Origins of Serious Games

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Origins of Serious Games

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Abstract The purpose of this chapter is to discuss the historical origins of Serious Games to try to understand where the current wave of "Serious Games" comes from. We first review the origins of the "Serious Games" oxymoron. We will then analyse digital games designed for serious purposes before the 2000's. Such games can be traced back to the beginning of the history of video games. We will use all these elements to discuss how the current wave of "Serious Games" began; and to highlight the differences between "Serious Games" and their ancestors.

Introduction

At a glance, "Serious Games" appear to be a recent phenomenon. A market study shows that the worldwide Serious Games market is worth 1.5 billion € in 2010 (J. Alvarez, V. Alvarez, Djaouti, & Michaud, 2010). If we consider this statistic as an indicator of the success of "Serious Games", we can question whether they really represent the "first attempt" at using video games for serious purposes.

The current definition of "Serious Games" appears to follow the lead set by Sawyer & Rejeski (2002). However, the oxymoron "Serious Games" was used with a similar meaning before the publication of this white paper. Therefore, we will first review the origins of this term and analyse how it evolved to designate *"games that do not have entertainment, enjoyment or fun as their primary purpose"* (Michael & Chen, 2005).

Moreover, the idea of using games, and more specifically video games, to deal with serious matters is also older than we would at first think. According to Sawyer: *"[America's Army] was the first successful and well-executed serious game that gained total public awareness"* (Gudmundsen, 2006). But games matching the definition drawn by Sawyer were released long before *America's*

Army (2002). Actually, we can even suppose that some of the first video games were designed to serve serious purposes. We will review these pioneer video games in detail before broadening the scope of our study to analyse the variations of "Serious Games" releases from 1951 to 2011.

We hope that this information will help the reader to understand the origins of the current wave of "Serious Games."

1. Origins of the "Serious Game" oxymoron

Current research on the use of games outside of entertainment may raise a debate about "Serious Games" being an oxymoron. Indeed, video games have been demonstrated to be useful in education (ELSPA, 2006; Gee, 2005, 2007; Klopfer, Osterweil, & Salen, 2009; Robertson, 2009; Shaffer, 2007), defence (Caspian Learning, 2008; Smith, 2009), healthcare (Lieberman, 2001; Robertson & Miller, 2008)… and so on. According to these references, we could argue that all games are "serious" and that the "Serious Games" term is not really an oxymoron.

However, if we consider the historical origins of this term and how it reached the gaming field, we believe it was meant to be an oxymoron. For example, we can trace the use of this term back to the Renaissance. Neo-Platonists used the term "serio ludere" to refer to the use of light-hearted humour in literature dealing with serious matters (Manning, 2004). A similar idea can be found in the Swedish novel "*Den allvarsamma leken"*, whose English title is "*The Serious Game"* (Soderberg, 2001). Written in 1912, this novel tackles the delicate topic of adultery. The 'playful' side of cheating is put in opposition with the 'serious' consequences of adultery. Here, the "Serious Game" oxymoron stresses the differences between adultery and the usual definition of games, such as the one coined by Huinzingua (1951) : *"a free activity standing quite consciously outside 'ordinary' life as being 'not serious', but at the same time absorbing the player intensely and utterly."*

A similar use of the "Serious Game" oxymoron can be used to describe the professional practice of games and sports. For example, in the autobiographical "*Not Dark Yet: A Very Funny Book About a Very Serious Game"*, Mike Harfield (2008) tells about his 30 year long career as a professional cricket player.

The first use of the "Serious Game" oxymoron with a meaning close to its current use seems to be in "*Serious Games"*, a book written by Clark Abt (1970). Abt is a researcher who worked in an U.S. research laboratory during the cold war (Abt Associates, 2005). One of his goals was to use games for training and education. He actually designed several computer games such as *T.E.M.P.E.R.* (Raytheon, 1961). This game was used by military officers to study the Cold War

conflict on a worldwide scale. But in his book, Abt also provides examples of "non-digital" Serious Games, such as math-related games to be used in schools. Abt also gives a clear definition of "Serious Games": *"Games may be played seriously or casually. We are concerned with serious games in the sense that these games have an explicit and carefully thought-out educational purpose and are not intended to be played primarily for amusement. This does not mean that serious games are not, or should not be, entertaining."*

Another example of a "non-digital" game explicitly labelled as "Serious Game" is presented in the book *"The New Alexandria Simulation: A Serious Game of State and Local Politics"* (Jansiewicz, 1973). This book explains how to play a game designed to teach the basics of the U.S. political mechanisms. Despite its age, this game is still used in classrooms, thanks to several reissues since 2004. It is also interesting to note that Jansiewicz kept his game in a non-digital format, because he thinks that only human interactions can convey the complexity of politics (Jansiewicz, 2011). Kahn & Perez (2009) have conducted a study on this game and observed that it improved the learning outcome for students in an *"Introduction to American Politics"* course.

