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THE HISTORY OF THE VIDEO GAME

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To summarize the history of the video game in a single chapter is by no means a self-evident assignment. Although the games industry is much younger than the film, literature, or pop music industries, it nonetheless entered its fifth decade in 2003. A brief glance at the number of games produced between 1962 and today clearly indicates that it is impossible to discuss this topic with the help of a timeline of all games ever produced; there simply are too many. Therefore we have chosen to divide video game history into a number of separate periods, each with its own specific tendencies and characteristics. Our primary objective is to provide an improved insight into the video game phenomenon that we know today; the enumeration of independent historical events is of secondary importance.

Prehistory: 1958–1972

Even though 1962 is frequently cited as “the year when the first video game was produced,” it is not true that before 1962 there was no such thing and afterwards suddenly there was. Like other media, such as film or recorded music, it is difficult to connect the emergence of the video game to one brilliant inventor who started from scratch and decided it was time to invent something new.

Instead we should consider the early period, which we like to refer to as “the prehistory of the computer game,” a period of experimentation, a period in which a number of people from a variety of backgrounds, whether stimulated by one another or not, made their own contribution to what would eventually become a new form of popular culture. We must remember that a number of cultural and scientific traditions had already prepared the ground for the development of the video game. There was the amusement industry with pinball machines and board games on the one hand, and the rapid development of computer technology on the other. In this section we will first say a few words on the early forerunners and then take a closer look at the three “godfathers” of the computer game.

The Forerunners: Willy Higinbotham, Game Traditions, and Computer Technology

Computer and game first went hand in hand in 1958, at the Brookhaven National Laboratory, a research institute of the American government. For the open day of this company, one of the engineers, Willy Higinbotham, proposed to do away with the traditional statistics and corporate presentations used each year and come up with something more exciting to show the visitors (Hunter, 2000). He converted an oscilloscope (a machine that transforms vibrations into a wavelike motion on a screen) into a kind of pinball game. A speck of light moved across the screen and with the help of two boxes with push buttons one could control the curve it followed. He considered his creation an abstract simulation of the game of tennis, and aptly named it *Tennis for Two*. He had not foreseen game aspects such as “who scores the point?” or “what is the score?” Higinbotham was not interested in the possible applications of his invention. He saw it as an attractive way to demonstrate the operation of a piece of technology, no more, no less. Subsequently, he did not patent his invention.

One of the interesting aspects of Higinbotham’s creation was the interaction between player(s) and machine. He managed to make a scientific instrument attractive for a nonscientific audience, simply by obscuring its complexity and making it easy to manipulate. The interactive possibilities that he foresaw were closely related to the mechanical amusement tradition that already existed in his country in the form of pinball and slot machines. The popularity of such machines depended on the same principle: players got a limited amount of control (by operating several buttons or pulling an automatic arm), but the game could still go an unlimited number of ways (Yesterdayland, 2000). Higinbotham did not explicitly incorporate the aspect of reward (a second important element of such games) into his machine; he left this to the imagination of the players.

This brings us to the second set of forerunners of the video game: the tradition of board games and children's games such as hide and seek or cops and robbers, in which (part of) reality is represented in a simplified, iconic way, and players are expected to use their imagination to play their part in this world. Those who play *Monopoly* are supposed to dive into the world of capitalism, and those playing *Stratego* will consider themselves generals for the duration of the game. In the early seventies, with the advent of *Dungeons and Dragons* (1974, created by Gary Gygax and Dave Arneson), an extreme variant of such games emerged: the so-called "fantasy role playing game." In those games, the players enter a wholly imaginary environment and work out the storyline with the help of several standard plots. Although at the time, already some text-based adventure games existed (e.g., *Star Trek*, 1967; *Hunt the Wumpus*, 1971), fantasy role playing games have exercised a considerable influence on the structure of a variety of future computer games. Aspects such as a complex object system, or the creation of a fantasy world governed by its own social and economic rules, have now become a standard ingredient in many console and computer games, and can be directly traced back to the rules described in the manuals of *Dungeons and Dragons* and its followers.

In essence, a video game is nothing more or less than a special kind of computer program. This automatically brings us to a third forerunner: the development of computer technology, which accelerated enormously in the 1940s and 1950s (LaMorte & Lilly, 1999). A number of important inventions, such as transistor memory in the late 1940s and the first chips in the late 1950s, resulted, in the early 1960s, in the early forerunners of today's computers. These machines were still bulky and expensive. By today's norms they had very limited storage and processing capacities, and were predominantly found in universities. Since those days, the technical foundations for computers have improved rapidly and this evolution is still going strong. Over the past forty years, the continuous development of computer technology has served as the driving force behind the ever-increasing sophistication of video games. Little wonder, then, that this force will serve as a red thread throughout our argument.

The Inventors: Steve Russell, Ralph Baer, or Nolan Bushnell?

When investigating the question of who should be considered the true inventor of the video game, three names pop up repeatedly: Steve Russell, Ralph Baer,

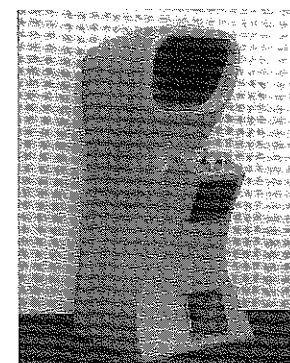
and Nolan Bushnell (Hunter, 2000; GameSpy Staff, 2002). A heated discussion will usually follow concerning which of the three made the most essential contribution and can consequently be considered the founding father. We do not consider it our task to answer the question here. We limit ourselves to briefly considering each of the three men, leaving it up to the reader to pick his or her favorite.

Steve Russell, the first of the three, was a student at the renowned Massachusetts Institute of Technology (MIT) in January 1962, when he developed *Spacewar* for the PDP-1 mainframes that were available there.¹ In contrast with his predecessor Higinbotham, he explicitly intended to create an application for entertainment (Hunter, 2002). Soon, many varieties of the game's code spread amongst universities across America. Technically speaking, *Spacewar* came down to the constant appearance and disappearance of flashes of light on the screen, comparable to some of today's screensavers. Russell's greatest merit was to incorporate a game element into this light show by making two of those specks look like spaceships, which could be controlled by two different players. The other specks were stars that figured merely as decoration. In the middle of the screen was a cross representing a black hole. The task of a player was twofold: to prevent your spaceship from crashing into the black hole, and to fire torpedoes to destroy your opponent before he was able to destroy you. Technically speaking, *Spacewar* can be seen as the first *computer game*, simply because it was the first "game" that was programmed on a "computer." Moreover, because the game contained both a simulation and an action element, it laid the foundation for a number of different genres that would follow in the 1970s and 1980s.

The second man on the list, Ralph Baer, came from a completely different background. When he introduced his innovations in 1966, he was a well-respected, forty-four-year-old engineer at an electronics company, Saunders Associates (Hunter, 2002). Baer, an immigrant from Nazi Germany, was intrigued by the possibilities of the medium of television, which had already entered the living rooms of some 40 million families across the United States. He designed a device that could be connected to his TV, which would allow him to play a kind of ping pong game on the screen. The game itself strongly resembled Willy Higinbotham's creation of almost a decade before, but contained a number of game elements that were missing in *Tennis for Two*. Baer did not stop there, and in 1967, he developed a new television game, this time a hockey simulation. In 1968, he even thought up a system that

could bring his games to living rooms by cable, just like television programs. Cable companies did not fancy the idea, and, even though Baer managed to obtain no fewer than seventy-five patents, his plans were shelved for a couple of years (Hunter, 2002). Baer's innovative contributions did not involve the nature of computer games—even in those days the controlled movement of a ball or puck across a screen was nothing new—but they involved the possible applications that he foresaw for his games. He can be considered the founder of the in-home video game: his idea that computer games could penetrate the privacy of the home was proof of great vision.

The most famous, but without doubt also the most controversial, name on the list of founding fathers is Nolan Bushnell. When he was young, Bushnell was a fervent chess player and a gamer *avant-la-lettre*. He enjoyed Japanese thinking games such as *Go*, and he worked in an amusement park. In university he encountered *Spacewar* and used it as the basis for *Computer Space* (figure 2.1), a game he developed in 1970 (Jacobi, 1996; Hunter, 2002). As a game, *Computer Space* was not too innovative, but nevertheless it constituted breakthroughs in a number of areas. First of all, it was not a computer game for the mainframes at university, or a video game to play at home on the television, but a machine in the pinball tradition. Bushnell took advantage of the dramatic reduction in price and size of computer chips in the late 1960s and used them to market the first arcade videogame. Second, *Computer Space* introduced a practical, profit-oriented way of thinking that was unprecedented in the video games sector until then. Bushnell fitted his game with an extensive visual layout to make it more attractive, and he made no secret of the fact that the main purpose of this game was simply making money.



| Figure 2.1 |
Computer Space (Nutting Associates, 1971): The first arcade game

Bushnell's strategy was less successful than expected; the instructions were too complicated, and the public massively ignored *Computer Space*. The idea of attracting players by means of a colourful cabinet and a range of simple controls, was there, however, and it was Nolan Bushnell himself who brought it to perfection two years later. His new arcade game, *Pong*, was the simplest possible game and the instructions could hardly be misunderstood: "Avoid missing ball for high score," or, in other words, "no prior knowledge needed to enjoy the game." *Pong* was not the only ping pong game around at the time, but it was the first serious games hit, and it gave the go-ahead for a booming industry.

This game also made Nolan Bushnell's contribution to the development of videogames rather controversial, to say the least, as Ralph Baer recognized his own ping-pong game in *Pong* and sued Nolan Bushnell for copyright violation (Hunter, 2002). However, from a historical point of view, this dispute is of no great significance. It suffices to say that Bushnell managed to break ground that none of his predecessors had broken before. He managed to take video games out of the sphere of scientific research and bring them to the general public. His role in the evolution of video games is therefore comparable to the role of the Lumière brothers in the evolution of motion pictures. Technically speaking, Bushnell can be considered the founding father of the arcade video game.

The Birth of an Industry: 1973–1977

The mid-seventies, more specifically the years 1976–1977, are known as the time when America first massively fell for video games. Both the console market, based on the ideas of Ralph Baer, and the arcade market, following Nolan Bushnell's footsteps, took off and quickly realized excellent sales figures. This same period witnessed some important innovations, both technically and contentwise, which contributed to setting the standards for future platforms and genres. In this section we will take a closer look at the technical and economic aspects of both markets, and mention a number of important games to illustrate some major content-related innovations.

