon explains,

Interactive music is audio that happens when a user does pretty much anything with any kind of device, whether it be to click a mouse or hit a key. Adaptive music refers to something that happens...when the user influences the audio, and the audio influences the user.¹⁸

The issue becomes increasingly complicated in light of the open-ended format of more recent games, sometimes referred to as sandbox games (the term "sandbox" is used to mean a playing environment that encourages experimentation and creativity, sometimes to the exclusion of any set narrative). The somewhat rigid nature of Red Book audio (i.e., the tempo and pitch cannot be modulated, only one track can be played at a time, etc.) makes its use in adaptive music problematic. Simpler, more modular sound file formats, such as MIDI, are better suited to the task, a fact capitalized on by LucasArts in the 1990s with their development of the iMUSE system, which permitted smooth transitions between pieces of looped music in several of their games.¹⁹ Microsoft's DirectMusic interface (introduced in 1999 and still widely used today) allows composers to pair MIDI with more advanced sound formats.

Most games feature some level of adaptation in their music; often, it is no more complicated than changing melodies whenever the player reaches a new level or location, or when the player's status in the game changes. Even the "game over" music that accompanies player death or defeat in any given game can be said to be adaptive, since it is the player's action or inaction that causes it. The style of game often dictates how much adaptivity a game's soundtrack can employ. Role-playing games, for example, focus more closely on character development than any other genre; they have the most potential for an extensive story and, therefore, an extensive soundtrack. However, since RPGs are the most narrative-dependent genre of games, their interactivity potential is thereby limited; most of them do not allow significant deviation from the preprogrammed storyline and the music that accompanies it. Thus, though the soundtrack of an RPG can be beautifully written (and often is); at its heart it is most like film music. First-person shooters have a high potential for adaptive music, since the player's environment has a high interaction potential; enemies appear suddenly, passageways open and close, and the player is constantly updating his playing style, moving slowly through the shadows when avoiding enemies, and then charging out with guns blazing to take them by surprise. A truly adaptive soundtrack would tailor itself closely to the player's style while still providing atmosphere and audio cues; for example, the appearance of an enemy would cause an "enemy theme" to play for both a cautious player and an aggressive player, but the cautious player would hear the theme played in a different style than the aggressive player—in a minor key, for example, as opposed to a major one, or with slurred notes rather than sharply articulated ones.²⁰ As games become more complicated and allow for even greater levels of player freedom, game music will have to adapt to an ever-increasing number of scenarios and narrative moods. Most video games are still primarily combat-oriented, but as game technology begins to allow for player interaction that goes deeper than pure antagonism, the need for effectively nuanced game sound design is greater than ever. As video games continue to evolve in scope and detail, their music must necessarily evolve with them.

The importance of music in games has become increasingly apparent since its inception in 1972, both to game players and game developers. Game sound design has progressed to the point where the music is no longer considered secondary to graphics or gameplay, but rather part of a dynamic whole that succeeds or fails as a single unit. The works of celebrated sound designers and composers have been elevated in status to the point where today gamers and non-gamers alike listen to game music entirely separated from the games that contained them, on soundtrack CDs and at live performances in concert halls.²¹ In 2005, companies EA and Square-Enix began offering music from their games through the online music service iTunes. Video game music ringtones for cell phones have

also grown in popularity (on May 6, 2006, the ringtone "Super Mario Bros. Theme" was No. 2 on *Billboard's* "Top 10 Ringtones" after 80 weeks on the list.).²² The May 19, 2005, *Business Week Online* article, "From Beeps to *Billboard*" puts the phenomenon into perspective:

The soundtrack for *Halo 2*, a game in which a genetically enhanced supersoldier battles evil, has sold more than 90,000 copies since its release last November. Peaking at No. 162, it marked game music's first entry into the *Billboard* 200 chart. (A typical movie soundtrack, on the other hand, sells only 10,000 copies and never comes even close to the chart.).²³

Game sound has grown from the looped beeps of its beginnings to fully realized digital audio that rivals the output of the traditional music industry in fidelity and originality—well on its way to being recognized as a true genre of music in its own right.