Another example of "Serious Games" used as an oxymoron is the title of an artistic exhibition held in the Barbican Art Gallery from 1996 to 1997. The companion book of this exhibition (Graham, 1996) presents the work of eights artists who sought to make a link between video games and modern art. One of these artists, Regina Corwell, created an interactive art piece to ask if video games can be used as a mean of artistic expression: *"If we shift from the fun of games with their overt or covert messages about power, speed, command and control to those same messages delivered for expediency and with urgency by the military and to the efficiency of the office workplace and the various heritage in consumer culture, are art and culture ready to squarely face this complex mosaic?"*

This latter example limits the scope of "Serious Games" to video games, in a similar fashion to most current definitions of Serious Games (Michael & Chen, 2005; Zyda, 2005). Indeed, all these definitions seem to be influenced by the vision of Ben Sawyer and his white paper entitled *"Serious Games: Improving Public Policy through Game-based Learning and Simulation."* (Sawyer & Rejeski, 2002). As the title suggests, this paper is a call to use the technology and knowledge from the entertainment video game industry to improve game-based simulations in public organisations. However, this paper does not mention the oxymoron "Serious Games" one single time apart from in its title. Indeed, Sawyer first wrote his paper under the title *"Improving Public Policy through Game Based Learning and Simulations."* But his colleague David Rejeski felt that this title lacked something. Rejeski was aware of a book entitled *"Serious Play"* (Schrage, 1999), which details how private companies use simulations to stimulate innovation. In reference to this book, Rejeski decided to modify the title of Sawyer's white paper to include the oxymoron "Serious Games." This paper was

quickly followed by the creation of the *"Serious Games Initiative"*, an association to promote the use of games for serious purposes. Thus, the oxymoron "Serious Games" was gaining some momentum in the minds of many people (Sawyer, 2009). By chance, 2002 was also the release date of *America's Army*, a game that Sawyer considers as *"[...] the first successful and well-executed serious game that gained total public awareness"* (Gudmundsen, 2006). The conjunction of *America's Army*'s popular success and Sawyer & Rejeski's efforts to promote such games, makes us identify 2002 as the starting point of the "current wave" of Serious Games.

Later, Sawyer refined his definition of "Serious Games" to *"any meaningful use of computerized game/game industry resources whose chief mission is not entertainment"* (Sawyer, 2007). Michael Zyda, who participated in the development of *America's Army*, proposed a similar definition (Zyda, 2005) : *"A mental contest, played with a computer in accordance with specific rules, that uses entertainment, to further government or corporate training, education, health, public policy, and strategic communication objectives."* Nowadays, most Serious Games that are released tend to follow this line by sticking to the use of digital games, instead of following the broader definition of "Serious Games" for both digital and non-digital games introduced in the 70's.

2. Were video games solely meant for entertainment?

Although the current wave of "Serious Games" appears to begin in 2002, many games were designed for serious purposes before this date. Abt's book features many earlier "Serious Games", including some examples of computer-based games. If we stick to current definitions, any digital game that was "designed for a purpose going beyond entertainment" can be considered a Serious Game. In popular culture, *Pong* (Atari, 1972) is usually considered as the first video game. If it is unquestionably the first video game to have embraced a massive commercial success, it is not 'the' first video game per se (Barton & Loguidice, 2009a). Among the video games invented before *Pong*, some titles are not designed for entertainment but for serious purposes. In the chronological order of their appearance, these serious purposes are: **to illustrate a scientific research study**, **to train professionals** and **to broadcast a message.**

2.1 Early digital games designed to illustrate a scientific research study

The first example in this category comes from England during the invention of the first computers. Created in 1951 by Ferranti, the *Manchester Mark I* is the first

computer to have been publicly commercialized. It supports several programs created by researchers in computer science (Copeland, 2000). For example, Dietrich Prinz programmed a chess game that can 'play' against a human, at least for the latter moves before checkmate (Wall, 2009). The first game able to play a full game of chess was released in 1958 for the *IBM 704* computer (Bernstein, Roberts, Arbuckle, & Belsky, 1958). In a similar vein, Christopher Stratchey developed a checkers game in 1951 for the *Pilot ACE* computer. Unfortunately, this game required too much memory for the *Pilot ACE* to be able to run it properly. Stratchey then recreated his program for the *Manchester Mark I* (Jackson, 2000). All of these computer games were created by scientists to do research in computer science, especially in the artificial intelligence field (Newell, Shaw, & Simon, 1958).

Last but not least, the United Kingdom is also the birthplace of what is currently considered as the first video game in history, *OXO* (Donovan, 2010). Also known as *Noughts and Crosses*, it is a tic-tac-toe game created by Alexander Douglas for the Cambridge University's *EDSAC* computer. The particularity of this game lies in its input and output devices. Unlike aforementioned examples, this game displays a tic-tac-toe grid on a CRT screen. This screen was originally built as a memory monitor for the *EDSAC*. But by manipulating the memory of the computer with his program, Douglas succeeded in displaying a tic-tac-toe grid on it. He also used the rotary phone dial plugged into the computer as a rudimentary "gamepad." Each cell in the grid is numbered from 1 to 9. To select a cell and place a nought or a cross, the human player simply has to dial the corresponding number on the phone. This game was designed to illustrate a research thesis in computer science on "human-computer interface" (Cohen, 2009).