The Industry Develops Through Different Channels: Arcades versus Consoles

Arcades: Atari Against the Rest After a dispute with Nutting Associates, the firm that took care of the production and distribution of his *Computer Space*, Nolan

Bushnell decided that he no longer wished to be dependent on a third party to publish a game. Together with his business partner Ted Dabney, he established Atari (X, 2001b). They delineated well-considered and efficient policies, and quickly became the largest arcade manufacturers. The success of *Pong*, their first game in 1972, inspired many other companies to give the video games market a try and launch their own versions of the game. Due to, among other things, aggressive licensing politics, which contractually prohibited all Atari distributors to distribute machines of other companies, Bushnell and company managed to establish a quasi-monopoly around 1974, at which time their main competitors were small companies operating on a local scale. In 1976, perhaps fifteen companies were active on the arcade market, but on a national level only one had sales figures approaching Atari's, namely Midway, owned by Bally, a pinball producer (Brown, 1998). With his company operating at an ever-growing scale, Bushnell found himself forced to sell Atari to Warner in that same year (Seitz, 2001). By the end of 1977, Atari controlled about 70 percent of the coin-operated market in the United States.

The industry's growth between 1972 and 1978 went hand in hand with the evolution of the hardware of the platforms on which these arcades ran. Although games such as *Pong* and *Computer Space* were operationally still far from actual computers, some important innovations helped to close the gap around 1976. The game *Tank*, which was launched in 1974 by Kee Games (a daughter company of Atari), constituted a major technical breakthrough (Yesterdayland, 2000). It was the first game to use ROM chips to store graphics, making them far more accurate. The use of separate ROM chips for graphics can be seen as an early precedent of the graphics cards known today. Another milestone is the game *Gun Fight*, which was marketed by Midway in 1975. In this game, microprocessors replaced the cumbersome and sluggish chips that had been prevalent up to then (Yesterdayland, 2000). This considerably accelerated the processing of instructions. The game also introduced a number of peripheral devices, such as an early joystick and a number of fake guns, two devices that would become common gadgets in the console and arcade markets.

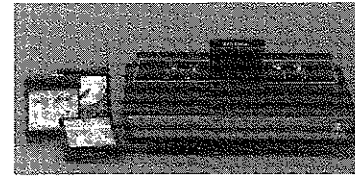
Home Consoles: Atari Cashes in on the Work of Others

At the end of this period, Atari also dominated the home console market, which built on Ralph Bear's ideas. This, however, turned out to be more time-consuming and difficult than taking over the arcade

market. Both technically and economically speaking, the home console had to come a long way between 1972 and 1978.

In the early 1970s, Ralph Baer's ideas were finally appreciated at their true value. Electronics giant Magnavox recognized the enormous potential, and bought a license from Baer for manufacturing a home console (Hunter, 2002). The result is the Odyssey, which came out in 1972. It is a simple device, which, like the arcades of the time, was far removed from the game computers we know today. It was a fully analogue system, which meant that the possibilities for image formation and game variety were rather limited (Brown, 1998). In addition, the difference between "console" and "game" did not exist yet: all possible games (meaning some twelve variations on the same ball and paddle theme) were programmed in the hardware itself. It was impossible to buy a new game and connect it to the Odyssey. A final limitation of the Odyssey was that it used only a fraction of the possibilities that the TV set had to offer: there was no sound, and the games were black and white. This last problem was overcome by introducing colorful plastic covers that could be placed over the screen. By today's standards, the Odyssey can be considered a marginal console at best. It was nonetheless quite popular and it took some time before new and better consoles were marketed. For this reason the arcades were initially the Odyssey's largest competitor.

In 1974, Atari took the plunge onto the home console market when it launched Home Pong, a console that did not differ greatly from the Odyssey. Other companies followed, resulting in a whole series of ball and paddle games that each offered a slight variation on the original concept: some introduce a digital console, some allow four players to play at once, others add color or sound to the game (Brown, 1998). It was not until the end of 1976 that a true turnaround came about with the introduction of two highly innovative new consoles: the Studio II by RCA and the Channel F by Fairchild. Both were so-called programmable consoles: the code of a game was not built into the hardware, but the consoles were "real" computers that listened to a language of predetermined instructions (Brown, 1998; Hunter, 2002). Using this language, programmers could develop games for these consoles and store the code on external data carriers. The Studio II and the Channel F introduced the cartridge system: separate data carriers (the cartridges), sold separately, that contained the game's source code and could be connected to the appropriate consoles. They also started a trend that would run as a red thread through-



| Figure 2.2 |
The Atari VCS

out the history of home consoles: consoles are genuine computers, and each and every improvement in computer technology will almost directly influence the quality of the available games.

As we saw in the Ralph Baer–Nolan Bushnell conflict, and as we will see repeatedly throughout this chapter, it was not necessarily the technically most innovative console that would eventually have the largest impact. In 1977, when Atari launched its Atari 2600 (or Atari VCS; figure 2.2), which was quite similar to the Studio II and Channel F, the RCA and Fairchild machines, innovative as they were, were pushed to the background. Partly thanks to a range of ingenious games and partly thanks to strong management, the 2600 managed to leave its competitors far behind and enter the history books as the first modern home console (X, 2001a). All later consoles use a structure similar to the one used in 1977, but merely add refinements made possible by technological progress. Despite its name (VCS stands for Video Computer System), Atari's console was not an actual computer. There was no keyboard, and all peripheral devices were aimed at making games easier to play. The 2600, for example, was equipped with primitive joysticks and a number of turning buttons, specifically designed for ball and paddle games (X, 2001a; Brown, 1998).

The Contents: The Foundations for a Number of Genres

Largely due to limitations imposed by the hardware, most games in the 1970s were variations on the *Pong* concept, games in which players control a paddle and have to maneuver a ball as well as possible. As we will discuss later, this overproduction of ball and paddle games was largely responsible for the crisis that the industry faced in the late 1970s. The introduction of better chips opened the door for other, more innovative games. Some of the new games laid the foundation for genres that would become very big in the future. We will list the most important ones.

The 1974 game *Tank* constituted a major technical breakthrough. Contentwise too, this game introduced a number of innovations (Yesterdayland, 2000). Two

players each control a tank in a maze littered with mines. The winner is the one who destroys the other or forces him to drive onto a mine. Both graphically and game playwise, *Tank* meant a large step forward: the tanks no longer looked like a collection of dots (as in *Computer Space* and its many relatives) or abstract geometrical figures (like the rectangles in *Pong*) but they were well-outlined, solid figures. Moreover, *Tank* introduced the "kill-or-be-killed" element that would return in a range of later games. Danger was lurking behind every corner and the players had to think fast and efficiently to finish the game successfully. *Tank* is the forefather of the many "shoot 'em ups" that were to be produced in the years to come.

As far as navigation and screen set-up is concerned *Tank* used a number of principles that Atari had been working on for *Got'cha*, a game that was produced a year earlier and proved highly innovative, despite its simplicity. *Got'cha* is classified as the first "maze game" and is considered the main predecessor of subsequent classics such as *Pac-Man* (Yesterdayland, 2000). It was a two-person game that was based on the "cat-and-mouse" principle: player number one, the "catcher," had to get a hold of the other, and player number two, the "runner," had to prevent this from happening. Both players were able to move horizontally and vertically through a maze on the screen. This possibility to move in two directions already existed in *Computer Space*, but was a large step forward from games such as *Pong*.

Also in the genre of sports simulations Atari came up with a number of innovative games: *World Cup Football* (1974) laid the foundation for a whole generation of soccer games, and *Grand Track 10* and *Grand Track 20* (both 1974) were milestones in the development of racing simulators. Other games worth mentioning are *Space Race* (1973, again by Atari), a forerunner of the subsequent platform and obstacle games, and *Death Race* (1976), by Midway. This last game was a racing simulator, with the added bonus that drivers could score additional points by running over live creatures (the "Gremlins") as they crossed the road. *Death Race* was the first game that startled parents, politicians, the media, and other authorities because of its explicitly violent character.

1978–1982: A First Crisis Awakens the Industry

The year 1978 was a turning point in the history of the computer game. For the first time, the young industry was not making any progress and many companies were suffering heavy losses. Rather than being the end,

this crisis created space for a number of creative newcomers, predominantly from Japan, guiding the video games industry into its golden years.

Crisis

Christmas of 1977 meant the beginning of an unexpected end for many companies in the games industry. There was a spectacular drop in games sales, right when growth had been expected. The home console market was hit hardest, but the arcade market did not go unscathed. In 1978–1979 a number of important players were forced to seriously reduce, or even stop, the production of their consoles: the Channel F disappeared in 1978, the Studio II in 1979, and the Odyssey slowly passed into oblivion (De Meyer, Malliet & Verbruggen, 2001, p. 58). The only player that (more or less) managed to survive was Atari. Even though the 2600 shared in some of the blows (the number of consoles sold was still growing, but games sold rather poorly), Warner's daughter company managed to maintain itself thanks to her strong position in the arcade market (X, 2001a).

A second reason why Atari managed to survive the crisis while all its competitors got into rather serious trouble, was related to the nature of the crisis. The drop in sales figures was a result of the state the market was in: there was an oversupply of consoles (hardware), and a shortage of innovative games (software). During this period Atari was the company that introduced the most creative games. It was therefore less vulnerable to the public's decreasing interest. The crisis did, however, affect Atari's dominance in the market as space was created for new, more innovative companies. This helped to make the period of 1979–1982 one of unprecedented bloom and creativity.

The Japanese Invasion

Until 1978, the Americans dominated the world of video games. Then things changed. Many Japanese companies, which had long been active in different sectors in their own geographical area, started to focus on computer games. They soon managed to greatly influence the games scene in the United States and Europe by introducing a number of technical and content-related innovations that set new, lasting standards.

It is not a coincidence that this impulse for innovation came from Japan (Costello, 1991, pp. 114–117; Sheff, 1993, pp. 12–33). For one, Japan had a long tradition of game machines, and pachinko, the Japanese version of the pinball machine, was, to put it mildly, wildly popular. Furthermore, during the mid 1970s a

considerable market for video games had developed, initially by importing arcade machines from America, and later, when it became apparent that additional variations on the *Pong* concept did not really pose a threat to the pachinko machines, by coming up with new games. Around 1976, there were already many games companies, the most important ones being Taito and Namco. Both of these companies gained a firm foothold in the United States during the late 1970s, early 1980s, and were soon followed by fellow-Japanese companies such as Nintendo, Universal, Konami, Sega, and Tehkan.

Taito: *Space Invaders* On June 5, 1978, Taito, a Japanese company established by Belorussian immigrant Michael Kogan, released *Space Invaders*. The game caused a true mania and was the first computer game to become more popular than the local pachinkos (Poole, 2000, pp. 33–34). American company Midway noticed the enormous potential of the game and bought a license to manufacture the game and distribute it on the western market. Here too, *Space Invaders* was a great success. Already in 1981, the game had swallowed more than four billion coins, an average of one game per inhabitant of the earth.

The success of *Space Invaders* can, for a large part, be explained by the nature of the game itself. It contained a number of elements that were completely new, or that were a perfection of techniques that had been peripheral beforehand. First of all the game used a narrative structure, albeit a primitive one (Yesterdayland, 2000). Referring to the body of science fiction ideas that existed, a simple story was told of a swarm of aliens that came to conquer the earth and it was up to the player to stop them from getting a stronghold on this planet. The player was given a mission, which created the feeling of being the hero in a great adventure.

