Article

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Virtual Worlds, Video Games and the COVID-19 Pandemic

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Abstract: The expansion of Open World Video Games (OWVGs) has seen the emergence of multiple new fictional worlds. This type of video game is characterized by total immersion in a world built for the players entertainment. What videogames developers want when players enter an OWVG is that they could feel like if they were open a door to an entirely new world and leave the real world behind. These virtual worlds manifest as a complement, an alternative, or the successor to the physical universe, and in some way continue the philosophical tradition of possible worlds begun by Leibniz. Accustomed to 'surviving' in hostile environments, millions of people continued to improve their skills in the midst of the COVID-19 pandemic while locked in their homes. Once the pandemic seems to start to be left behind, the paper analyzes the virtual worlds created by the video games and the relations between the pandemic and these fictional worlds.

Keywords: virtual worlds; video games; players statistics; COVID-19 lockdown; digital-real crossovers; digital society

1. Introduction

The words vulnerability, hazard, or resilience, are words that rarely appear in the scripts of video games and yet the imaginary dystopian, and apocalyptic landscapes of good few of these games transport us into environments where such concepts are highly applicable. Vulnerability manifests itself in the unstable socio-ecological systems of post-apocalyptic video game worlds [1]. These worlds have undergone some crisis that means society must start anew and the game is set in the ruins of our, or other civilizations, and generally, destruction prevails over construction [2]. Thus, people that play these games find themselves in worlds that have succumbed to some type of threat and display their mortal wounds in the form of demolished buildings and derelict industries. The hazards, meanwhile, take the form of deadly storms, earthquakes, volcanoes or epidemics, such that players have a heightened awareness of risk, knowing that at any moment a devastating catastrophe could happen. The frenetic rhythm of the action in these games only adds to the constant sense of risk. In these gameworlds vulnerable to all manner of hazards, resilience, understood as the ability to adapt to changing circumstances, becomes one of the key skills necessary to succeed.

The influence of video games on player resilience is the topic of Tichon and Mavin's 2017 study [3]. These authors analyzed players' comments posted on the PlayStation Network (an online community for gamers) and used structured interviews to assess how players' perceptions of their emotions and self-confidence might have altered as a result of gaming. In a similar vein, Jane McGonigal defends the idea of building resilience by 'wasting' time with video games [4], and Jesper Juul [5] argues that games motivate us to play more in order to escape of our continuous errors, so players need to improve their skills to escaping failure, so the central enjoyment of games is the art of failure [6].

The environmental hazards and the perception of vulnerability generate a sense of risk that could create a negative gaming experience. Thus, the apocalyptic scenarios of these games unfold in idealized, bucolic landscapes, designed to enhance the player's experience [7]. Shaw and Warf have defined these videogame landscapes as Worlds of Affect, describing how they are specifically aimed at generating predominantly affirming, positive gaming experiences [8]. Gordon Calleja [9] in his

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work describes the immersion possibilities offered by videogames, defined as a player's sensation of inhabiting the space represented onscreen, towards a new concept of incorporation, when the intensity and internalization of the game experience is total.

Miguel Sicart [10] argues that playing games is a way of being in the world, that playing is a natural characteristic of human beings and a form of understanding the world around us and a way of engaging with others. Play goes beyond games, especially in our childhood but time spent with toys and in playgrounds is increasingly reduced due to our way of life. Nevertheless, in present time, gaming has reached a prominence in our lives as never before.

Bearing in mind Sicart's assertions about playing and understanding the world, the uniquity of video games has some interesting learning potential. Video gameplayers are simultaneously conscious of the reality of the virtual worlds and of the virtuality of the everyday landscape, thus behaviour learned in virtual environments can influence action in the real world [5]. This feature has many applications and has been investigated in the area of environmentalism and sustainability [11,12].

This discussion gained a new dimension in March 2020, when countries across the world placed their populations under strict quarantine, and the real world came to resemble, more than ever, a 1:1 scale version of an apocalyptic video game. While gamers played in front of their screens, fighting to save the world or their lives from the comfort of their homes, the stories and images from the real world appearing on the news media were starting to look very much like footage from their video games.