Additional examples of such games for research can be found in the neighbourhood of *Spacewar!*. This game is widely regarded as the first video game solely designed for entertainment (Barton & Loguidice, 2009b; Chaplin & Ruby, 2006; Fleming, 2007; Graetz, 1981; Herz, 1997; Kent, 2001; Levy, 1984). It was created by a group of hackers at the MIT. Alongside this game, other programs were created, such as *Qubic*, a game that looks like a three-dimensional tic-tac-toe. It was programmed by Bill Daly in order support his masters thesis in computer science (Daly, 1961).

2.2 Early video games designed to train professionals

During the Cold War, the U.S. army invested a lot of money in research. Numerous projects from this period led to technologies that are now widespread in our daily lives, such as computers or the Internet. However, many of the first computer programs were created to serve military purposes. From ballistics

computations to resource management, the U.S. army was very familiar with computer simulations. Meanwhile, military officers around the world were using "war games" for training purposes (Halter, 2006). These two influences formed the idea of creating computer-based war games in research departments (Montfort, 2005).

HUTSPIEL is a very good example of such games. Created in 1955, this strategy war game allows two human players to experiment with the impact of nuclear weapons on a global battlefield. The OTAN fights against the URSS in a fictional – but highly probable at the time – battle along the Rhine. This game is highly detailed. It simulates ammunition and fuel supply for each unit controlled by the two players (Harrison Jr., 1964). *HUTSPIEL* was invented by the Operations Research Office (ORO), a research centre conducted by the John Hopkins University. This centre was closed down in 1961 in favour of the Research Analysis Corporation (RAC), which pursued most of its research projects. These two research centres conducted many studies on the use of computer games for training purposes (Research Analysis Corporation, 1965). Besides *HUTSPIEL*, *NEWS (Naval Electronic Warfare Simulator)* was designed in 1958 to simulate naval battles. In the early 60's, the RAC built *THEATERSPIEL*, an improved version of *HUTSPIEL* (Harrison Jr., 1964).

Several similar games were created during the 60's, mainly under the command of the Joint War Games Agency (Banister, 1967). This section of the U.S. Army was dedicated to the use of games for military purposes. *T.E.M.P.E.R.*, the Cold-War simulation game created in 1961 by a team led by Clark Abt, was created for this agency. Abt later founded his own company, Abt Associates, to create similar games. For instance, *ARPA-AGILE COIN GAME* simulates an internal revolutionary conflict in a country (Abt Associates, 1965). These strategy games represent the first step to more complex simulation models used for tactical evaluation, such as *CARMONETTE* (Dondero, 1973).

Alongside such military-related games, the RAC also designed training computer games for civilians. For example, in 1956 they built a series of games called *American Management Association Games*. This collection of turn-based strategy games casts the players as managers of a product firm. They compete against each other in order to earn as much money as possible within 40 turns of play (Harrison Jr., 1964).

Obviously, none of these games was available to the general public, and the little information we can find about them today comes from unclassified military documents. We can however consider them as being the ancestors of the simulation video games that appeared on personal computers in the 80's, either with military topics (Dunnigan, 1992) or not (Wolf, 2007).

2.3 Early video games designed to broadcast a message

Games can also convey a particular message. In 1951, Ferranti built a computer called *NIMROD* that could play only one single game: the game of *NIM*. In this math-based game, each player picks matches from a pile. The player who takes the last one looses. While *NIMROD* represents an important step for computer science, it was not designed to do scientific research. Its sole purpose was to be a live advertisement for its constructor. Indeed, this large computer was built to be shown during the "Festival of Britain" (Montfort, 2005). It was an impressive piece, but it did not use a CRT display. Instead, the current state of play was displayed through a set of coloured lights. A first set of lights was built into a small control panel, so players could see the remaining number of matches whilst pressing buttons to play. Another set of lights was built into the front part of the computer itself, so that visitors could watch the game even if they were far away from the control panel. This computer was so successful during the festival that it was also shown during industrial fairs in Germany and in Toronto (Smillie, 2010). However, despite its popular success during these three events, this game failed to broadcast its message about the technical expertise of Ferranti. As told by John Makepeace Bennet, the inventor of *NIMROD* (Bennett, Broomham, Murton, Pearcey, & Rutledge, 1994) :*"The machine was a great success but not quite in the way intended, as I discovered during my time as spruiker on the Festival stand. Most of the public were quite happy to gawk at the flashing lights and be impressed. A few took an interest in the algorithm and even persisted to the point of beating the machine at the game. Only occasionally did we receive any evidence that our real message about the basics of programming had been understood."*