In addition, the aspect of reward took a large step forward. *Space Invaders* was a game without an end (Poole, 2000, p. 37). When the player had neutralized the first swarm of aliens, a second would come that moved slightly faster than the one before, and so on. The rhythm of the game would build to the point that it became impossible for the player to keep up and the game would stop. There was no upper limit to the number of points that a player could score, and as a result players could keep on playing indefinitely, always finding a new challenge in having to do better than the time before.

Third, *Space Invaders* used sound in a functional way: the rhythmical bass-based soundtrack, which sped

up with the rhythm of the game, was an integral part of the game experience (Poole, 2000, p. 36). Before *Space Invaders*, sounds in video games had generally been used as padding or a subordinate bonus, but afterwards game developers could no longer afford to ignore this aspect.

The success of *Space Invaders* invited other companies to market their own copies of the game, which were, more often than not, cases of genuine piracy (Yesterdayland, 2000). Europe, for example, witnessed the introduction of such games as *UFO Invaders* or *Space Commanders*. The practice of copying or reproducing the source code of a game already existed in the early years of the videogame business (e.g., the different *Space War* or *Pong* clones in the 1960s and 1970s). It was, however, not until the 1980s that piracy assumed such dramatic proportions that enormous amounts of money would disappear into the illegal circuit (De Meyer, Malliet & Verbruggen, 2001, pp. 145–147).

Namco: *Pac-Man and the Rise of the Maze Game* *Space Invaders* unleashed a true flood of space war games, which would only be counterweighed some two years later. Again the answer came from Japan; it was a game that depended more on friendliness and humor than on violence and threat and it was called *Pac-Man*. The game, which was developed in 1980 by a team of eight at Namco in Japan, was launched in 1981. In that year alone, more than a hundred thousand *Pac-Man* arcade machines were sold (De Meyer, Malliet & Verbruggen, 2001, p. 138). The success of *Pac-Man* can be explained both from a content perspective and from a social standpoint.

With respect to content, *Pac-Man* was the perfection of the maze game genre. By using bright colors, funny names for the opponents, happy background music, and animation breaks between the levels, the developers wanted to create a feel-good atmosphere (Jacobi, 1996). The game was relatively simple: a pizza-like figure, called Pac-Man, enters a maze in which he has to eat as many little balls as possible. He is being chased by a number of ghosts that do not try to kill him, but merely send him back to the starting point. Pac-Man could walk in four directions only, so controls were quite easy.

Pac-Man entered history books as the first game that managed to draw the female population into arcades (Herz, 1997, p. 132). Previously only teenage boys had populated the arcades, satisfying their macho impulses by playing the role of a trigger-happy space explorer. With its cartoonlike contents, *Pac-Man* took

a different route and opened doors that had previously remained closed for video games. The game was not only found in dark arcades, but soon also made its way into more neutral surroundings such as restaurants and bars. An entire media hype came into being surrounding Namco's ball-eating creature. Pac-Man appeared on t-shirts, in newspapers, and on television; he could be found on snack wrappers, lunch boxes, and plastic bags; he got little brothers and sisters, uncles and cousins; and he became the hero in innumerable follow-up games. Pac-Man became the first star of the video game era, giving the industry a new, less violent image (Poole, 2000, pp. 159–160).

Nintendo, Universal, and Sega: *The Rise of the Climbing Games* Space games here, maze games there: the early 1980s seemed to offer something for everyone. Two other Japanese firms, which refused to market clones and derivatives of games that already existed, disagreed. Sega and Nintendo have always been known to impulsively go their own way, and this was already obvious in the early 1980s, when they developed another new genre: the climbing or obstacle game.

Climbing games built on the theme of maze games, but focused on different aspects. First of all, players did not just wander around a maze, but had to go from start to finish in as little time as possible. Often they would start at the left bottom of the screen and end at the top right. Spatially there was a clear direction and line in these games. On their way from the bottom to the top, players would collect points, but these were secondary to the final goal of reaching the finish alive. This usually came down to trying to dodge all kinds of obstacles (ranging from ladders and barrels to speeding cars) encountered on the way up. The first climbing games were based on principles of reward similar to those in *Space Invaders*: upon reaching the end of one level, the game starts anew, but with a slightly increased level of difficulty.

Space Panic, the first climbing game to enter the market, was introduced by Universal (another Japanese arcade manufacturer) in 1981. The game introduced a screen composed of platforms, scaffoldings, and ladders, and combined these with the alien-theme of *Space Invaders* (Hunter, 2000). By far the most famous and influential climbing game, though, was Nintendo's *Donkey Kong*, which also came out in 1981. *Donkey Kong* set the norm that would be copied by numerous imitators: using a screen composition similar to *Space Panic*, the manufacturers proved to be clever in presenting a wide variety of obstacles that ranged anywhere

from being “quite possible” to being “too hard” (Yesterdayland, 2000). The game also introduced two figures, one virtual and the other human, that would return to play an important role in the history of the computer game. The first, the virtual figure, was the main character of the game. Initially his name was just “Jumpman,” but later on he would be called “Mario,” and reappear in a large number of highly innovative games. The second, the human, was the developer of the game: Shigeru Miyamoto. Miyamoto, an industrial designer by training, had been working at the development department of Nintendo since 1977. He was put in charge of the development of a new game in 1981, and *Donkey Kong* was the result. The success of this game (which meant the breakthrough of Nintendo on the American arcade market) considerably strengthened Miyamoto’s position within Nintendo and gave him a large degree of creative freedom (Sheff, 1993, pp. 52–53). The games he developed in the 1980s, as we will show later, became some of the most essential video-games ever.

A final important climbing game was *Frogger*, developed by Konami in 1981, and distributed in the United States by Sega. The game differed from the usual ladders-and-scaffoldings concept (as had been elaborated in games such as *Donkey Kong* and all its clones) in that it worked vertically rather than diagonally. A frog, positioned at the bottom of the screen, had to get to the top as quickly as possible, running into a variety of obstacles on the way, such as roads and rivers. Altogether *Frogger* had a more realistic touch than most other climbing games, due to the more “natural” environment it imitated (Yesterdayland, 2000).

During this period Sega introduced another important game: *Zaxxon* (1982). *Zaxxon*, a space war game, introduced a new way to construct the screen that would later become very popular in god games and adventure games: the use of the isometric perspective (Poole, 2000, p. 133; Yesterdayland, 2000). We will discuss the isometric perspective further.

America’s Reaction

In the meantime, things had not come to a standstill in the United States. The most important games companies, with Atari in the lead, realized that producing good and innovative games had gradually become the norm and a must for companies that aspired to commercial success. We shall see that two strategies became popular: the Atari strategy, which implied coming up with better games yourself, and the Midway strategy,

which consisted of importing and distributing the more successful games from Japan.

Atari: Asteroids, Adventure, and Battlezone Following the disappointing years of 1978 and 1979, Atari became very productive again in 1980. It managed to produce a number of influential games and, just as a number of the Japanese companies mentioned above, laid the foundations for some influential techniques and genres.

The first one was *Adventure*, a game developed in 1979 for the 2600. Though visually rather primitive (a king, for example, was depicted by a crown, just as in chess), it was the first adventure game that used graphics, instead of being text-only (Jacobi, 1996). With respect to the narrative, the games followed the traditional quest-structure: a player is placed in an imaginary world and has to complete a task. In this game the player’s task is to find a golden goblet and return it to the castle of the king, without being killed by one of the three dragons. Both the search motive and the narrative structure became prototypical of the organization of any adventure game. It is therefore not surprising that the whole genre was named after the first game in its kind.

On the arcade market, Atari scored some successes with a number of games that were not really innovative (i.e., closely related to *Computer Space* and *Space Invaders*), but contained a number of interesting novelties. *Asteroids*, a *Computer Space* clone, was the first to provide the possibility of breaking through the flat enclosure of the screen: the spaceship could disappear on one side of the screen and reappear on the other and instead of being a rectangular plane the screen represented a cylinder-like space (Poole, 2000, p. 130). *Lunar Lander*, a game in which the player had to land a spaceship on the moon’s surface as safely as possible, relied more on strategic thinking than on speed and firepower, thus becoming somewhat of an odd-one-out in the world of space games (Yesterdayland, 2000).

In 1981, Atari marketed one of the graphically most forward-looking games of all times, *Battlezone*. *Battlezone* introduced an image processing technique that would, in the 3D era, come to be a kind of Holy Grail. Because a discussion of the visual principles used in *Battlezone* is most appropriate when we discuss the games of the 1990s, we will postpone further analysis of this game until later.

Midway: Imports from Japan Whereas Atari mainly invested in producing new games to compete with the Japanese, Midway took another turn. Instead of com-

peting with the Japanese firms, it made licensing deals with them, becoming a manufacturer and distributor of Japanese products. In the 1970s, this method had already proven quite successful on a number of occasions (*Gun Fight*, licensed by Taito, being the most important example), but from *Space War* on it became clear that this way of working could be highly profitable. Midway’s name is often associated with games such as *Galaxian* (1980) that had initially been developed by Japanese companies (Namco in this case).

Williams and Defender: Horizontal Scrolling In the early 1980s, a new manufacturer entered the American arcade market: the Chicago-based Williams company. Just like Bally, this company had been active (and highly innovative) in the pinball market for many years. Encouraged by the success of games such as *Pong*, Williams entered the arcade market in the 1970s. They remained a second rate player until early 1981, when they came to the foreground with a game called *Defender*, which was developed by their own staff (under the supervision of Eugene Jarvis).

Defender differed from the average space battle game. In contrast with *Space Invaders* and its many relatives, the action did not take place vertically, but horizontally (Poole, 2000, pp. 130–131). The player would fly his spaceship from left to right (or vice versa) above a moon landscape to shoot as many aliens as possible. An important novelty was that the enclosure of the screen was opened; the world of the game was no longer limited to the world that one could see on the screen. When the player reached the side of the screen, the landscape would move, allowing the spaceship to fly to places that were initially invisible. At the top of the screen was a map, keeping the player informed about the location of the spaceship in the entirety of this virtual world.

Where *Asteroids* already suggested that off-screen action was possible (by having the spaceship disappear and reappear on opposite ends of the screen), *Defender* was the first game to actually use it (Poole, 2000, p. 131). To use this navigation technique for this purpose was as innovative as the principle itself. *Defender* was the first game to use “scrolling”: the landscape zoomed by the spaceship, making the movement of the spaceship more pronounced. Scrolling became the video game equivalent of panning movements in film, and proved to be highly suitable for games that required lots of speed and action on the screen.

Just like *Lunar Lander*, *Defender* is an example of how, at that point in time, games moved away from

the principle of “the faster you move and shoot, the more points you score.” Strategic thinking became more and more important. The aliens in *Defender*, for example, were equipped with a limited form of AI (Artificial Intelligence) and there were a number of different tactics that players could use to eliminate certain enemies as efficiently as possible.