2. Methodology. Conceptualization, sources and context

The research question we want to solve is whether the situation of confinement caused by the Pandemic generated some kind of change in the world of videogames and how the people who play videogames adapted to this situation of global health crisis.

This research aims to add to the debate concerning the relationships between the virtual worlds and the real world. Using open world video games and the COVID-19 pandemic as our context, we aim to uncover the elements and processes in video games that might reinforce the resilience of contemporary society. In order to achieve this objective, we investigated the global evolution of video games during 2020 using the statistics and reports published from various sources and discuss the future of the possible worlds in the post-pandemic world.

The philosophical concept of possible worlds can be traced back to the beginnings of the eighteenth century and specifically to Gottfried Wilhelm Leibniz (1646-1716). Leibniz wrote about the origin and the mutability of the world, and how all possible worlds were ideas in the mind of God. In a process of deduction using a series of logical propositions he went on to conclude that our universe is the best of all the possible worlds God could imagine.

In his collection of essays entitled Théodicée, Leibniz describes a wise, rational, and mathematical God contemplating the monads (the simplest substance in the universe) and all their possible conjunctions. Leibniz's theory of monads is founded on two principles: the principle of sufficient reason and the principle of non-contradiction. The former asserts that nothing exists without sufficient reason and thus if a thing is possible it has the logic of being, while the latter means that two contradictory statements cannot be true at the same time, thus compatibility and consistency must exist between things [13].

In the twentieth century the development of modal logic has led to new conceptions about our world´s realities, differentiating between what is possible and what is real and opening new ways to think about possible worlds. David Lewis, the originator of modal realism, holds that our actual world is just one among many like it; everything that is, exists, although not everything that exists can become actual [14]. In other words, all the possible worlds exist, although not all of them are actual, or rather, each world is actual for its inhabitants.

Fictional worlds are worlds derived from an actual world, endowed with autonomy, and composed of different subjects, objects, properties, and rules that, according to modal logic, are constructed from what is possible and necessary [15].

The necessity of rules has particular significance in the possible worlds of video games: rules need to exist, but rather than suffocating play, they make the game possible [16]. As Bogost [17] (p. 121) pointed out:

"The rules do not merely create the experience of play—they also construct the meaning of the game. That is to say, the gestures, experiences, and interactions a game's rules allow (and disallow) make up the game's significance. Video games represent processes in the material world—war, urban planning, sports, and so forth— and create new possibility spaces for exploring those topics. That representation is composed of the rules themselves. We encounter the meaning of games by exploring their possibility spaces. And we explore their possibility spaces through play".

Another feature of the video game environment, or game space, is that while it is designed in a specific way, it can be altered by player actions. As Phllip Penix-Tadsen stated [18], video games provide a responsive environment where obstacles and affordances are affected by player input. As a player moves through a game space, interacting with the surroundings, their actions change the space, their decisions modify the contours of meaning. In this way, the video game space becomes a place where players actively create new meanings. This is also the basis of the "projective stance" concept, developed by Gee, in which the world is seen simultaneously as a project imposed over the players and as a site onto which they can actively project their desires, values and goals [19].

Even so, the specific design of the game space is a determining factor in the construction of meaningful content throughout play. The game's scenarios include symbolic descriptions of the culture around which gameplay is centered, and these imbue game characters with particular characteristics and permeate every level of the game in order to provide players with a fully immersive, high intensity experience.

The representation of space in video games can be made by abstracting reality in two dimensions: simulation of three dimensionality and depth. Three dimensionalities can be emulated either by generating an isometric vector space, where spaces conserve the distances between the points, or by 3D modelling either using polygonal meshes, curve modelling or digital sculpting. The simulation of depth arises, in general, through the superimposition of three planes of vision: the foreground (closest to the observer, in which the detailed drawing can be seen), the second plane (in the medium distance) in which colors and textures can be seen, and the third plane (the far distance, extending to the horizon), in which silhouettes and color masses can be seen [20].