In a similar vein, *Tennis for Two also* aims to broadcast a message to the general public. This tennis game is played from a side view with simulated gravity. It was created in 1958 by William Higinbotham, an American nuclear physicist working at the Brookhaven National Laboratory (Poole, 2001). During this cold war era, the general public was not really at ease with scientific research, especially with laboratories working on nuclear projects. In order to reassure the neighbouring population, the Brookhaven National Laboratory regularly organized guided tours. However, Higinbotham found these tours quite boring. He then decided to create a computer game to improve these guided tours (Anderson, 1983) : *"It might liven up the place to have a game that people could play, and which would convey the message that our scientific endeavors have relevance for society."* This game was successfully displayed for two years at the laboratory before being dismantled. Although it would later be used as a reference during legal battles for the paternity of the invention of video games (Kent, 2001), its sole purpose was to broadcast a reassuring message to the civilians living near the nuclear research laboratory. We can also note that Higinbotham was a recognized physicist in the scientific community. Like other researchers involved in the

Manhattan project, he spent most of his life fighting against the proliferation of nuclear weapons. Besides the quality of his scientific works and his ethical engagement, Higinbotham illustrates the close relationship between the technological progress due to the Cold War and the field of video games (A. Wilson, 1968).

2.4 Did serious games appear before entertainment video games?

All the games presented thus far were non-commercial. However, some of the first video games available in stores were also designed for purposes that went beyond entertainment. The first home video game console, the *Magnavox Odyssey* (Ralph Baer, 1972), was shipped with both entertainment games (*Tennis*, *Haunted House*, *Roulette*...) and educational games (*Analogic*, *States*, *Simon Says*...). Its inventor, Ralph Baer, was working for an U.S. defence contractor, Sanders Associates. While Sanders accepted to let his employee release a console for the entertainment market, Baer quickly imagined 'serious' applications of his technology. He improved his "light-gun" technology to design gun-shooting games for training purposes. His *Interactive Video Training System* series uses real weapons – such as LAW or STINGER rocket launchers – as devices to play with rail-shooting games. These games were proposed for training to military forces, but also to police departments (Baer, 2005).

Nowadays, most video games are solely designed for entertainment purposes (ESA, 2010). But in the light of all these examples, it can be argued that entertainment video games only appeared after the first digital "Serious Games."

3. The ancestors of current "Serious Games"

Following these pioneering experiences, many video games were released to support serious purposes before the current wave of "Serious Games." Below are six examples of such games for a wide range of domains.

3.1 Education

One of the most famous ancestors of current "Serious Games" can be found in the field of Education. *The Oregon Trail* (MECC, 1971) started as a text-only game created by three History teachers: Don Rawitsch, Bill Heinemann and Paul Dillenberger. It casts the player as an American pilgrim in 1848, whose goal is to reach Oregon in order to settle down. The road to Oregon is full of traps, but the

game is enriched with information related to this period of American History. This game was 'published' by the Minnesota Educational Computing Consortium (MECC). This institution helped teachers from Minnesota to use computers for teaching. *The Oregon Trail* was so popular with students (and teachers) that many upgrades have been released. In 1978 a graphical version of the game was released in open-source format. It was improved and released commercially in 1985. This game was followed by several sequels – *The Oregon Trail II* (MECC, 1996), *The Oregon Trail: 3rd Edition* (MECC, 1997) – and spin-offs – *The Amazon Trail* (MECC, 1993), *The Africa Trail* (MECC, 1997). But the original game is still popular today thanks to mobile phone versions and a Facebook application. Ultimately, this game clearly shows that an "educational" or "serious" game is not necessarily the opposite to a "popular and commercially successful" game.

3.2 Healthcare

Captain Novolin (Raya Systems, 1992) is designed to teach kids how to manage diabetes. This game lets you play as a diabetic superhero, who must take care of the glucose-level in his blood while beating evil junk food aliens. This platform game 'hijacks' the well-know "collectable bonuses" mechanism to broadcast a message. The bonuses that the hero can collect are all food items. So, if the hero collects too many of them he risks feeling sick due to a high level of glucose in his blood. Hopefully, before each level, a nutritionist tells players how many food items they are allowed to eat. Players also have to manage their insulin. This game and three other health-related titles were released for the Super Nintendo console by the same company, *Raya Systems*. While they were not labelled as "Serious Games", several research studies have been conducted to analyse their effects on children (Lieberman, 2001). For example, the game *Packy & Marlon* (Raya Systems, 1994), similar to *Captain Novolin* with a two-player mode, was analysed in a clinical trial (Brown et al., 1997). The group of children who were presented with this game was observed to be better at managing their diabetes. The number of cases where these children had to go to the hospital due to a glucose crisis decreased by 77% compared with the group who did not play it. The study concludes that the games helped the children to learn how to manage insulin and to have healthy meals in order to prevent glucose-related crises.