Cinematronics and Space War: The Level System In addition to Williams, another American firm came into being: Cinematronics, from El Cajon, California, near San Diego. In 1977, before *Space Invaders* had even been launched, Cinematronics had already scored a hit with a space war game, aptly named *Space Wars* (not to be confused with *Spacewar*, Steve Russell’s first game). Cinematronics owed its success largely to the original make-up of the game’s cabinet, and thus to the way the machine was presented visually in the arcade halls. But contentwise, too, *Space Wars* offered some novelties (Yesterdayland, 2000). The game was equipped with different degrees of difficulty: there were separate levels for beginners, experienced players, and experts, which helped to attract a wider range of players. Just like *Battlezone*, *Space Wars* used a vector beam screen instead of the regular pixel-based raster screen.² This technique allowed the lines to be drawn much more smoothly, but it limited the use of colors.

Content Innovations: The State of Affairs

The hectic description of innovative games presented in the previous paragraphs points to a number of general tendencies. We can say that the period discussed above is dominated by three different genres: maze games (after the model set by *Pac-Man*), climbing and obstacle games (à la *Donkey Kong*), and space wars (the *Space Invader* genre). Having noted this, it is remarkable that almost all genres known today already existed in a prototypical form in the early 1980s.

Grand Prix Monaco (Sega, 1979) and *Pole Position* (Namco, 1982) are examples of simulation games that managed to break through in the arcades. In the console market a number of soccer and basketball simulations did well. Simulation games became more and more realistic due to increased computing power and the use of ever-improving content-related techniques, such as the use of perspective to display depth on the screen (Herz, 1997, pp. 29–30). The genre of the graphical adventure game got off the ground, in the wake of games such as *Adventure* (Atari, 1978), that was a logical succession to traditional text-based, narrative computer games. A number of titles followed that,

despite their limited graphics and narratives, managed to find an opening in the console and (especially) the game computer market. We should remember *Wizard of Wor* (Midway, 1981) and *Venture* (Exidy, 1981), which both incorporated the adventure theme into a maze game. This period also saw the rise of the role-playing game. A number of computer games were created, based on the rules of *Dungeons and Dragons*, with *Akalabeth* (California Pacific, 1979), and its successors, the first two games in the *Ultima* series (California Pacific, 1980, and Sierra, 1982) as key examples. Also worth mentioning are the games in the Epyx *Dunjonquest* series: *The Temple of Apsbai* (1979), *Hellfire Warrior* (1980), or *The Curse of Ra* (1982). Finally we should make notice of a founding father in the genre of thinking games (*Qix*, by Taito in 1981) and a number of primitive “first-person shooters” (*Battlezone* and *Tempest*, both by Atari in 1981).

It is interesting to see how these different genres each found their way into different market segments. We already mentioned that adventure games scored well on the home markets. Arcades turned out to be suitable for action and simulation games, whereas maze and climbing games were predominantly found on handhelds.

Technical Innovations: The Evolution of the Home Console and the Rise of Handhelds

Home Consoles: Atari, Mattel, and Coleco In the period 1977–1982 a whole range of consoles saw daylight that were similar to the Atari VCS. With the exception of the Mattel Intellivision, they were eight-bit systems that used higher screen resolutions and faster internal connections to graphically outperform Atari’s console.

The first system that truly attacked Atari’s monopoly position was Mattel’s Intellivision in 1979 (figure 2.3). Intellivision stood for intelligent televi-

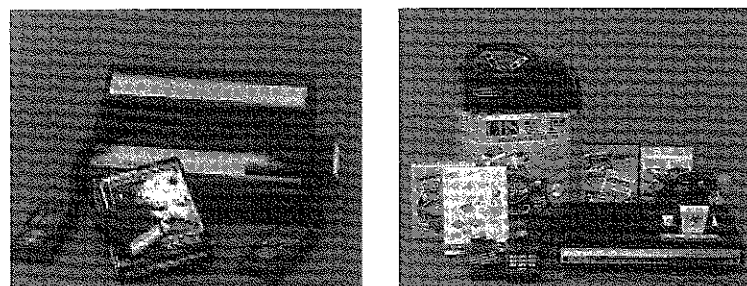


Figure 2.3 | Atari’s competitors: The Intellivision (left) and the Colecovision (right)

sion, a name that the console, graphically speaking, absolutely lived up to. The console was built around a sixteen-bit processor and contained a much more complicated chip structure than any of the other game computers and consoles of the time (Brown, 1998).

The launch of the Intellivision was followed by a period of fierce competition between Mattel and Atari (Brown, 1998). This battle was fought both on the hardware and the software front. Both companies would regularly introduce new technical gadgets to give their respective machines the competitive edge, simultaneously trying to produce as many quality games as possible. Atari had an extensive arcade department at its disposal and managed to convert a large number of games for use on the 2600. Mattel followed a different route. It specialized in sports simulations, a genre in which its superior graphical capacities truly paid off, and made lots of deals with sports clubs and associations (such as the NBA) to use the names of the players and teams in their games.

In June 1982, a third competitor entered the battlefield: the Colecovision by Coleco (figure 2.3). The console, which was an eight-bit system, was presented as being less mainstream than its two competitors and managed to obtain a solid market share by converting a number of lesser-known, but nonetheless good arcade games (Brown, 1998). In 1983, Coleco even sold more consoles than the other two companies. In 1982, Atari introduced its new console: the Atari 5200. This system contained a number of improvements compared to the 2600, without truly causing a graphical revolution.

During the early 1980s Atari, Mattel, and Coleco dominated the console market and they did not tolerate much competition from others. The story of the Channel F 2 (the successor of the revolutionary 1976 system) was typical of the situation: again Fairchild’s console did not manage to get a grip on the market, and it disappeared as suddenly as it had appeared.

Handhelds The honor of having produced the first-ever handheld goes to toy manufacturer Milton Bradley (MB) for producing *Simon* in 1974. *Simon* was actually a cross between a true video game (controlled by a computer program) and a regular mechanical toy. The game consisted of a platform with four buttons, each button producing a specific sound. The player could (re)produce melodies by pressing a certain combination of buttons in a certain rhythm.

A few years later, Mattel marketed a number of handheld sports simulations. These miniature systems were graphically greatly inferior to the consoles of the time and the available batteries could only guarantee fifteen minutes of playing pleasure. Owing to these two factors, handhelds had a rather slow start in the late 1970s.

In 1980, Nintendo started its “Game & Watch” series, causing the great turnaround for handhelds. Inspired by the miniaturization of calculators, the Japanese company used LCD screens that allowed the device to be kept small. Although the first Game & Watch games used only one screen, there were two screens after 1982. Although Nintendo ran into similar problems as Mattel several years earlier (most importantly the still limited graphical capacity), it managed to create a market for its product for a number of reasons. The Game & Watch series did not, at first, aim to produce graphically challenging games such as sports simulations, but marketed adaptations of climbing and obstacle games. Nintendo marketed these games as the cheap and handy counterpart of the expensive consoles that were sometimes difficult to control. It was largely this positioning that gave the handhelds a big push in the right direction (Sheff, 1993, pp. 110–112). The biggest successes in the Game & Watch series were a number of conversions of *Donkey Kong* and cartoons such as *Mickey Mouse* and *Popeye*.

Game Computers: Apple, Commodore, and the Rest

What the 1960s had been for computers in general, the 1970s were for the *personal* computer. As chips became ever smaller and cheaper, it became possible to market compact computers for a reasonable price (LaMorte & Lilly, 1999). Additionally, companies such as IBM finalized techniques such as the floppy disk system. In the 1970s, IBM as well as MITS³ launched their first “personal computers” (the term PC was introduced in 1981, before which these machines had been referred to as *microcomputers*). For the evolution of video games, however, two other companies that

brought out their own microcomputers were of great importance: Apple and Commodore.

Steve Jobs, a friend and former colleague of Nolan Bushnell, and Steve Wozniak established Apple in 1976 (Hunter, 2002). That same year saw the marketing of their first microcomputer, the Apple I. Between 1976 and 1983, as many as five different computers were launched, the Apple II becoming most popular (Patterson, 2000). Distinguishing themselves from other microcomputers thanks to their graphical capacities, Apple computers were highly suitable as a platform for video games. The most famous Apple games of the time were adventure games such as the *Zork* and *Ultima* series.

Commodore, a company that originally produced typewriters and calculators, produced a series of microcomputers during the late 1970s and early 1980s. Like Apple computers, they were user-friendly and relatively inexpensive. In scientific circles, Commodore computers were considered inferior machines, and, just like Apple, Commodore sold most computers to a gamer public. Commodore also produced a whole sequence of computers, most importantly the PET (1977), the VIC-20 (1981) and the Commodore 64 (1982) (X, 2002a). On the games market they scored with conversions of hits such as *Frogger*, *Pac-Man*, and *Battlezone*. Because Commodore managed to offer good visual quality for a relatively low price, it reached a large public and positioned itself as a counterpart to the expensive consoles, just like the handhelds.

At the time, microcomputers offered a number of advantages over consoles. Although all machines were 8-bit systems, the Apple and Commodore machines had somewhat more processing power than the consoles produced by Atari, Mattel, and Coleco. Additionally, they offered broader functionality. Many youngsters were introduced to the world of computers and programming languages by writing their first simple computer programs for the C-64 or the Apple II. Consequently, it is not a great surprise that certain console manufacturers tried to enter the home computer market. With the Odyssey II, Magnavox was the first to market a console with a keyboard, partly closing the gap between the two formats (Brown, 1998). It was, however, still a specialized gaming console, and it could not be considered a real computer. Atari, on the other hand, developed an entire series of machines with their own operating systems that would run applications in addition to games. Among them were the Atari 400 and the Atari 800 (both 1979) (Brown, 1998). In the

early 1980s, a number of improved versions followed, namely the Atari 600 XL and the Atari 1200 XL. Although the Atari sequence and the Odyssey II were responsible for decent sales figures, they never posed a serious threat to the popular consoles and game computers of the time.

Innovations in the Industry: The Declaration of Independence of Developers

In the early period of video game history, companies such as Atari and Magnavox took care of all aspects of the development of a game, from conception to distribution. Throughout the 1970s and especially during the 1980s, this situation changed. We already indicated that many Japanese companies relied on American distributors to run their operations overseas. Companies such as Midway are examples of the gradual disconnection of production and distribution.

This period witnessed a remarkable increase in the number of independent developers who produced games for a specific format and marketed these games without any involvement of the hardware manufacturer. The most famous example is Activision, a company that was established by a number of programmers that left Atari with a thorough knowledge of the programming language for the Atari 2600. They developed games for the 2600 and marketed them without any Atari involvement (Hunter, 2000). Another example is Imagic, established by former Mattel employees that developed games for the VCS and the Intellivision.

Before long, distributors, console manufacturers, and developers started to collaborate. Each of the three parties benefited from a quick and efficient division of labor and exchange of information. Developers needed the technical specifications of the different consoles, distributors needed a license for using and distributing the source codes, and the console manufacturers saw the economic value of their console rise with the increased availability of good games. In the long run, this change in the market structure was to have a positive influence on the games industry as a whole.