The way a particular game space conditions the game's action is all to do with the objects present in that space. As the philosopher Gernot Böhme [21] explains, objects generate spheres of presence that affect the attitude of the observer. This, Böhme argues, is atmosphere, that is, something that proceeds from and it is created by things, people, or by their configurations. To explain this, the German philosopher creates the concept of the "ecstasies of things" [21] (p. 123) to describe the qualities of a body that do not necessarily belonging to that body except in relation to the subject that perceives them (the observer), for instance being blue. In this sense, the atmosphere of a place is generated by the presence of the bodies located in it and that are encountered by the observer, giving rise to an event (phenomenon). Despite observer subjectivity, an atmosphere nevertheless has objective qualities that are experienced in a similar way by different people, thus it is possible to create a specific atmosphere by manipulating the position of objects in space [22].

These theoretical aspects related to fictional worlds can be verified in very popular OWVGs. For instance, in the video game The Last of Us [23] action takes place in a post-apocalyptic United States of America, where humans have been almost wiped out by a killer fungus and their abandoned towns and cities have been invaded by vegetation. The game's narrative develops as its characters journey down this world's deserted roads seeking refuge in its live forests and ruined manufacturing installations. The game's atmosphere is created using a variety of techniques such as using intermediate planes that generate uncertainty, games of light and shadows, environments characterized by the presence of water, sounds that reproduce the body experiences of the gameplay.

Researchers Moore and Carter [24] introduce us to the term worldness in their article, "It's not an island, it's a world: Fortnite and worldness", arguing that the huge success of the first-person shooter (FPS) game Fortnite [25] lies in how it promotes its worldness. They examine how the game

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achieves these highlighting certain key features, in particular, the way it evolves due to changes introduced with each new version giving players a narrative to identify with and its social element that creates a community:

"... the changing game world and evolution of the game immerses players in myth; the social construction of Fortnite as a third-place in players' lives immerses them in a space; and social capital, monetization and avatars entwine to immerse players in a sense of belonging to the world of Fortnite" [25] (p. 2850).

Another interesting and popular game is EverQuest [26]. First releasing 1999, this massively multiplayer online roleplaying game (MMORPG) has created a huge community of players around the world since two decades "living" a few hours a day in its game space, Norrath, well characterized and documented by Aarseth [27]. The virtual world of Norrath is reminiscent of the fictional world of Tolkien's Lord of the Rings, or that of Dungeons and Dragons, and as the game progresses, players online form alliances to carry out increasingly complicated missions. The Legend of Zelda. Breath of the Wild [28] shows us another excellent example of a strange, novel, possible world. This world, the land of Hyrule, has green meadows, forests, clearings, and high mountains with towering summits; it is a world at once recognizable and beautiful, but also strange and other. World of Warcraft (WoW) [29] set in the world of Azeroth, and League of Legends (LoL) [30] with its virtual world called Runaterra follow a similar premise to EverQuest. The WoW boasts the highest number of players (124,7 millions) of any MMORPG worldwide, according to mmo-population.com while LoL national leagues and world championships are held online and watched by audiences of millions (the 2019 final was viewed live by more than 44 million people).

Video games from other genres have also developed communities of players who converge in a parallel world. Even in battle royal style video games (only one can survive) like Garena Free Fire [31], a FPS similar to Fortnite, or PlayerUnknown's Battlegrounds (PUBG) [32], in which huge numbers of players shoot at one another in a bid to become the last survivor. In terms of user numbers and downloads, with the data provided by newzoo.com, Garena Free Fire was the most downloaded mobile video game in 2019 and as twinfinite.net pointed out in Q1 2020 set a new record with 90 million daily players, while PUBG accumulated 734 million mobile downloads in December 2020, in addition to selling 70 million copies for PC. Furthermore, like the EverQuest style adventure games, the community element of these war games sometimes extends to the formation of alliances, indeed, the other highly popular FPS, Call of Duty [33] allows three game modes including a co-operative mode alongside the more familiar single or multi-player modes.