VIDEO GAMES AND THEIR RELATIONSHIP WITH OTHER MEDIA

Martin Picard

In the 1990s, LucasArts, the game division of the powerful empire set up by director George Lucas, created some of the most narrative and cinematographic video games ever seen with *The Secret of Monkey Island* (1992), *Sam and Max Hit the Road* (1993), *Full Throttle* (1996), and *Grim Fandango* (1998). Conversely, video game industry leaders have gained enough power to control the production of the film adaptations of their games; for example, Microsoft sold the rights for the adaptation of the video game *Halo* (2001) to Hollywood studios by their own terms.

Even filmmakers are starting to share creative interest in both media, such as Steven Spielberg who has always admitted to being a video game enthusiast. In 1995 he founded DreamWorks Interactive, a division dedicated in producing video games, including *Medal of Honor* in 1999, based on an original concept by Spielberg himself. In 2005, Spielberg signed a partnership contract with EA to personally design three new video games.¹

These examples demonstrate the indisputable bond which has developed between video games and other media, especially cinema and, to a lesser extent, television. The associations between these media have been unfolding in many ways, as we will see. First, the audiovisual likeness and the economic rivalries between video games and films (or television) are the most obvious ones. From an economic point of view, the video game industry maintains a partnership with these media as well.

Since video games have become a huge industry involving a large number of employees working in many specific departments, the production processes and facilities now have many similarities with film and television. Some of these industries merged into powerful multinationals (Sony Corporation) which have interests in all of these media. In some other cases, major film studios have their own division of video game production, like LucasArts and Dreamworks mentioned above.

Video games' exhibition outlets are similar to those of cinema and television: arcade games can be found in multiplex theatres, home systems are hooked to television sets, and major video stores have video games, film, and television series rentals all in one

place.² All these examples reveal a kin partnership among these industries. The music industry is also becoming an essential player in the video game industry, and video game soundtracks are increasingly popular.³ Live concerts of video game music (like the Video Games Live tour in 2006) have played to sold-out crowds. Nowadays, the music created for video games is composed in a similar fashion as film music scores. As on television, advertisements in video games have become a common phenomenon. A study by Activision and Nielsen Entertainment was conducted in late 2005 on this issue and found that young gamers felt that the presence of in-game advertisements, if well integrated into the games, increased their enjoyment of the games.⁴

Much video game theory shares a close connection with other media, since many of its basic concepts and thoughts came principally from film and television studies.⁵ For media theorist Henry Jenkins, all these associations are consequences, or symptoms, of a much larger manifestation in culture which he calls "media convergence." Such convergence manifests itself in many ways, including technologically, economically, socially, culturally, and globally.⁶

Such relationships between video games and other media go back to the early days of video game history. In the early 1980s, video games already were known for their adaptations of television series and American films, especially on the Atari 2600 console:

Film and television industries realized the potential of the new medium as early as the mid-1970s, when they sought to have a hand in the video game market; CBS Electronics and 20th Century Fox made their own game cartridges, and several dozen movies and television shows were planned to be adapted into game cartridges for the Atari 2600 alone.⁷

It was not until 1983 that the movie industry stopped showing interest in video games, as a result of the video game crash caused by the saturation of the market and the eager releases of poorly made licensed games for the Atari 2600 like *Pac-Man* or the video game adaptation of the movie *E.T.*, which was a monumental flop and quickly became an icon of the crash. Another reason may be the commercial failure of Steven Lisberger's film *Tron* (1982) (the first movie based on a video game world), which helped push Hollywood away from CGI technology and the whole video game industry for a decade.⁸