1983–1989: A Second Crisis Guides the Industry into the Nintendo Era

Early in 1983, not even five years after the first crisis, the industry went into a second recession. This crisis was more radical than the previous one, as it was deeply rooted in the 1982 market situation. Its effects had far-reaching consequences for the structure of the different market segments. Despite the economic shift, technological progress continued, however, and genres that

had taken shape in the years before were developed further.

1983–1985: Crisis

In the mid 1980s, the industry was faced with a large setback: sales figures went down from \$3 billion in 1982 to \$2 billion in 1983, and made a free fall in the years 1984 (\$800 million) and 1985 (\$100 million) (De Meyer, Malliet & Verbruggen, 2001, p. 58). In three years' time, turnover went down by 96 percent, to a level below that of 1979. The crisis was due to the overproduction of software, rather than to the overproduction of hardware (as in 1978). Too many games were available. The console market especially contributed greatly to this problem, as Atari, Mattel, and Coleco were trying to compete by spewing out as many games as possible. The market was flooded with too many average games and too many poor variations on the same concept, and the public massively lost interest in computer games. Certain companies responded to the crisis by dumping their games at extremely low prices, causing a domino effect that would not come to a standstill until 1986.

Again a large number of companies ran into serious problems. The games industry faced some hectic years characterized by takeovers, changes in corporate structure, disputes, and eventually the rise of a new superpower.

Mattel's games department was taken over by Odd-Lot Trading, a company specialized in second-hand trade, and was renamed Intellivision Inc. Toy manufacturers Milton Bradley (MB) and Hasbro, both active in the arcade market, fused, and swallowed Coleco in 1988. Warner sold 60 percent of Atari's arcade department to Namco, one of its competitors, and 75 percent of its console and computer department to Jack Traniel, the former CEO of Commodore. Corporate disputes were a frequent phenomenon: in 1982, Coleco sued Atari for monopoly formation. Some time later, Mattel did the same, also accusing Atari of stealing trade secrets from Mattel employees. In turn, Atari sued its former employee Nolan Bushnell, for breaking past agreements. And finally Coleco, Atari, and Nintendo started fighting over the rights to produce *Donkey Kong* for game computers (De Meyer, Malliet & Verbruggen, 2001, pp. 67–68).

The situation stabilized around 1986. Turnover gradually started to climb again and several market segments began to show a new structure. The big winner was Nintendo, the company that had already scored big with *Donkey Kong* in the early 1980s. In the second

half of the 1980s, Nintendo would be the absolute leader in the console and handheld market (Selnow, 1987, pp. 23–24).

The Console Market: Nintendo Dominates, Sega and Atari Compete

Nintendo: The Famicom, the NES, and Shigeru Miyamoto Not paying any heed to the general malaise in the United States, Nintendo put a new console on the market in 1983: the Famicom. It was another eight-bit system, but thanks to its separate processor for graphics, it meant a large step forward with respect to image processing. In Japan, the console soon became a big hit. The success was largely due to a game called *Mario Bros.*, which (re)wrote some of the rules of how a good console game had to be put together (Sheff, 1993, pp. 36–54).

Shigeru Miyamoto, the man who had been responsible for *Donkey Kong*, also developed *Mario Bros.* The game had the same main character as *Donkey Kong*, a plumber called Mario, who was now forced to share the spotlight with his brother Luigi. Mario quickly became a true video game star, just like Pac-Man a few years earlier. He became the figurehead of Nintendo and everything the company stood for. In contrast with Pac-Man, Mario was not an abstract disc, but an actual person with a family and a job. His appearance was inspired by cartoons in the Japanese manga tradition, giving Mario a high cuteness factor that helped set Nintendo's reputation as the video game equivalent of Disney (Horwitz & Miller, 2001).

As a game, *Mario Bros.* leaned heavily on the existing climbing and obstacle games, such as *Donkey Kong* and *Joust* (1982, Williams). Similar to those games, the players would start at the bottom of the screen and would gradually climb to the highest of a number of platforms. The game could also be played in multi-player mode: two players each controlled one of the two brothers and they had to cooperate to finish the game. Furthermore *Mario Bros.* used a new reward system: instead of playing the same game over and over again at ever-increasing speeds, the players would enter new levels. Upon reaching the end of a screen, they had to start again at the bottom, but in a slightly different setup: new opponents, new obstacles, sometimes even a new goal. The level system was still rather rudimentary, but in the years to come it would develop into a fixed ingredient in many games in the platform and obstacle genre.

This brings us to the next game in the Mario sequence, *Super Mario Bros.* (1985), also developed by

Shigeru Miyamoto. The game made optimal use of the Famicom and was much more complex than the first Mario game. It became one of the most essential platform games ever. *Super Mario Bros.* combined techniques that up to that point had only been used separately in specific genres. The game also realized Shigeru Miyamoto's vision of the computer game as an interactive cartoon.

The level system was taken to new heights as *Super Mario Bros.* consisted of no fewer than eight worlds, spread out over thirty-two levels. The game's movements were both horizontal and vertical: Mario moved from left to right (using the scrolling technique used in the space war games), but at the same time he had to climb all kinds of platforms, pillars, hills, and the like. During his search for the princess he would run into a wide scope of opponents (each of a different species, name, and intelligence) and he could eat certain "power-ups" to increase in strength. The highly detailed background had, up to that point, occurred mainly in simulation games.

In 1986, *Super Mario Bros.* was the game that managed to revive the American games industry. This year saw the release of the Famicom in the United States under the name of Nintendo NES, and the accompanying large-scale advertisement campaign surrounding Mario caused the public to run back to the stores to buy video games in large numbers. The NES was a true hype, making Nintendo the biggest player on the video games market for the next five years (Sheff, 1993, pp. 139–150).

In Nintendo's Footsteps: Atari Licks Its Wounds, Sega Gets a Foot in the Door With *Super Mario Bros.*, Nintendo not only created a very influential game, but also laid the foundation for a completely new business model (Sheff, 1993, p. 67). Due to the growing demand for NES games, and the increased complexity of the games, it became impossible for Nintendo to be responsible for the development of all of its games. This resulted in greater cooperation between console owners and developers. Thanks to the immense popularity of the NES, Nintendo was in quite a favorable negotiating position, the result being that whoever wanted to develop a game for the NES was not allowed to do business with any other companies for the duration of their agreement. In addition, there was Nintendo's policy to give the highest priority to the quality of the games produced, rather than to the number of games produced. Nintendo's name had to be a guarantee for good games, and consequently this company did not

walk into the same trap as its predecessors Atari, Mattel, and Coleco had done.

The “big three” of the beginning of the decade had a hard time recovering from the crisis and never managed to step out of the shadow of the NES. The successor of the Intellivision, the INTV III came onto the market, and although it accounted for considerable sales figures (in 1986, it registered more than \$6 million worldwide), it wasn’t able to step out of the shades of Nintendo (Brown, 1998). In 1984, Coleco stopped the production of the Colecovision and entered the game computer market, albeit with little success (Brown, 1998). Atari was the only one of the three that managed to keep up with the pace of its Japanese counterparts, even though it was only a shadow of the superpower it was in the 1970s. The Atari 7800 was a console that was technically comparable to the NES, but contentwise, Atari completely lost track. It kept on bombarding the market with old arcade conversions and did not manage to appeal to the new, young crowd that Nintendo had managed to reach (Brown, 1998).

Nintendo’s biggest competitor turned out to be another upcoming company, called Sega. This Japanese arcade-king became involved in the American console market in 1986, when it launched the Sega Master System: another 8-bit system, which was technically slightly superior to the NES (X, 2002b). Sega had to content itself with a second place, though, as the best game developers already had exclusive agreements with Nintendo, forcing Sega to score with games from their own arcade department.

Handhelds: The GameBoy Revolution

On the handheld market, Nintendo’s dominance was even more absolute. The company had already been the biggest player with the Game & Watch series, but caused a true revolution in 1989 when they launched the GameBoy. The GameBoy was for the handheld what the Channel F and the Intellivision had been for the console: it introduced the cartridge system and greatly increased the graphical possibilities of the format (X, 2002b). Technically, the GameBoy was the first true “handheld game computer” and it used the same chip structure that is still found in today’s handhelds.

Paradoxically, it was a very simple game called *Tetris* (developed in 1985 by Russian mathematician Alexei Pajitnov) that brought about the breakthrough of the GameBoy. After a legal battle that dragged on for several months, Nintendo obtained the rights to develop this game for its handheld, and used *Tetris* as the top game for the GameBoy (Jacobi, 1996; Sheff, 1993,

pp. 174–192). *Tetris* went on to become one of the most popular video games of all time. This was a great surprise, because it deviated in all possible ways from what would be considered a “hip” game. To explain the success, a psychological theory was developed that claimed that the game satisfied the fundamental human need to create order in a world full of chaos. Furthermore, *Tetris* proved that a scoring system could greatly contribute to the attractiveness of a computer game, and that complexity and violence are not necessary ingredients of a good game. Whatever the case may be, *Tetris* meant the breakthrough of the puzzle game, a genre that had existed for years, but had never been considered a fully fledged complement of the climbing games or space wars.

Game Computers and Adventure Games

Initially, game computers had been considered an important cause for the crisis that occurred in the mid 1980s. Graphically they were more powerful, they had a broader functionality, and their price was comparable to that of the better consoles. The argument was that PCs were inherently better than consoles and therefore it was pointless to buy one. If we look at the second half of the 1980s, however, we see that game computers and consoles simply developed along different routes, rather than interfering with each other.

Especially after the arrival of the Amiga (Commodore, 1986), the Macintosh (Apple, 1984), and a whole sequence of IBM PCs (1981, 1983, 1985), personal computers were indeed ahead of the consoles of the time with respect to processing capacity (LaMorte & Lilly, 1999; Brown, 1998). The games that helped make these computers so popular, however, differed from the typical console games. During the 1980s, PCs turned out to be more suitable for games built up around a story requiring a lot of memory activity and controlled by keyboard or mouse.

“Keep Searching”: Adventures, Quests, and Rambles

The honor of having thought up the first graphically controlled adventure game goes to a woman, Roberta Williams (X, 1994). In 1979, she and her husband Ken Williams started a small development company called Sierra-On-Line. In 1983, they created *King’s Quest*, an adventure game with an unprecedented graphical capacity. The game used the sixteen-color image processing techniques of the time to display the game’s world in great detail. The main character (a knight called Graham) was no longer an icon on an abstract screen, but a colorful silhouette in a colorful environment. He

could be directed using the cursor key, and players could type commands to make him perform certain actions. This form of interaction often led to frustration (as it sometimes took hours to find the appropriate command for a certain action), but it was highly influential during the mid 1980s. Sierra-On-Line produced two sequels (*King’s Quest II* and *III*), and a range of other games (*Space Quest I–III*, *Leisure Suit Larry I–III*, and *Police Quest I–III*) that all worked in a similar way.