The open world sandbox game Minecraft [34] occupies the first position on the Wikipedia video game best-seller list. This game is popular with players of all ages, although one study has asserted that, at least for boys, after the age of 11 interest dwindles [35]. Nevertheless, according to the statistics, it is the best-selling video game of all time with more than 238 million copies sold and up to 126 million active players in any given month. Minecraft was originally created by Swedish company Mojang, and in 2014, it was purchased by Microsoft for $2.5 billion. Microsoft then went on to develop the Minecraft China extension, which it released onto the Asian market in 2017 – for free – with the result that it soon had over 300 million user accounts.

Finally, this compendium of fictional worlds is not complete without mentioning Animal Crossing: New Horizons [36] a game developed by Nintendo for its Switch console. This video game generated great interest in 2020, as its release on 20th March coincided with the announcement of national lock downs across the globe due to COVID-19. This simulation game revolves around a scenario where animals, with the appearance of stuffed toys, coexist with humans in a totally cute world. This particular release was the sixth version of Animal Crossing and the narrative involves players assuming the role of a character who relocates to an island inhabited by anthropomorphic animals where they buy a property with a mortgage loan that needs to be repaid. The player's avatar works off their debt by completing tasks such as fishing, collecting bugs or growing food, in addition, players can partake in annual activities on the island and interact with other players online [37]. The game provided an escape from the harsh reality of the pandemic and enabled real-time social interactions with friends, family or indeed, strangers.

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3. Results. What Happened in 2020 with Open World Video Games?

In 2020, mobility restrictions enforced due to the COVID-19 pandemic saw millions of people around the world confined inside their homes. During those endless months, video games, digital multimedia platforms, as well as YouTube, Twitch, TikTok, and online shopping platforms suddenly became the main entertainment in most homes with an internet connection. Our question is, did this result in any major changes in the global consumption of video games, particularly, was there any growth in open world video games? If we look at the statistics the answer is "yes", although the it was not as spectacular as might be assumed. Perhaps, this was because gamers around the world were already accustomed to virtual pandemics, since some of the most popular video games are based on post-pandemic worlds.

In the field of strategy video games, two titles are of particular note include Pandemic, and Plague Inc. These two games experienced huge growth in 2020 and, while the games each have very different rules of play, both involve situations in which the world faces some form of global health catastrophe. Pandemic [38] is a board and digital cooperative game, where players work together, using science, to beat four epidemic diseases that are blighting the world. Plague Inc [39] on the other hand is a strategy game in which the player unleashes one of a choice of deadly pandemics with the objective of wiping out humanity. Players can further their aims using various tactics such as fake news and groups of vaccine deniers to frustrate anti-pandemic measures taken by states.

Many other open world video games have their narrative origins in imagined pandemics, such as Resident Evil [40], The Last of US [23], Left 4 Dead [41], Tom Clancy's The Division [42], World War Z [43], Dead Space [44], Days Gone [45], The Walking Dead [46], H1Z1 [47], or State of Decay [48]. Thus, it is noteworthy how one particular gaming community responded to the real pandemic in 2020. Since 2013 the developers of The Last of US, Naughty Dog, have held a commemoration day called Outbreak Day on 26th September. According to the game's mythology this day marks the start of the Cordyceps fungal pandemic around which gameplay is based, and to celebrate, Naughty Dog offers the game's followers promotions, gifts, and new content. Days before the 2020 celebration, Naughty Dog stated that they could no longer use the name Outbreak Day in the midst of a real pandemic which was causing the deaths of millions of people. However, as their video game community still continued to grow, with four million units sold in just three days after the release of Series II for PS4, they also felt some kind of celebration should continue, thus the 26th September has become, simply, The Last of Us Day.