3.3 Defence

Apart from the games produced for the Joint War Games Agency and before the release of *America's Army*, the U.S. army showed a high interest in entertainment video games for its training purposes. One of the most famous examples is *The Bradley Trainer* (Atari, 1981). Also known as *Military Battlezone*

or *Army Battlezone*, this game is a customised version of *Battlezone* (Atari, 1980). The original game casts the player as a tank in a 3D world, and asks him to shoot down opposing vehicles. The U.S. Army hired Atari to create a more realistic version of this game so they could use it as a training tool. Instead of a fictional tank, the player is now controlling the *Bradley Fighting Vehicle*, a military ground vehicle armed with a chain-gun and a canon. The player must shoot down opposing helicopters and tanks by firing the weapons of this real vehicle. The realism of the ballistics simulation has been improved to match the training purpose of this game (James, 1997). Although Atari accepted to create this customized version of its game for the U.S. Army, several of its employees were clearly against it, including Ed Rotberg, the designer of *Battlezone* (Kent, 2001): "*We didn't want anything to do with the military. I was doing games. I didn't want to train people to kill."* Though anecdotal, this reaction illustrates the cultural differences between the field of entertainment video games and the current "Serious Games" industry.

3.4 Art & Culture

Versailles 1685 (Cryo, 1997) is the flagship of the "cultural entertainment" video games wave. Such games merge entertainment and cultural education. This example is set in Versailles during the reign of Louis XIV. The player must investigate to identify who is threatening to destroy Versailles. They can freely move inside this beautiful place, talk with historical characters, and learn about the paintings and arts of this era. This title received a warm reception in Europe with more than 300.000 copies sold. It opened the way for similar titles with different historical periods, such as *Egypt 1156 BC Tomb of the pharaoh* (Cryo, 1997), *Byzantine: The Betrayal* (Discovery Channel Multimedia, 1997), *China the Forbidden City* (Cryo, 1998), *Pilgrim Faith As A Weapon* (Axel Tribe, 1998), *Vikings* (Index+, 1998), *Rome: Caesar's Will* (Montparnasse Multimedia, 2000)...

3.5 Religion

Captain Bible in the dome of Darkness (BridgeStone Multimedia Group, 1994) is an adventure-action video game designed to teach Christian religion. In a distant future, the player is cast as a hero in a city full of robots telling "lies" (e.g. "*You don't have to serve either God or the devil, you can be your own master.*"). The player must navigate through the city and seek verses from the Bible. These verses can counter the "lies" told by the robots in order to defeat them. Like many entertainment titles of the same period, this game was distributed both as shareware and retail versions.

3.6 Corporate Training and Advertising

Last but not least, *Pepsi Invaders* (Atari, 1983) is an original example of a video game used as a corporate management tool. This game plays exactly in the same way as *Space Invaders* (Taito, 1978), but aliens are replaced by the letters P-E-P-S-I. This game was created for the sales employees of Coca-Cola. Play sessions are limited to 3 minutes, in order to prevent them spending too much time playing. Coca-Cola thought this game would be a good motivational tool for its employees, and a way to strengthen its competitiveness against Pepsi. Besides this unique example, many food-related brands also used video games as advertising tools, especially with console-based titles. For instance, *Kool Aid Man* (Mattel Electronics, 1983) promotes Kool Aid drinks; *M.C. Kids* (Virgin Interactive, 1991) is a platform game set in the famous fast-food universe; *Chex Quest* (Digital Café, 1996) is a first-person shooter that helped to sell many Chex cereal boxes...

3.7 The numerous ancestors of "Serious Games"

As we can see, these six examples clearly match the current definitions of "Serious Games", though they were not using this label. We can complete these illustrative examples by some quantitative data about the number of such ancestors of "Serious Games." While far from complete, we have referenced a total number of 2218 "Serious Games." To check whether a video game can be considered a "Serious Game", we simply verified that it matches the definitions coined by Sawyer (2007; 2002), Zyda (2005) and Chen & Michael (2005).

As seen in *figure 1*, the number of games released each year regularly increases, with a high peak at the end of the 2000's. As we consider that 2002 is the starting point of the current wave of "Serious Games", it means that we have a corpus of 1265 "Serious Games." We also have a total of 953 ancestors of "Serious Games" (43% of our total corpus).