Video Games and Cinema

The almost total absence of video games-related themes in Hollywood did not last long. The U.S. importation of the Japanese home consoles from companies like Nintendo and Sega [especially the NES in 1985, the Sega Master System (SMS) in 1986, the Sega Genesis in 1989, and the SNES in 1991] changed the course of video game history. Because of the enormous popularity of these consoles in households, the movie industry regained interest (and economic interest) in video games. In 1989, Universal Studios, in partnership with Nintendo, released Todd Holland's film *The Wizard*, which was mostly a feature-length publicity film for Nintendo products like the NES, the Power Glove, and the forthcoming *Super Mario Bros. 3*. The buzz created by the motion picture among the gaming youth led *Super Mario Bros. 3* to sell "more than 17 million copies . . . world-wide, setting a lasting sales record for a game cartridge that was not packed in with console hardware."⁹

Since the video game industry continued to release video game adaptations of movies at the end of the 1980s and the beginning of the 1990s (especially for the NES console, where many games were based on movies),¹⁰ it was therefore only a matter of time before Hollywood, in return, adapted a video game. The obvious choice at that time was to adapt one of the biggest video game icons of all time: Nintendo's Mario. In 1993, Hollywood Pictures in association with Nintendo released *Super Mario Bros.* starring Bob Hoskins as Mario. Even though the film was a commercial and critical failure (\$20 million gross for a \$42 million budget¹¹), movie studios saw this as an opportunity to attract gamers into theaters while it gave the video game industry an occasion to have licensed revenues and better media coverage.

Thanks to fighting games like *Street Fighter II*, *Mortal Kombat*, *Virtua Fighter* (1993) and many others, arcade games enjoyed a renewal of popularity: from 1990 to 1995 alone, more than 100 arcade fighting games were manufactured by more than 20 companies, most notably Capcom (*Street Fighter* series), Midway (*Mortal Kombat* series) and SNK (*The King of Fighters* series). Movie studios then decided to adapt some of them, these games being well suited for audiences of Hollywood action movies, due to their kinetic combat and stylish graphic violence. In 1994, following *Double Dragon* (directed by James Yukich) based on the 1987 arcade game of the same name, an adaptation of *Street Fighter* (directed by Steven de Souza) was released, but without much success (\$33 million gross for a \$35 million budget). The first relative success came with *Mortal Kombat* (1995) directed by Paul W.S. Anderson. Made for a budget of \$20 million, the film grossed \$70 million in the United States and \$122 million worldwide. The popularity of the film was sufficient for a sequel, *Mortal Kombat: Annihilation* (1997) directed by John R. Leonetti.¹²

After the box office failure of the film *Wing Commander* (1999) based on the science fiction video game series of the same name, a commercial success even bigger than *Mortal Kombat* followed with the first adaptation of a video game with a female icon: the heroine Lara Croft. With an \$80 million budget, *Lara Croft: Tomb Raider* directed by Simon West, grossed \$131 million in the United States (\$47 million the first weekend), making it the biggest commercial success for a video game adaptation. A sequel followed in 2003, *Tomb Raider: The Cradle of Life* (directed by Jan de Bont), again starring Angelina Jolie as Lara Croft.

Meanwhile in Japan, a company named SquareSoft, who was responsible for *Final Fantasy*, the most popular role-playing game series worldwide, worked on a flamboyant adaptation of its own video game series. Square Pictures (their movie division) in association with Columbia Pictures wanted to make the first entirely photorealistic digital animation movie. Although the film was noted for its technical achievement, thanks to the enormous budget of \$137 million, *Final Fantasy: The Spirits Within* (directed by Hironobu Sakaguchi, 2001) was a major commercial failure, grossing only \$32 million in the United States, and \$85 million worldwide. Ironically, the studio's losses of approximately \$123 million (taking the marketing cost into account) eventually bankrupted Square Pictures, leading to the merging of SquareSoft with their longtime rival, Enix.