Sierra-On-Line was the sole supplier of adventure games until Lucasfilm Games (later renamed LucasArts) employee Ron Gilbert developed a new navigation technique in 1987 (GameSpy Staff, 2002; Roschin, 2002). This was the “point-and-click” technique, which allowed the player to communicate with the game using the mouse rather than the keyboard. The point-and-click technique signified a radical break with the conventional way of working. Instead of specifying left/right and up/down with the cursor keys, it sufficed to click somewhere on the screen and the computer would move the character to the designated location on the screen. This technique turned out to be very suitable for games in which the player had to do a lot of exploring, but was less appropriate for games that depended on quick action. It introduced a kind of intuitive storyline to the adventure genre and it did away with text commands once and for all.

Toward the end of the 1980s, LucasArts became known as an important developer of point-and-click adventure games, consecutively producing *Maniac Mansion* (1987), *Indiana Jones and the Last Crusade* (1989), and *The Secret of Monkey Island* (1990). All these games combined a quick rhythm with a good dose of comedy. Sierra-On-Line, too, successfully switched to the new formula and produced many (some would say, too many) follow-ups in the *Quest* and *Larry* series.

“Everybody’s God to Me”: Strategy Games With the emphasis shifting to story telling and the introduction of the point-and-click technique, the 1980s provided a breeding ground for one of the most addictive genres ever: the strategy game. This genre is inextricably linked to a technique introduced by *Zaxxon* in 1982. *Zaxxon* used isometric perspective, a way to build up the screen that was greatly undervalued at the time and was only recognized for its full potential later. In games using the isometric perspective, the action does not take place parallel to the edges of the screen, but at an angle of about 30°, a technique creating the optical illusion that some of the objects could jump out of the plane (Yesterdayland, 2000). Literally speaking, the isometric

perspective was not a perspective in the true sense of the word, because distant objects were just as large as those in the foreground and all lines on the screen were parallel.

The isometric perspective introduced a new way of looking at things, namely the third-person total overview. As opposed to regular (frontal) third-person points of view, the player would get the impression that the playing field was an endless plain. The player would be somewhere at the top right corner and could observe everything in its totality. Between 1989 and 1990, three groundbreaking games were developed that managed to incorporate this total overview as a functional game element: *Populous* (Peter Molyneux, 1989), *SimCity* (Will Wright, 1988), and *Civilization* (Sid Meier, 1990). The narrative of these three games was totally different from the quest structure that was most common at the time (GameSpy Staff, 2002). The player does not control an individual character, but an entire population. The aim of the game is to bring your people to the highest possible level of development by making strategic decisions. You were almost literally an almighty god in the game’s world. By now it is commonly accepted that *Populous*, *SimCity* and *Civilization* laid the foundation for a totally new genre: the strategy game, or “god game” (as they were also known at the time).

The Legend of Zelda Before we move on to the arcades, we would like to point out that in the 1980s, adventure and role playing games were not exclusively available for the PC. Adventure stories were also developed for consoles, and we can be especially grateful for *The Legend of Zelda*, yet another creation of Shigeru Miyamoto, which was brought out for the NES in 1986.

At first sight, *Zelda* looked like a crossover between a platform game, à la *Mario* (on which the controls were based), a searching game, à la *King’s Quest* (on which the storyline was based), and a role playing game in the tradition of *Ultima* or *The Temple of Apsbai* (on which the character structure was based). It was especially this last characteristic that made *Zelda* a somewhat exceptional game in the console market. The player had to solve all kinds of puzzles and earn power-ups, just as in many other games. In *Zelda*, however, the impression existed that these activities were not an end in themselves, but small steps toward a greater good, namely building up a strong character. Therefore, *The Legend of Zelda* meant a major breakthrough of the role playing game genre to a mass audience.

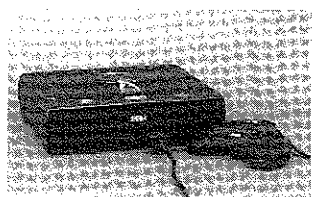
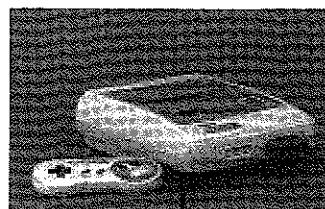
“Beat Me Out of It”: Arcades, the Violence, and the Reputation

In the 1980s, arcades clearly fell behind PCs and consoles. Even though the Japanese Amusement Machine Manufacturer’s Association (JAMMA)⁴ standard for arcade architecture and the introduction of laser discs signified considerable steps forward, this format was unable to follow the pace of its two competitors. Arcades managed to survive mainly because their games attracted a rather specific, but dedicated target audience.

The 1980s formed the heyday of the traditional “beat ‘em ups,” a genre based on different martial arts movies. Players had to control a fighter as quickly and inventively as possible in order to beat as many opponents as possible. The one who could beat the most opponents or stay alive the longest scored the most points. Beat ‘em ups, with *Street Fighter* (Capcom, 1987) and *Double Dragon* (Technos, 1987) as two prime examples, extensively used the scrolling technique and required large amounts of skill (Yesterdayland, 2000). They appealed to a specific audience and aroused a lot of worried reactions from parents, politicians, the media, and other authorities in the conservative 1980s (Le Diberder & Le Diberder, 1993, pp. 149–158). The criticism was mainly based on the “dark” milieu in which arcade games were generally played and the interactive way these games dealt with violence. Passively experiencing violence on television was already considered extremely harmful, and this obviously applied all the more to games that “taught” youngsters to violently knock down all opposition they encountered.

1990–1999: The War of the Bits

Technological innovation has always been the force pushing video games to new heights. The cartridge system in the 1970s and the PC and the increasing screen resolutions in the 1980s greatly influenced the entire video game industry. However, when comparing these developments to those that took place in the 1990s,



| Figure 2.4 |

The instigators of the “war of the bits”: The Nintendo Super NES (left) and the Sega Mega Drive (right).

they were little more than careful steps in an evolution that would soon go out of control.

During the 1990s, the bit capacities of PCs as well as consoles grew exponentially. New methods of visual processing were developed allowing computer generated images to achieve an unprecedented level of precision. Existing genres mainly improved quantitatively; year after year games became more complex and average playing time increased. In addition, the money flow generated by computer games grew to such a level that at the beginning of the twenty-first century, the turnover of the games industry exceeded that of the film industry (*USA Today*, May 23, 2002).

A detailed description of everything that happened in this period could fill an entire chapter, or even a book of its own. This is why we have decided to limit ourselves to describing only the most fundamental changes with respect to the periods already been discussed. We will first describe how the industry entered this chaotic acceleration, both technically and economically; then we will take a closer look at some of the content-related changes.

“Stop This Crazy Machine”: The Story of an Industry Unleashed

The 1989 Mega Drive, Sega’s answer to Nintendo’s Entertainment System, is generally seen as the instigator of the “war of the bits” (figure 2.4). The machine, named Genesis in the United States, was built around a 16-bit processor, and technically speaking it was superior to the NES (X, 2002b). Sega used these capacities to produce a number of fast, rhythmical games. We remember *Sonic the Hedgehog* (1991) and *Virtua Racing* (1992), but also lesser-known games such as *Toejam and Earl* (1993), games that were aimed at the teenager market. “More Rock and Roll, Less Disney” seemed to be Sega’s motto. Sonic the Hedgehog (from the game of the same name) became the sparkling opponent of “good old” Mario, and gave Sega an image that turned out to be quite lucrative (Horwitz & Miller,

2001). In 1991, after five years of Nintendo dominance, Sega’s Mega Drive finally overtook the NES as the best-selling console.

Nintendo’s reaction came that same year. The NES was succeeded by the Super NES (figure 2.4), also a 16-bit system, which was equivalent to the Mega Drive with respect to processing power (X, 2002b). Games such as *Super Mario World* (1991), *Donkey Kong Country* (1994), and a number of RPGs in the *Dragon-Quest* and *Final Fantasy* series had highly detailed graphics and extensive virtual worlds. Whereas Sega focused on rhythm and game structure, Nintendo turned out to be an accomplished producer of technical tours-de-force with respect to landscapes, background images, and the like. Both competitors raced neck-and-neck, which had great consequences for the market structure (Games Investor Staff, 2004).

With Nintendo losing its comfortable monopoly position, it was unable to uphold its strict licensing politics. Game developers had more freedom, a fact that was further enhanced by a whole range of programs and devices that became available to simplify programming in the different programming languages. As the production and distribution processes became increasingly more complex, a third player entered the market, namely the game publisher (De Meyer, Malliet & Verbruggen, 2001, p. 154). Traditionally, publishing had been the task of a separate division of producers or developers, but now a number of companies stood up that specialized in publishing games for others.

Even though a number of other 16-bit systems were available at the time (i.e., the TurboGraphics by NEC, and the Neo*Geo by SNK from Japan—both impressive consoles with disappointing games), the big two did not run into serious competition until 1994, when Sony introduced the revolutionary PlayStation, a console that had everything necessary to sweep the market. Equipped with a 32-bit processor, the PlayStation technically took another large step forward (X, 2002b). Due, in part, to an intensive cooperation with developers such as Namco and Squaresoft, Sony’s machine managed to live up to the expectations. In two years, Sony sold more than 30 million PlayStations and more than 200 million games around the world (De Meyer, Malliet & Verbruggen, 2001, p. 150).

One of the most important innovations introduced by the PlayStation was the fact that the console no longer used (specialized) cartridges, but read its games from the general CD-ROM format. This method, which Sega and others had previously tried, offered many advantages, but had one major disadvantage. On

the one hand, the PlayStation was an “all-around” machine. It could be used as a CD-ROM player, providing an extra incentive for many people to buy one. Furthermore, the capacity of a CD-ROM is vastly larger than that of a cartridge. On the other hand, Sony spoon-fed the software piracy industry by using the CD-ROM format, and it became easier than ever to produce illegal copies of video games.

Initially PlayStation’s fiercest competition came from two consoles that each meant the beginning of the (slow) end of two manufacturers: the Atari Jaguar (1993) and the Sega Saturn (1994). The first of the two can be considered Atari’s final attempt to renew its grip on a market that had escaped its clutches several years earlier. With the Jaguar, the first 64-bit console ever, it had a superior console at its disposal, but the games Atari produced predominantly scored criticism (Jacobi, 1996; X, 2002b). Sega’s Saturn, a 32-bit machine just like the PlayStation, was a different story, typical for Sega’s future. It was an excellent console, nobody doubted that, and they came out with some beautiful games that, according to some, were better than those for the PlayStation, but it just never managed to come close to Sony’s sales figures. Several erroneous marketing and management decisions were held responsible for this lack of success (Games Investor Staff, 2004).

Nintendo fared a little better with its introduction, in response to the PlayStation, of the Nintendo 64. This console pushed the capacities of game computers to an even higher level. Sales figures were not as expected however, mainly because Nintendo had decided to stick to the cartridge format instead of making the move toward the CD-Rom as a carrier of its games software. For reasons of efficiency and compatibility, many developers preferred the PlayStation and the Sega Saturn as their favorite platform. The Nintendo 64 was forced to thrive on conversions of older games, and suffered a shortage of new games (Horwitz & Miller, 2001). Another problem for the Nintendo 64 was caused by the PlayStation already being present in millions of living rooms and having already saturated a large part of the market.