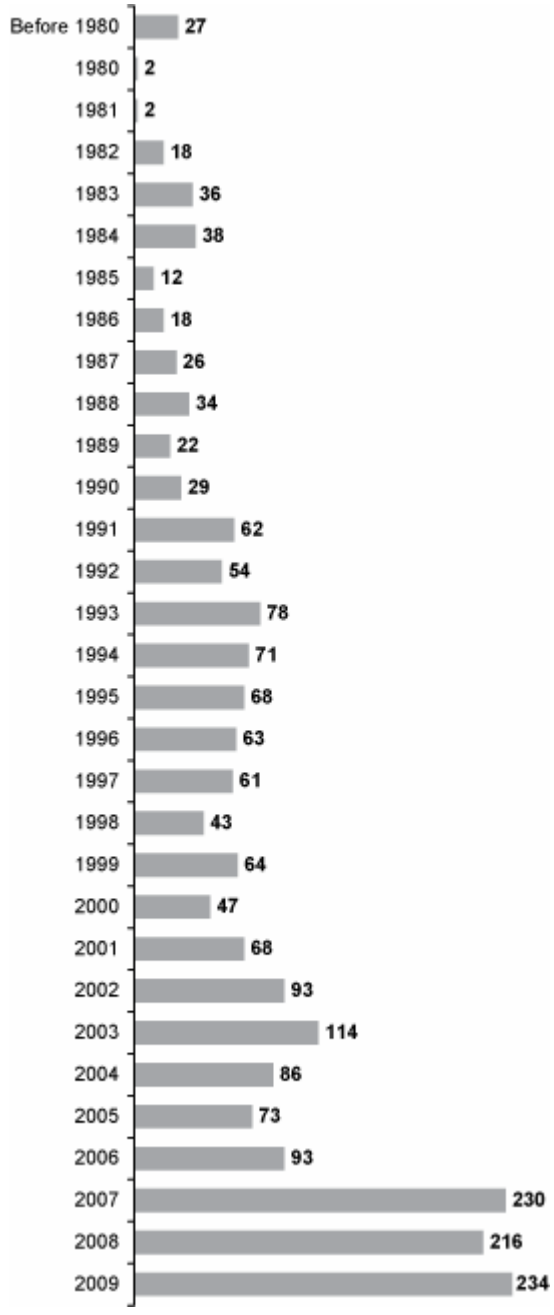

Fig. 1 Number of “Serious Games” released each year [2218 games]

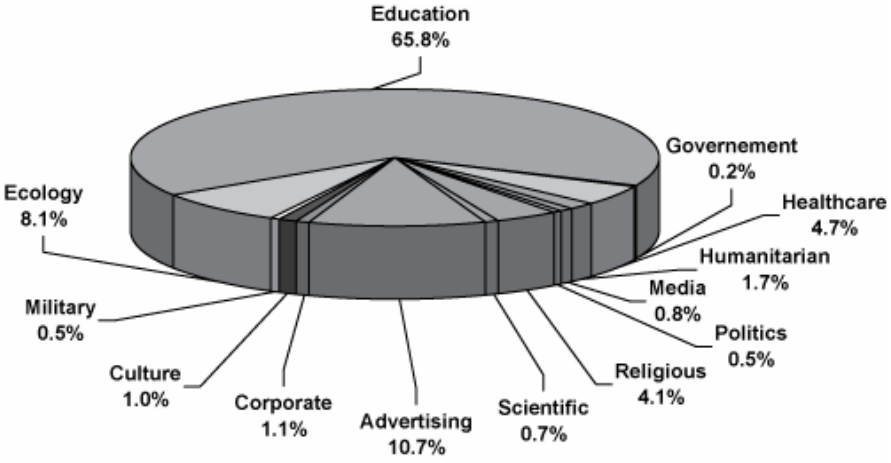

Fig. 2. Market repartition of “Serious Games” released before 2002 [953 games]

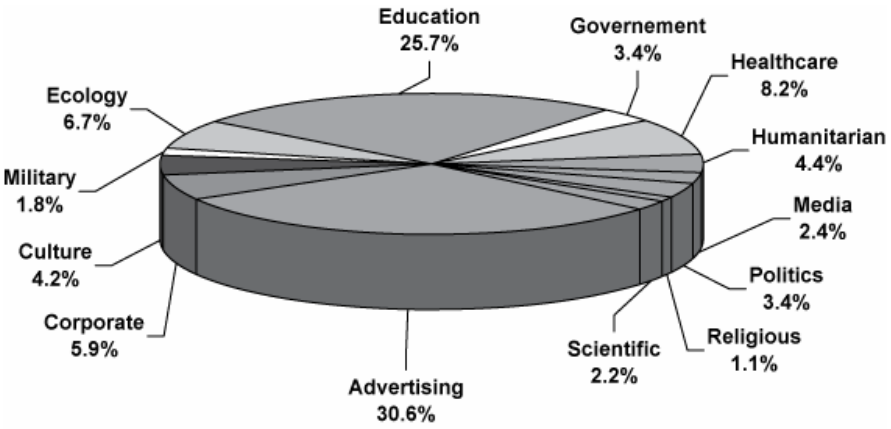

Fig. 3 Market repartition of “Serious Games” released after 2002 [1265 games]

Out of the 953 ancestors of Serious Games, 65.8% were designed for the educational market, as seen in *figure 2*. We also note that 10.7% of them were created for advertising and 8.1% for ecology. The ancestors of “Serious Games” show a clear dominance of educational games. The situation is very different when we look at the current wave of “Serious Games” in *figure 3*. Though Education is still a major market, it represents only 25.7%. As the size of Education decreased, all the others market have grown. Advertising reaches the top with 30.6% of the games, and all others markets that were often below 2% are now between 4% and 10%.