Back in Hollywood, the major studios decided to take advantage of new interest in popular culture that had begun in Japan a few years before: horror movies and games. As a result, Hollywood studios hastened to produce several remakes of Japanese horror movies rather than to simply import them [for example *The Ring* (*Ringu*), *The Grudge* (*Ju-On*), *Dark Water*, and *Pulse* (*Kairo*)]. Soon after, Hollywood decided to devote their

film adaptations of video games to survival horror games. The first one to be adapted to cinema was the *Resident Evil* series, and in 2002, Paul W.S. Anderson directed *Resident Evil*, starring Milla Jovovich. The film had a budget of \$32 million and grossed \$101 million worldwide. A sequel followed in 2004, *Resident Evil: Apocalypse* directed by Alexander Witt.

Following on the horror craze, the controversial German director Uwe Boll purchased the rights of several horror video game hits and started to make his own adaptations of such games as *House of the Dead* (2003), *Alone in the Dark* (2005), and *BloodRayne* (2005). These adaptations were mostly famous for being the weakest ones, irritating gamers who nevertheless went to see Boll's pictures or purchased the DVDs of his films. (*House of the Dead* grossed \$10 million in the United States with a budget of only \$7 million, while *Alone in the Dark*, with a budget of \$20 million, only grossed \$5 million in the United States. *BloodRayne* grossed a mere \$3 million worldwide in theaters with a budget of \$25 million. Nevertheless, the DVD sales of these films were much more profitable.) The controversy surrounding Uwe Boll continued in 2006 when he decided to organize a boxing event, "Raging Boll," with his most virulent critics. The footage of these fights was used for his next movie, another adaptation of a violent video game, *Postal* (2007).

Another horror movie based on a video game, based on a popular sci-fi first-person shooter, was released in 2005: *Doom* (directed by Andrejz Bartkowiak), starring the wrestling champion The Rock. Despite the common practice of casting celebrities, the adaptation was again a critical and commercial failure (it was shot with a budget of \$70 million and grossed \$28 million in the United States). At the time of this writing, the last movie adaptation of a video game was *Silent Hill* (2006), based on the critically acclaimed survival horror series of the same name, directed by the French filmmaker Christophe Gans (*Brotherhood of the Wolf / Le Pacte des Loups*, 2001) and written by Roger Avary (director of *Killing Zoe* and writer of *Reservoir Dogs* and *Pulp Fiction*). Even with these big names behind the camera and the fact that Gans was a self-proclaimed gamer and fan of the *Silent Hill* series, the film received bad reviews and did disappointingly at the box office (it was shot with a budget of \$50 million and grossed only \$72 million worldwide).

Although none of these films became major blockbuster hits, the tendency to adapt video games to cinema is far from over. Considering the large number of video games licensed by Hollywood studios, there will be more adaptations than ever in the years to come. Indeed, almost all video game best-selling hits had their rights bought by a movie studio or a producer. Several projects are already in production, the most anticipated ones (perhaps excluding the ones by Uwe Boll) being *Splinter Cell* (due in 2007), *Halo* [announced for 2008, to be produced by WingNut Films (Peter Jackson's banner)], and finally *Metal Gear Solid* (also announced for 2008, to be directed by the famous designer of the game, Hideo Kojima). To ease the wait, fans can buy the graphic novels adapted from some of these video games, an increasingly popular practice from the game developers. In early 2006, Hideo Kojima released a digital graphic novel based on the *Metal Gear Solid* universe sold exclusively on UMD for Sony's PSP. Another graphic novel, based on the game *Halo* was published by Bungie Studios in the summer of 2006.

Video Games and Comics/Animation (Manga/Animé)

Many video games have been adapted from comic books since the beginning of the console era in the United States. The majority of these adaptations are based on Marvel

and DC Comics's super heroes. The MobyGames website has listed more than 100 adaptations of Marvel and DC Comics (67 for Marvel and 39 for DC Comics more precisely). The main characters adapted in this fashion have been Marvel's X-Men and Spider-Man, and DC Comics's Superman and Batman.