On the other hand, unexpected virtual pandemics have occurred inside video gameworlds, as happened in 2005 when the world event known as the corrupted blood incident occurred in the World of Warcraft player community. The pandemic lasted for a week after a spell infected several players, then spread through pets and amongst player's avatars throughout Azeroth such that up to two million players in the community were affected. Avatars could carry the disease asymptomatically and infect others, creating a situation where many fled the most populous cities and measures such as social distancing and self-isolation were imposed to curb community spread. This virtual pandemic caused tens of thousands of 'deaths' and was studied by real-world epidemiologists who published their findings in high-impact journals such as Science, Epidemiology, and The Lancet Infectious Diseases [49–51].

According to Newzoo, an investment analysis firm related with video games, there was a 10% increase in the number of video gamers in the world between 2019 and 2020 with numbers of players exceeding 2.7 billion in the year of the pandemic [52]. This represents a considerable annual growth, but it is in keeping with the general trend shown in recent years (see Figure 1).

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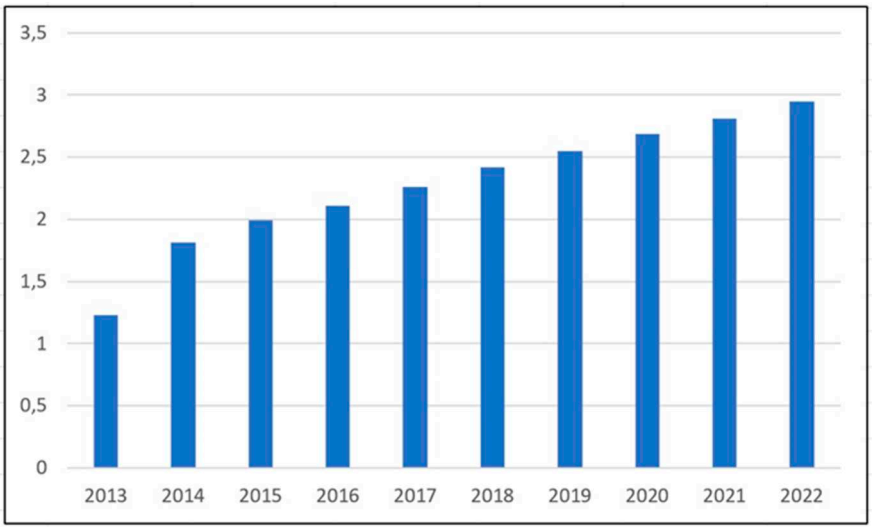

Figure 1. Growth in the number of video gamers in the world in billions. Source: newzoo.com.

The initial impact of the pandemic on the gamer community, can be seen in the exponential increase in the video game market and this is especially marked during the period when the first quarantines and states of emergency were being declared. According to the Interactive Software Federation of Europe (ISFE), in the 6 days between March 16th and March 22nd 2020, video game sales increased by 63% worldwide. Individual countries saw much larger increases, for instance France went into lock down on March 17th, and in that week (March 16th–22nd), digital downloading increased by more than 180%. In Spain, lock down started earlier, 14th March, and sales had already risen by 148% in the week 9th–15th March and rose by a further 23% in the following week (March 16th–22nd). In Italy meanwhile, during the first week of its lock down, digital download sales rose 174.9%.

New releases of games in March and April 2020 saw their number of players grow rapidly. One such, Animal Crossing: New Horizons [36], sold 5 million copies in the first month after its release and closed the year with more than 31 million copies sold. The free-to-play, multi-platform (Xbox, PlayStation 4 and Microsoft PC), battle royal game, Call of Duty: Warzone [52] was released on March 10th, and in 10 days recorded more than 30 million downloads going on to surpass 85 million downloads by the end of the year. Another multi-platform game (Xbox and PlayStation), Doom Eternal [53], was released on March 20th and made a profit of $450 million in nine months. As a final example, a new version of the famous pandemic game Resident Evil 3 [54] was released. This Japanese made game first appeared in 1999 and features the T-virus that famously turns humanity into zombies in an epidemic that expands from Racoon City. The new version appeared on April 3rd (for XBOX and PC) and in the first week of sales, in the midst of a genuine viral outbreak, a remarkable 3 million copies were sold.