Overall, we can observe that most of the ancestors of “Serious Games” are in fact “educational games” – edutainment, edugames, etc. According to these figures, we can argue that the current wave of “Serious Games” allows video games to embrace a wider variety of themes. Their ancestors were mostly meant for education while current “Serious Games” can be found in different markets with a more homogenous breakdown. This may be due to the fact that “Serious Games” are far more numerous than their ancestors. Indeed, 1265 “Serious Games” were released between 2002 and 2010 (8 years), while only 926 of their ancestors were published between 1980 and 2001 (21 years). Although “Serious Games” and their ancestors match the same definitions, here we can see a difference between them. “Serious Games” are different from their ancestors not as individual games, but as a group of games which targets a wider range of topics thanks to a larger population.

The full list of the 2218 Serious Games that we used as a reference corpus for these data is available in an online collaborative database: http://serious.gameclassification.com/

4. Discussion

Taking into account the existence of games designed for serious purposes before 2002, we can question why the oxymoron “Serious Games” has only been widely used since the beginning of 2002. Indeed, if such games are available since the beginning of video games, why wait 40 years to name them with a specific term?

Several elements can explain this fact. The main one seems to be the dominance of “entertainment” games in the market, and the bad reputation from which they sometimes suffer. As we noted earlier, the current wave of “Serious Games” mainly originates from the USA. Games like *America’s Army* and the work of Sawyer through the *Serious Game Initiative* were the driving forces of the current wave of “Serious Games.” Our conviction is that U.S. designers of “Serious Games” had to invent a new label to convince people that their games were “not just for entertainment.” But why did video games have such a ‘negative’ image that these designers wanted to emphasize how different they are from “entertainment video games”?

The history of video games can shed some light on this topic. More specifically, we think that two factors explain the quite ‘negative’ image of video games in the USA at the beginning of the 2000’s:

- The marketing strategies of video game manufacturers that targeted children’s entertainment.
- Several controversies about the content of video games, especially their violence and the possible impact they may have on children.

4.1 Leisure for children?

Historically, two economical models co-existed for video games. In the first one, players pay for each play session, for instance with arcade games. In the second, players buy a retail copy of the video game and play it on a home console or computer. With such economic models, it seems logical that the most profitable games are the ones that players enjoy the most. The more fun a game is, the more likely players are willing to pay for it. Moreover, with arcade games the place in which you play matters. Therefore, the first arcade cabinets were set up in bars, restaurants, shopping malls and amusement parks. Games located in such places are designed to entertain people, and not to make them learn something. This fact is far from being anecdotal. The first home video game console, the *Odyssey* (Magnavox, 1972), is sold as a system with both leisure and educational games *(see 2.4)*. However, manufacturers realised that the home video games that sold the most were the ones based on successful arcade titles. For example, many home version of *Pong* were released between 1975 and 1977 (Herman, 1997). Later on the best-selling titles on the *VCS 2600* (Atari, 1977) were adaptations of popular arcade titles like *Space Invaders* (1978) and *Pac-Man* (1980). So, while educational titles were available on home consoles, they quickly faded away because entertainment titles sold more copies. However until this time, games were not targeted at a specific age range. Adults were often seen playing video games in TV advertising.

Then came the 1983 crash of the video game industry in the USA. Due to this huge crisis, retailers believed that "video games were a fad", and refused to sell new consoles or cartridges, fearing people would no longer buy them. This was a huge problem for Nintendo, who successfully launched the *Famicom* in Japan and was looking for a way to sell it in the U.S. In order to convince American retailers that its home console was different from previous ones, Nintendo disguised it as a toy. The name was changed from *"Family Computer"* to *"Nintendo Entertainment System"*, and the console was shipped with a robot toy. Moreover, Nintendo's advertising campaign solely focused on children, hoping it would sell better. And this strategy was very successful. But to convince parents that the *N.E.S.* and its games were "safe for children", Nintendo created a very restrictive system to control which games were published for its console. In order to release a game for the *N.E.S.*, game developers had to adhere to some limitations, such as to pay Nintendo royalties and to avoid publishing more than a few games per year. But they also had to follow the "Nintendo Content Policy", which explicitly states that video games must not deal with "topics inappropriate for children", such as violence, sex, religion or politics (Kent, 2001). Ultimately, though the video game industry became a very profitable market again, it was now bearing the image of being "a leisure activity for children."

4.2 Leisure for children with inappropriate content?

Such an image can explain why many people were shocked to discover the existence of rather violent video games. For example, *Mortal Kombat* (Acclaim, 1992) raised so much concern among politicians that the video game industry had to create a way to rate games. Created in 1994, the *Entertainment Software Rating Board (ESRB)* rates video games by adding logos on video games boxes. These logos warn parents about the content of the video games, and display recommended age limitations. But this rating system was not enough to put an end to the debate over video game violence. In 1999, the Columbine tragedy initiated a new controversy, as the two killers were apparently avid players of *Doom* (id Software, 1993). The full details of this very complex and sensitive debate is not within the scope of this chapter. But we can at least cite Dave Grossman, who clearly accuses *Doom* of being dangerous in his book titled "*Stop Teaching Our Kids to Kill"* (Grossman & Degaetano, 1999): *"Doom is being marketed and has been licensed to the United State Marine Corps. The Marine Corps is using it as an excellent tactical training device. How can the same device be provided indiscriminately to children over the internet, and yet the Marine Corps continues to use this device?"*

Whilst his opinion has been later criticized, this retired military officer clearly illustrates what many people in the U.S. were thinking at the time. On one hand, video games "are a leisure activity for children." On the other, many video games feature violent and war-themed content. The existence of *Marine Doom* (U.S. Army, 1996), a modified version of *Doom II* (id Software, 1994) created and used by the U.S. Army for training purposes, emphasized this apparent contradiction between the video games audience and their content.