In Japan, the list is significantly larger, since video games have always been strongly associated with other Japanese media, especially *animé* and *manga*. *Manga* is the word in Japanese for comics or printed cartoons. *Animé* are Japanese animated films created according to a distinct aesthetic, influenced almost exclusively by *manga*. Video games, which have such a major importance in Japanese popular culture,¹³ appeal to a whole generation, named the "visual generation" (*shikaku sedai*) in Japan.¹⁴ The obsessive fans of these hobbies are called by the Japanese pejorative term *otaku*.

Consequently, almost every popular *manga* and *animé* have been adapted into video games in Japan,¹⁵ with increasing numbers of them being imported into Europe and North America. Although children in countries such as France, Italy, Canada, and the United States grew up with Japanese animation since the end of the 1970s, the craze for all that touches Japanese popular culture truly started with the *manga*-based *animé Akira* (1988) directed by Katsuhiro Otomo and was followed by several others during the 1990s, like Mamoru Oshii's *Ghost in the Shell* (1996) based on a *manga* by Masamune Shirow, and Hideaki Anno's television series *Neon Genesis Evangelion* (1995). These titles have also had their video game adaptations. *Akira* was adapted into a video game in 1988 on the NES, *Ghost in the Shell: Stand Alone Complex* in 2004 on the PlayStation 2, and *Neon Genesis Evangelion* in 1999 on the Nintendo 64, although the latter had never been released outside of Japan.

Not surprisingly, many young people worldwide who are interested in Japanese animation are also gamers and consumers of video games series adapted from *manga* and *animé* (such as *Dragon Ball*, *Mobile Suit Gundam*, *Full Metal Alchemist*, and so on), to such a point that even some fans in the United States have been called *otaku*. In the United States, adaptations of animated films and television series was less of a phenomenon, with the notable exceptions of games based on Disney characters (of which there are more than 100) and games based on the immensely popular series *The Simpsons* (of which there are more than 20), until the emergence of movies using 3-D computer animation made by studios like Pixar and DreamWorks. Every feature film from these studios has had a video game adapted from it so far. For this genre, video games have become the obvious tie-in products, since 3-D animation and video games share the same target audiences as well as the same visual style and technology.

Conversely, fewer and less known are the adaptations of video games to comics and animation. Once again, it is necessary to look at what has been done in Japan. With the exception of the recent adaptation of *Metal Gear Solid* into a graphic novel as previously mentioned, the best known example is the *Pokemon* video game series. It was so popular in Japan and then in North America that one could forget that this franchise began as Nintendo Game Boy Advance video games (*Pokemon Blue* and *Pokemon Red*, released in Japan in 1996 and in North America in 1998). Indeed, *Pokemon* involved a great many tie-in products, such as television series, animated films, figurines, cuddly toys, home furnishings, and practically every piece of clothing for children with an effigy of the characters Pikachu and Ash. Even though the *Pokemon* franchise is best remembered in North America as a cartoon and may be the most successful adaptation of a video game, it is not the first manifestation of the close relationship between video games and television.

Video Games and Television

Since the emergence of video games as a popular phenomenon, the video game industry has had a relationship with television, while the film industry often considered video games as mere spin-offs. Similar to television, the video game "has played a crucial role in the child's entry into narrative," as well as to the construction of "consumerist subjects."¹⁶

It is therefore no coincidence that video game settings and characters were first adapted to television in Saturday morning cartoons. The first popular one was the *Pac-Man* series (which ran from September 25, 1982, to September 1, 1984). Based loosely on the original arcade games *Pac-Man*, *Ms. Pac-Man*, *Pac-Man Jr.*, and *Super Pac-Man*, the cartoon production company Hanna-Barbera brought all these characters to life for the TV series. The show featured the Pac-Man family (in which "Ms." Pac-Man is actually a "Mrs."), who are in most episodes troubled by the familiar villainous Ghost Monsters from the games. The family usually got out of trouble by munching on power pellets to energize themselves and chomp the Ghost Monsters. Other shows followed over the years, including *Frogger Video Game* (1982), *The Super Mario Bros. Super Show!* (1989), *Sonic the Hedgehog* (1993), and *Donkey Kong Country* (1998).