The overall number of players, however, has not increased dramatically due to the pandemic, although the time spent by each one on video games has increased greatly. In addition, the demographic profile has modified becoming more equal in terms of the numbers of male and female players and gaining a broader age spectrum, including many more far older and far younger players than before [55].

The leading media consulting group, NPD, conducted a survey of 5,000 US game players in May 2020 to assess video game playing habits [56]. Results indicated that these gamers averaged 14 hours per week playing video games, which was up from the 12 hours per week reported in 2018. Nielsen, another consulting firm specializing in media and video games, also looked at the increase in time spent playing video games in March 2020. They questioned a total of 3,000 gamers and compared four countries, finding increases in playing time of: 45% in the US; 38% in France; 29% in the UK; and 20% in Germany This survey also found that the time spent watching streamed gaming content had

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also increased in all four countries, with the US leading once again with a nearly 50% increase, followed by France with one of 40%.

In September 2020, the market research company Ipsos MORI compiled a report for ISFE entitled "Video Gaming in Lockdown" [57]. This report estimated that there had been an increase in the time spent per week playing video games of 1.5 hours compared to the same period in 2019 (see Table 1).

Table 1. Weekly time dedicated to videogames in some European countries. .

	Q4 2018	Q1 2019	Q2 2019	Q3 2019	Q4 2019	Q1 2020	Q2 2020
U.K.	10,8	11,2	11,7	11,7	11,6	12,5	13,6
France	7,7	8,2	8,8	9	8,6	9,5	9,2
Germany	8,8	8,5	8,8	7,8	8,3	9,6	9,5
Spain	7,3	6,7	7,1	7,6	6,7	7,9	9,2
Italy	6,7	7,1	6,5	7,6	7,4	8,2	8,5

Source: isfe.eu.

Other statistics provide data showing a further increase in time spent on digital entertainment, especially among minors. Parents Together, a US-based association with more than two million members, conducted a survey of kid's online habits in April 2020 in which 48% of the families who responded claimed that their children were spending more than six hours per day online. This represents a 500% increase compared to before the crisis. Parents surveyed also reported that the platforms and apps most used by their kids were largely non-educational: YouTube (78.21%), Netflix (49.64%), and TikTok (33.41%).

According to NPD, Twitch, the most popular video streaming platform with 15 million daily active users and 3 million monthly creators, saw 3.1 billion hours watched in the first quarter of 2020 – a 24% increase since the last quarter of 2019. In March 2020, Steam, a popular PC gaming platform, experienced an all-time high in concurrent user count of over 20 million people.

All this increased time spent playing video games and watching video game related digital content has meant that, in 2020, the value of the video game market increased by 20% to a point where revenues are now in the order of $180 billion [52]. The two biggest individual markets are China and the United States, which together accumulate nearly 50% of all global transactions Nevertheless, other countries have seen rapid growth in this market sector, and additionally, while years ago revenues were mainly based on the sale of consoles and video games, nowadays, the highest percentage of revenues are derived from mobile microtransactions and monetization in free-to-play games (F2P).

According to the data the list of games with the highest number of followers in 2020 is practically the same as in previous years with just two new appearances: Among Us [58] and Fall Guys: Ultimate Knockout [59]. These two games are classed as 'party' video games and the popularity of this genre grew in 2020 greatly thanks to the possibility of social interaction that they offer.

As stated from the American Entertainment Software Association (ESA) in its 2020 yearbook: "the video games have become the leading form of entertainment because they bring us joy, connection and a sense of belonging when we need it most. Their value to society has never been more vital, …in the new paradigm video game play matters like never before" [56] (p. 2). Newzoo put forward a similar idea: "while COVID-19 has impacted some aspects of development, the pandemic has not fundamentally changed the games market—nor has it transformed player behavior. Rather, it has accelerated trends we have previously reported. This acceleration results from the ongoing measures around the pandemic. Gaming has been a means for entertainment, escapism, and socializing and interacting with friends/family for many consumers, leading to unprecedented growth for the games market" [52] (p. 3).