A final console that was launched in the 1990s was Sega’s Dreamcast, the successor of the Saturn. The story of this console is even more astonishing than that of its predecessor. The Dreamcast was not just a console with slightly enhanced capacities, it was technically vastly superior to any of its competitors, with a 128-bit processor, the capability to connect the console to the Internet, unprecedented storage capacity, and so on. Sega also published a number of excellent games to

accompany the console. Still, sales did not live up to the expectations by a long shot, yet again thanks to a variety of economic reasons. In 2001, Sega decided to stop producing the Dreamcast and to leave the console market for good.

Different Formats: Different Forms Evolve at Different Rates

The console market was subject to a hectic succession of developments, and the question arises how the other market segments evolved. When trying to answer this question, it becomes apparent that each market segment developed at a different pace. Most techniques that the consoles rely on are based on PCs and computer technology; it is therefore no surprise that this sector evolved at least as rapidly. Handhelds and arcades, by contrast, fell behind during the 1990s, each for their own specific reasons.

Without going into too much detail, it is safe to say that the capacity and applicability of PCs developed at an astonishing rate. With the Pentium series (by Intel) and the PowerPC (by IBM, Apple, and Motorola) in the lead, a number of architectural standards were developed that served as the model for many powerful machines (Patterson, 2000). As in consoles, the PC's bit rates increased immensely, and the rate at which the processors could process instructions skyrocketed. From the second half of the 1990s on, the PC world was largely dominated by Microsoft, which managed to monopolize the commercial market with the Windows operating system. Due to the success of Windows and the increasing power of PCs in general, the position of Apple and Commodore machines on the game computer market gradually eroded. Ever-increasing processing capacity eliminated the difference between "serious PCs," predominantly aimed at data processing applications, and "recreational PCs," which specialized in graphical applications.

Another breakthrough in the field of home computing was the rapid rise of the Internet in the 1990s, which became an important element in the recreational applicability of computers.

The format of the handheld evolved at a more moderate pace. Although many competitors entered the market, some of them with relatively advanced machines, Nintendo managed to maintain a good grip on the market. The Atari Lynx (as early as 1987), the NEC TurboExpress (1990), and the Sega GameGear (1991) had a color screen, whereas the GameBoy was a black-and-white machine. Furthermore, the latter two were technically much stronger than Nintendo's hand-

held (X, 2000b). Both had been designed as a compact version of their bigger brothers (the TurboGraphics and the Master System, respectively). These handhelds were also regularly supplied with quality games, but still neither became a commercial success. Once again the reasons were bad timing and the wrong marketing strategy.

If we disregard the Virtual Boy (1995), an experiment with handheld virtual reality that was not quite compact enough to actually be considered handheld, Nintendo did not introduce the GameBoy's successor until 1998. This was the GameBoy Color, which was almost literally what its name suggested: a GameBoy with a color screen. Architecturally it was almost identical to its predecessor, except for a faster (32-bit) processor, and some additional memory capacity (X, 2000b).

Because the GameBoy mainly scored with platform-based action games (after the classics from the 1980s), there was no need for drastic innovations. Nintendo's comfortable position in the handheld market throughout the 1990s can be held responsible for the limited evolution of the handheld format during this period.

Throughout the 1990s, arcades continued to be pushed to the background. With their increased capacities, growing graphical quality and the possibility to be connected to a network, consoles and PCs took over the role of main supplier of action games (Jacobi, 1996). This development coincided with a reduction in the number of arcades due to the increasingly strict legislation concerning gambling and game machines that was adopted in many countries. The arcade as a format for video games is more and more becoming an icon of a time long gone, for which there is little place in the current landscape.

3D Takes Over

The previous two sections reveal the clear tendency that the success of a format or a company depended more on the content of the games that were produced, than on the rapid succession of technical innovations. It is therefore no surprise that the 1990s also witnessed a number of changes with respect to content.

"Blood on the Tracks": Violent Action in a 3D-World

In 1992, a developer called ID Software shocked the world by introducing *Castle Wolfenstein 3D*. The commotion that this PC game aroused not only stemmed from its highly violent content, but also from the fact that the action took place in a world that was totally

three-dimensional (Poole, 2000, p. 136). In contrast with earlier games that already used perspective or an isometric standpoint, this did not just mean that there was depth in the images. 3D meant that the player could actually manipulate and explore the image. In *Wolfenstein 3D* each wall existed in three dimensions, and it was possible to walk around it. This possibility did not exist in any of the two-dimensional games produced before.

The technique that was used to program *Wolfenstein 3D* was the perfected and refined form of the technique that was used ten years earlier for *Battlezone*. Central to this technique is the use of "polygons." The objects on the screen are no longer prints of images that are displayed, but transformations of a mathematical model. Inside the computer, the objects on the screen are a collection of polygons (usually triangles or rectangles) in a three-dimensional coordinate system. The graphics of a primitive 3D game, such as *Battlezone*, give a good idea of what this is like. One can clearly see how the tanks and rocks are little more than a number of points connected by lines.

As can be seen by looking at the graphics of the two games, *Wolfenstein 3D* employed far more advanced techniques than *Battlezone*, but in the end it comes down to the exact same principle. In *Wolfenstein* the visible figures consisted of far more polygons and were therefore visualized far more accurately. They were also colored, and looked less naked and skeleton-like than the tanks in *Battlezone*. At the time of *Wolfenstein 3D*, PCs were also sufficiently powerful to produce more fluent visual transitions, to add shadow, and so on.

With successors such as *Doom I* (1993), *Doom II* (1994), *Quake I* (1996), *Quake II* (1997), and *Quake III* (1999), ID Software further perfected their 3D-exploration techniques, and built (on its own) the foundation for a new genre: the first-person shooter (FPS) (GameSpy Staff, 2002). In addition to their dimensionality, FPS games differed from the beat 'em ups from the 1980s in a number of ways. They were the first genre to use a first-person standpoint, which managed to directly involve the player in the game. They required the player to be quite skillful, and eventually reached a very high level of realism. The levels of violence put on screen surpassed those seen in most karate or boxing games, mainly because it was portrayed rather expressively; it is self-evident that first-person shooters were the subject of fierce criticism throughout the 1990s.

Another innovation introduced by ID was the possibility of online gaming. *Quake* was the first game

that could be played over the Internet, giving players the opportunity to fight real opponents, instead of computer-driven characters (Morris, 1999). Games like *Doom* and its successors also allowed players to become co-authors of the in-game world. Programming languages like QuakeC were distributed and documented over the Internet, and whoever was able to master those languages had the possibility of writing new worlds for the game, or of making new skins⁵ for his or her character. Some of these additions, not created by the original team of developers but by enthusiastic fans, have grown to lead a life of their own, available as add-ons or modulations (mods) to the original game (e.g., *Urban Terror*, which is an extension of *Quake III: Arena*).

3D in Other Genres: Sports Games and Action Adventures

Among the major genres that had been established during the 1980s, there were two that gained considerably from the new image processing techniques: simulation and adventure genres.

In the 1990s, simulation games, and sports simulations in particular, became quite lucrative for many companies. With realism and "congruence with human intuition" being important criteria for such games, working with polygons was a perfect technique for developers. Especially toward the late 1990s, as bit rates increased, the popularity of sports simulations grew considerably. Electronic Arts, a game publisher that grew tremendously thanks to such series as *NBA Basketball*, *NHL Hockey* and *FIFA Soccer*, even established a daughter company that fully concentrated on sports simulations (De Meyer, Malliet & Verbruggen, 2001, p. 74). Another important game in this genre, receiving much praise for its astonishing levels of realism, was the *Gran Turismo* racing simulator (Polyphony Digital, 1998).

The adventure genre, too, embraced 3D technology. In many cases this resulted in sluggish games lacking the primitive charm of before. One game, however, forced a breakthrough, forming the beginning of a genre that combined adventure and action in a 3D environment. This game was *Tomb Raider*, developed by Core and published by Eidos in 1996. The success of *Tomb Raider* depended less on content-related innovations than on the game's heroine: the by-now legendary Lara Croft. In no time, Lara Croft became a role model, a sex symbol, for some even a symbol of feminism. She became the front-woman of the games industry, and, like Pac-Man fifteen years earlier, lent it a less violent character. In many circles she still elicited a lot

of criticism, though, mainly for the size of her breasts. Although the success of *Tomb Raider* was largely due to its heroine, the game nevertheless managed to pave the way for a range of 3D adventure games that gave the player a third-person point-of-view.

RPG's and Strategy Games: Two-Dimensionality Lives On Not all adventure games accepted the 3D action direction. Games such as the popular *Myst* series (Cyan, 1992, 1998) mainly continued working on the puzzle aspect; point-and-click technique, too, was also still common. Two other genres that did not switch to three-dimensionality were the RPGs and the strategy games. Mainly working on developing complex narrative structures, both underwent a number of necessary changes, but in contrast with the shooters and action games discussed above, they only used the new techniques at a later stage of development to include sophisticated graphics. For the designers of these games, developing an interesting storyline was the first priority.

Role playing games specialized in constructing a complex set of rules that would allow the player to build up his own character. These rules were, among others, based on handbooks from the fantasy role playing milieu (Costello, 1991, p. 214; Poole, 2000, p. 53). Graphically speaking they developed into two sub-genres: the PC games, which used the point-and-click technique, and the console games, which stuck to using cursor keys or a joystick. In the PC game category we remember *Diablo* (Blizzard, 1996) and *Baldur's Gate* (Black Isle, 1998), the latter of which especially received extensive praise for approaching the *Dungeons and Dragons* experience so closely (De Meyer, Malliet, & Verbruggen, 2001). By far the most famous console RPGs were the *Phantasy Star* series for the Sega consoles and the *Final Fantasy* series, initially for the SNES and later for the PlayStation. Games in these series consistently grew in size and often used short films or "cut scenes" to support the storyline. This approach was regularly criticized for pushing the interactivity of a game to the background (De Meyer, Malliet & Verbruggen, 2001, p. 59).