The video game craze also inspired a television quiz show called *Starcade*. The game show aired on television stations across the United States between 1982 and 1984, generally in a Saturday morning or early afternoon time slot. It consisted of trivia questions regarding video games as well as one-on-one competition between contestants, usually a father and son, on arcade games for electronic prizes and a grand prize of an arcade terminal.¹⁷ While arcade games tended to be popular among both children and adults,¹⁸ home video game systems, with their basic controls and simple graphics, were more typically aimed at children. Moreover, since systems such as the Atari 2600, the Intellivision, and the Colecovision were connected to television sets, they became substitute objects of entertainment for children that competed with television and could offer the feeling of control and direct action that the television could not.

Although Saturday morning cartoons would benefit from the popularity of the video game phenomenon, the video game industry had been adapting games from television shows for some time.¹⁹ However, some licenses were hard to obtain, especially in the arcade sector since the *Death Race* controversy.²⁰ For example, in Japan, Nintendo's game designer Shigeru Miyamoto wanted to license Popeye for a new arcade game. King Features Syndicate refused to sell the rights to Nintendo, so Miyamoto was then forced to create his own original character for the game. This is how the character Jumpman began, who was later renamed Mario for the arcade game finally entitled *Donkey Kong*.²¹ Even the name "Donkey Kong" caused legal issues, because of the strong association with King Kong. Nintendo did eventually obtain the rights and produced the arcade game *Popeye* in 1983, but the game had nowhere near the success enjoyed by the *Donkey Kong* and *Mario Bros.* series.

Exchanges between video games and television (mainly cartoons) became increasingly frequent.²² Some extremely popular franchises, like *Star Wars* and *Star Trek*, marketed derivative products using a variety of media (film, television, video games, comics, novels, toys, and so on), and have over 100 and over 50 games based on them respectively. This aggressive strategy played on consumers' desire for franchises they liked; once the consumption of a franchise begins, one wants logically and emotionally to obtain other

products in the franchise, to obtain a complete vision of the whole, both materially and narratively.

In her book *Playing with Power*, Marsha Kinder called this sort of marketed franchise a “supersystem of entertainment,” and cited the huge success of the *Teenage Mutant Ninja Turtles* (TMNT) as a good example of this phenomenon at the end of the 1980s.²³ For Kinder, the success of the TMNT with children was based on the judicious intertextual mixture of animality (Turtles), science fiction (Mutant), and Japanese martial arts (Ninja), and on the expansion of the franchise in several media. The TMNT “supersystem” began with a cult comic book from Mirage and then an enormously popular cartoon series, created in 1987. An arcade game appeared in 1989, followed by many console games, the first ones being on the NES [*Teenage Mutant Ninja Turtles* (1989); *Teenage Mutant Ninja Turtles II: The Arcade Game* (1990)]. Finally, a feature film directed by Steve Barron was released in 1990, its success spawning a series of sequels. The success of this kind of “supersystem of entertainment” relies enormously on the idea of “transmedia storytelling.”