Apart from the ethical and moral considerations on this topic, we can appreciate that in 1999, the image of video games in the U.S. was not very positive. So, when the colonel E. Casey Wardy proposed the *America's Army* project to his hierarchy, we can understand that it would have been a bad idea to call it a "video game" (America's Army, 2010). Although it appears to be a coincidence, this game was publicly launched in 2002, when Sawyer and Rejeksi published their white paper on "Serious Games." So, this oxymoron was used as a label to emphasize the difference between *America's Army*, which is designed for serious purposes and not for children's leisure, and entertainment video games. This label must have seemed quite relevant, as many other video games designed for serious purposes used it too, thus launching the current wave of "Serious Games."

4.3 U.S. video games market as the birthplace for "Serious Games"?

It is also interesting to note that the two other historical video games markets, Europe and Japan, did not rely on such a label to release video games for serious purposes. Video game historians always observed that the Japanese video games market was not focused on a child audience (Ashcraft, 2009; Kohler, 2004). Though many games are available for children, games for adults and/or serious purposes also get published in Japan without raising public controversy. Therefore, to release *Dr Kawashima's Brain Training* (Nintendo, 2005), Nintendo did not need to use the "Serious Game" label.

Regarding the European video game market, it is very similar to the U.S. game market with one historical exception: a better balance between the home console and home computer markets, especially during the 80's and 90's (Donovan, 2010; Railton, 2005). At the time, the European market was always the last market segment to receive home console games. This delay between the international releases of games produced by big studios allowed several smaller companies to thrive on the home computer market. These smaller companies often designed games that addressed different themes than those created by big studios. For example, the wave of "cultural entertainment" video games is a European phenomenon.

To summarize, we can identify that the U.S. video games market was the one that most needed to use a different label in order to be able to produce video games dealing with serious purposes and/or targeting an adult audience.

4.4 "Serious Games" as a label for a new economic model?

These few aspects from the history of video games can help us to understand why we had to wait until the beginning of the 2000's to see a specific term to label video games designed for serious purposes. But the current wave of "Serious Games" is more than just a new label. Current "Serious Games" are also based on a new economic model. While the ancestors of "Serious Games" were based on the same economic model as entertainment video games (people buying retail copies), it is no longer the case for most current "Serious Games." Instead, they are now funded by 'clients', who hire a development studio to create a video game tailored to their needs. The studio is paid once to create the game, so 'clients' can use it as they wish. If the game is intended to broadcast a message, it is likely that it will be available free of charge on the Internet. If the game is designed for training purpose, 'clients' will probably use it for the internal training sessions of their employees. As the game's success is no longer tied to its retail performance, we can identify that this different economic model is better suited to games dealing with serious purposes. As we have noted earlier, ancestors of "Serious

Games" were greatly focused on Education while the newer games embrace a wide variety of themes. This may be due to the fact that educational games were easier to sell with the previous economic model than games dealing with other topics. Hence, this new economic model is likely to enable the current wave of "Serious Games" to last longer and embrace more public recognition than their ancestors.

Conclusion

At first sight, "Serious Games" may seem to be a new phenomenon that appeared from nowhere. Whilst there is unquestionably some novelty in the current wave of "Serious Games", we can identify several sources of their historical origins.

First, we observe that the very first video games were not designed purely for entertainment. We can also note that these early video gaming experiments coincide with the first use of the "Serious Game" oxymoron to name games designed to serve purposes other than purely entertainment. But the first "Serious Games" were not necessarily based on a digital support. For example, Clark Abt and his colleagues designed several "Serious Games" using a wide range of supports, from board games to sports to early computer simulations.

Meanwhile, video games flourished as an industry focused on entertainment. However, some of the titles released in the video games market were designed to serve serious purposes, such as education, healthcare, defence... Whilst they were not labelled as "Serious Games", these video games are the closest ancestors to the "Serious Games" we know today. Apart from public awareness, the main difference between these ancestors and current "Serious Games" is their economic model. However, to be able to use an economic model better suited to video games dealing with serious matters and/or targeting an adult audience, designers had to mark their difference from "entertainment" video games and their sometimes negative image. We think that this is the main reason that explains why the label "Serious Games" was used again, 40 years after its creation, to name a new generation of video games designed for serious purposes.

Nevertheless, history is a rich and complex resource, and these elements are just a little information relating to Serious Games. While we do not pretend to have reached completeness, we hope that the historical elements proposed in this chapter will help the reader to understand the origins of the current wave of "Serious Games."

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