Strategy games, too, did not immediately jump to 3D graphics, but paid a lot of attention to the storyline. Just as the RPGs, this genre split up in two groups: the god game, following in the footsteps of *Populous* and *Civilization*, and the real-time strategy game that incorporated elements of the RPGs. God games saw their storylines expand in so far that there were more and more ways for the player to steer the game in different directions. It is important to point at the violence that

sneaked into many of these games, often as a simple solution to complicated challenges. We think of games such as *Age of Empires* (Microsoft, 1997) and the successors in the *Civilization* series. A new genre that flourished during the 1990s was the real-time strategy game that can best be described as a crossover between a god game and an RPG. Real-time strategy games shared their controls with god games; as a player you controlled a large group of people and some supplies that you had to use as efficiently as possible. Often you would be the general of a large army. The storyline, however, resembled that of the RPGs. Frequently the aim of the game was to beat some evil (historical) superpower and to prevent the world from coming to an end. Real-time strategy games required the player to be able to take certain strategic decisions, thinking quickly and efficiently, because, no matter what decision the player made, the rest of the game would continue. Enemies had high levels of Artificial Intelligence, which would regularly make gameplay rather difficult. *Herzog Zwei* (Technosoft, 1989) and *Dune II* (Westwood, 1992) are the pioneers of this genre (Geryk, 1998). The true classics followed a little later with the *Warcraft* (Blizzard, 1994, 1995) and the *Command-and-Conquer* series (Westwood, 1995, 1996).

The Future: PlayStation2, X-Box, GameCube, and Beyond

To summarize everything that happened in the 1990s in a limited number of pages was anything but self-evident. And, considering the tendencies of the past years, it is even more difficult to predict what we can expect in the future. As a starting point we will use the three consoles that, for now, constitute the latest generation, and we will look at some of the promises they will have to realize in the years to come.

At the moment, the market is dominated by the PlayStation2, launched by Sony in 2000 and a big success from day one, just like its predecessor. In many countries the demand for the new console was so high that Sony had trouble producing enough new machines. It was not until 2001 that the situation stabilized, and by then more than 50 million families worldwide owned a PlayStation2. Technically speaking, the PlayStation2 is the first console that truly outperforms the PC format. The machine can process more than 60 million polygons per second⁶ and offers spectacular possibilities for game programmers. In 2002, new releases such as *Gran Turismo 3* and *Fifa 2002* have shown the tip of the iceberg of what can be

expected of game consoles in the future, and it is indeed impressive.

There are two competitors to the PlayStation: the X-Box, by Microsoft (a newcomer on the console market), and the GameCube, by old-timer Nintendo. Both competitors have managed to surpass the PlayStation2 graphically (Tyson, 2002), and bring us yet another step closer to realizing the game programmer's dream of processing 100 million polygons per second. Recent sales figures have shown, however, that these technical capacities are no guarantee for an immediate domination of the market. Although at the time of writing, the amount of games available for both consoles has already surpassed a hundred, it is still the PlayStation2 that accounts for the largest share of console sales (MCV Magazine, July 26, 2002; August 30, 2002). Since the launch of its competitors, the Sony console has managed to outsell the GameCube at a ratio of 1.5/1 (meaning that for every GameCube sold, on average, 1.5 PlayStation2s are sold), and to outsell the X-Box at a ratio of 2.6/1.

Although the X-Box and the GameCube have entered a market that is already largely saturated by the PlayStation2, the graphical capacities of both consoles have raised expectations concerning the contents of future games. High on the wish list of many developers, manufacturers, and publishers are working out a framework for online gaming, the breakthrough of virtual reality, and an increased integration of different forms of entertainment. Before we end our history, we would like to briefly discuss each of these three dreams.

With respect to online gaming, the industry can build on a formula that has already proved successful. From the mid 1990s on, many first-person shooters have expanded to include multiplayer modes, mainly aimed at network-based play. These games allow multiple (clans of) players to battle each other in a virtual 3D world. A very popular game in this respect is *Counter-Strike*, a multiplayer extension of *Half-Life*, which was published in 1999 by Valve. Role playing games, too, have been exploring the possibilities of online gaming for a couple of years. "Massive Multiplayer Online Role Playing Games," or MMORPGs, which have almost become a genre in their own right, are in fact no more than endlessly long RPGs, where, in addition to the computer-generated characters, players can also run into human players.

Both online shooters and online RPGs already have large followings, but there is still a lot of room for future development. Online players with a slow network connection will often be frustrated while play-

ing online tournaments such as *Counter-Strike*, because their characters will not respond fast enough to their commands or controls. With the increased worldwide availability of broadband network connections, these technical issues are, however, more and more becoming of secondary importance, shown in the current success of such MMORPGs as *Everquest* or *Ultima Online*. The three largest consoles of the moment seem to envisage the potential of the Internet, as the X-Box, the GameCube, and the PlayStation2 are all equipped with a network connection. They do not only see a future in multiplayer games, but also, for example, in creating worldwide databases for high scores in certain games (Antoja, 2001).

A second challenge for the future is virtual reality. Even though the theories and concepts behind VR were already developed back in the 1980s, there has not yet been a practical application that has appealed to a wide audience. In certain ways, VR is the logical successor of the polygon model, as it takes the same idea a step further. The impression that, as a player, you are actually *inside* the game, which is created by the first-person standpoint, will only be amplified by the so-called "immersion" that goes along with VR. As a player you will no longer be confined to a screen, but you will be involved in the game with several senses at the same time.

Integration and synergy are coming. Different forms of entertainment will, as they say, grow toward one another, both with respect to content and hardware. When we look at the PlayStation2, we see that in addition to being a game console, it is also very popular as a DVD player, and soon probably also as a home computer. Many companies in the entertainment industry are playing with taking this concept a step further: they see computer, television, stereo system, and game console all together into one "all-around" multimedia machine (Antoja, 2001). Contentwise, they see a future in melding more and more media into one integrated style.

There is no doubt that technology will keep on moving. According to many gamers and executives, the industry should not focus on this evolution alone, however. When push comes to shove, the contents of the available games will always be the crucial determinant of success, and one should always keep economic market forces in mind. If there is one thing to learn from the foregoing history, it is the fact that the games industry only needs a few years to completely change its appearance. Therefore, we have to be very careful in drawing any premature conclusions and we cannot end

this chapter with a big closing remark that says it all. We do hope, however, that we have offered an improved insight into the ups and downs of this new form of popular culture.

Notes

1. The PDP (Program, Data, Processor) was the first computer equipped with a monitor and a keyboard to be commercially exploited. It was introduced by Digital Equipment in 1960. By the standards of those days, it was a very compact and user-friendly machine, but compared with today's personal computers it looks very awkward. As a consequence of their size and their price, PDPs were only used at universities and research companies (Polsson, 2002).
2. In systems making use of a vector beam monitor, images are not stored in the memory as a collection of *pixels*, each with their specific color information, but as a collection of *lines*, determined by the coordinates of their beginning point and ending point. The laser beam that is built in a vector beam monitor does not continuously scan every pixel that constitutes the screen (this is what happens in a regular cathode ray tube), but draws straight lines between two given coordinates on the screen.
3. Micro Instrumentation Telemetry Systems, a company that was better known in those days than it is now, is credited for having made the first commercially successful personal computer, the MITS Altair. More than two thousand of these machines were sold in 1975 (Patterson, 2000; LaMorte & Lilly, 1999).
4. Arcade machines that follow the JAMMA hardware guidelines are no longer bound to one single game: it becomes relatively easy to insert a new piece of hardware that contains another game, without having to change the entire cabinet. Because of this property, the JAMMA standard meant to the arcade market what the cartridge system had meant to the console market (IGN Entertainment Staff, 2002).
5. The "skin" of a player's character refers to how that character is actually visualised on the screen: the color of its hair, the clothes it is wearing, its size, etc. Traditionally players had to choose between a range of preprogrammed skins, with a male vs. a female appearance, a muscled vs. a wizardlike appearance, and so on as the major options.
6. The number of polygons a console can process per second is often used as a measure of its graphical capacity. It places a boundary on the level of detail of the 3D graphics within a game.

References

- Antoja, E. (2001). *The internet impact on the coin-up industry*. Presentation at the Eurotechno conference, Brussels. Oct. 5, 2001.
- Brown, D. (1998). *Classic home video games museum*. gamesmuseum.h-body.org.
- Costello, M. J. (1991). *The greatest games of all time*. New York: John Wiley & Son.
- De Meyer, G., Malliet, S., & Verbruggen, D. (2001). *Videogame lexicon*. Diegem, Belgium: Kluwer.
- GameSpy Staff. (2002). *GameSpy's 30 most influential people in gaming*. archive.gamespy.com/articles/march02/top30/61/index.shtm.
- Games Investor Staff. (2004). *The games industry: Past, Present and Future*. www.gamesinvestor.com/History/history.htm.
- Geryk, B. (1998). *A history of real-time strategy games*. www.gamespot.com/gamespot/features/all/real_time.
- Herz, J. C. (1997). *Joystick nation. How videogames ate our quarters, won our hearts, and rewired our minds*. Boston: Little, Brown, and Company.
- Horowitz, J., & Miller, S. (2001). *The history of Nintendo*. www.videogames.com/features/universal/hist_nintendo.
- Hunter, W. (2000). *The dot eaters—Classic videogame history*. www.emuunlim.com/doteaters.
- Hunter, W. (2002). *The history of video games: From "Pong" to "Pac-Man."* www.designboom.com/eng/education/pong.html.
- IGN Entertainment Staff. (2002). *IGN lexicon*. games.ign.com/lexicon.html.
- Jacobi, S. (1996). *The history of videogames: An independent study*. home.nycap.rr.com/poetwarrior/game.htm.
- LaMorte, C., & Lilly, J. (1999). *Computers: History and development*. www.digitalcentury.com/encyclo/update/comp_hd.html.
- Le Diberder, A., & Le Diberder, F. (1993). *Qui a peur des jeux vidéo?* Paris: La Découverte.
- Morris, S. (1999). *An examination of emerging forms of production and participation in multiplayer first-person-shooter gaming*. www.game-culture.com/articles/onlinegaming.html.
- Patterson, J. (2000). *The history of computers during my lifetime*. www.pattosoft.com.au/jason/Articles/HistoryOfComputers.
- Polsson, K. (2002). *Chronology of personal computers*. www.islandnet.com/~kpolsson/comphist.
- Poole, S. (2000). *Trigger happy. The inner life of videogames*. London: Fourth Estate.
- Roschin, O. (2002). *What's happening to adventure games?* ps2.mobygames.com/featured_article/feature_13/section,57.
- Seitz, L. K. (2001). *Classic videogaming nexus*. home.hiwaay.net/~lkseitz/cvg/nexus/nexus.cgi?Topic=Features&Feature=1.
- Selnow, G. W. (1987). The fall and rise of video games. *Journal of Popular Culture*, 21, 53–60.
- Sheff, D. (1993). *Game over. Nintendo's battle to dominate videogames*. London: Hodder & Stoughton.
- Tyson, J. (2002). *How videogame systems work*. www.howstuffworks.com/video-game.htm.
- Yesterdayland. (2000). *Arcade games*. www.yesterdayland.com/popopedia/shows/categories/arcade/.
- X. (1994). *History of King's Quest*. members.aol.com/KQswst104/history.html.
- X. (2001a). *Atari planet*. www.holyoak.com/atari/.
- X. (2001b). *Big history of the arcade*. dragonsden.emuunlim.com/ddhistory.htm.
- X. (2002a). *Commodore history*. amiga.emugaming.com/commodore.html.
- X. (2002b). *Games consoles*. www.gameconsoles.com/home_framed.htm.