Transmedia Storytelling and Media Convergence

In *Hamlet on the Holodeck: The Future of Narrative in Cyberspace*, Janet Murray acknowledged transmedia storytelling when she introduced the concept of “cyberdrama”: “The coming digital story form . . . will encompass many different formats and styles but will essentially be a single distinctive entity . . . a reinvention of storytelling itself for the new digital medium.”²⁴

Henry Jenkins, a few years later, coined the term “transmedia storytelling” which simply means “the movement of [narrative] content across media.”²⁵ The concept is an aspect of “media convergence,” which Jenkins described as follows:

The flow of content across multiple media platforms, the cooperation between multiple media industries, the search for new structures of media financing which fell at the interstices between old and new media, and the migratory behavior of media audiences who would go almost anywhere in search of the kinds of entertainment experiences they wanted.²⁶

This type of manifestation was advanced by the *Star Wars* franchise, in which the tie-in products played a central role. During the 1980s, for instance, the accompanying line of action figures and vehicles from *Star Wars* outgrossed the movies themselves,²⁷ creating a precedent in the marketing of ancillary products. Since then, goods—including video games—have been promoted with almost every Hollywood blockbuster targeting young audiences. The *Star Wars*-related video games have been used for two main purposes: the re-creation of the most memorable scenes from the trilogies (to be played by their fans), and the addition of new storylines and fresh approaches expanding the *Star Wars* universe. Such effects are not limited to the United States. Recent examples of transmedia storytelling in Japan include such franchises as *Neon Genesis Evangelion* (1995–1997) and *Blood, the Last Vampire* (2001). These franchises consist of many *manga*, *animé*, novels, and video games, each one telling a different story which adds to the franchise’s world.

Inspired by these notable achievements, the Wachowski Brothers, the creators of *The Matrix* film series and declared aficionados of video games, Japanese *animé* and *manga*, and comic book cultures in general, attempted to expand on the concept of

transmedia storytelling by creating *Enter the Matrix* (Infogrames, 2003), a video game that could expand the story of *The Matrix Reloaded* (which was released the same day as the *Enter the Matrix* video game, May 15, 2003), and anticipate developments of the third opus of the movie trilogy. Thus, in the game *Enter the Matrix* players can play as two minor characters in the movies, Niobe and Ghost (played by actors Jada Pinkett-Smith and Anthony Wong, respectively). These characters became increasingly crucial (especially Niobe) to the victory of the humans in *The Matrix Reloaded* and *The Matrix Revolutions* (2003). In this way, the game is not a mere spin-off but an integral part of a complex work spanning several media forms and platforms, which fills in blanks in the movies' stories to facilitate the comprehension of the movie trilogy. In addition to the video game, the Wachowski Brothers simultaneously released derivative material such as a series of nine animated films (*The Animatrix*, 2003), two comic books (*Matrix Comics*, Vol. 1 and 2, 2003), and complementary content on the official movie website (<http://whatisthematrix.warnerbros.com/>).

Two more video games were released with the same objective in mind. In 2005, the Wachowski Brothers released an MMORPG called *The Matrix Online*, which continued the story of the trilogy beginning just after the end of the third film where machines and humans have reconciled thanks to Neo (Keanu Reeves). *The Matrix Online* allowed players to be part of one of three opposing groups (the humans of Zion, the machines, or the exiles of the Merovingian), all of whom strive to achieve control of the Matrix. The game producers released on a regular basis what they called "Live Events" to stimulate players' immersion in the virtual universe. At the end of 2005, Infogrames released another video game based on the Matrix franchise, also written by the Wachowski Brothers, called *The Matrix: Path of Neo*. The game put the player in the shoes of Neo himself, reliving the main adventures of Neo in the movie trilogy, but with new perspectives never seen in the movies.

The marketing strategies of this groundbreaking franchise helped create a unique transmediatic work brought about by the convergence of several media (film, video games, websites, comics, *animé*, etc.). Media convergence and transmedia storytelling are becoming the new trend for creators who do not want to be confined to a unique medium or platform and for producers who want to maximize the profits from a hit, no matter what the original platform. This kind of cultural practice underscores the importance of other media in the emergence and construction of the video game and helps to predict the possible directions that video games may take in the future. The "intermedial" nature of the video game is far from being a mere tendency but instead forms an essential part of the medium.