4. Discussion and conclusions

users have entered the video game market and experienced gamers have increased their engagement with both groups spending much of their time in open world video games.

The amount of time spent viewing broadcast content about video games has also increased. A particular area of growth is in watching events where players live-stream their game play. Many of these live-steaming players having huge followings which in turn increases the hype surrounding particular games. Constantly searching for innovation, the principal companies behind the social media platforms, live-streaming platforms and video games (Facebook or Epic Games for instance) are currently developing something known as the Metaverse, a concept that could become the ultimate new virtual world. The Metaverse is conceived as a space in which thousands of games coexist and where each gamer has their own game-independent identity. Obtaining their own skin in Fortnite [25] is a key milestone for some players, and this is a feature of many other video games, but gamers often alter these skins throughout the games as they take on different personalities.

Examples of how people are increasingly living online can be seen across the globe demonstrating how the world of video games has taken a qualitative leap during the pandemic. The rapper Travis Scott, for instance, donned a Fortnite skin to perform a series of concerts watched by more than 48 million people inside the game's environment. Korean Roblox players have chosen to get married within the game – with an audience of thousands of people from different nationalities and Animal crossing: New Horizons [28] has been the scene of numerous real children's birthday celebrations. Even the business world has got involved with offices being 'built' in Minecraft [34] to hold business meetings between managers from different countries. Many large companies now use video games, in addition to social media, as another means of marketing to consumers and the investment in online marketing now surpasses that put into traditional advertising. In terms of sports, e-sports audiences now lead those of the real-world super bowl or NBA and, during 2020, FIFA's highest revenues were generated by video game royalties rather than real football. Added to this, a generation of gamers, youtubers, and streamers have turned virtual fun into fortunes becoming also the new idols for millions of young people.

Our research question was whether the situation of confinement caused by the Pandemic generated some kind of profound change in the world of videogames and how the people who play videogames adapted to this situation of global health crisis. According to this research, the videogames industry has grown during this time, continuing the progression recorded in previous years and in contrast to what has happened in many other leisure industries. Video games are in production for years before they are released and the COVID-19 pandemic may have accelerated or delayed companies' schedules. Future projects, such as the Metaverse, will have to wait for new technological advances to become "reality". There have been no major changes in the lists of best-selling or downloaded videogames, except for the rise of two party games, Among Us [58] and Fall Guys Ultimate Knockout [59], due to the sociability and fast pace of both games. The global and future importance of this entertainment industry has become more visible to society as a whole. Beyond the previous debates about the violence of some video games or the possible addiction they could cause in teenagers, video games have permeated society during these months, through the news, their adaptation in series or films, their presence in social networks, their use in classrooms, conversations at work, the social rise of gamers and streamers, or the games that children now play in the park.

On the other hand, the people who play videogames have adapted to the health crisis by transferring their social relations to virtual worlds. The social distancing ordered by the authorities has been bridged by game players by reinforcing the bonds of their virtual communities or by transferring friends and relatives to different videogames to meet up in these Worlds of Affect with them and spend good times together. Virtual worlds have been places of escape and meeting while the health crisis progressed. The people who play videogames use their "projective stance" to supply different social interactions that moved to virtual worlds, such as birthday parties, playing with friends, dating, "going out", attending concerts or participate in work meetings.

At the beginning of the paper, we outlined that this research intended to pose questions for debate concerning the relationships between the different possible worlds and the real world, using open world video games and the COVID-19 pandemic as a context. Our intention was to uncover elements and processes that might strengthen the resilience of our contemporary society. In this

sense, the thing that stands out most from our research is the magnitude of the changes happening in the global entertainment industry in the last years, and how there can be no doubt that video games will be a very important part of our future digital society. Indeed, this future is already a reality for millions of teenagers and young adults who spend their leisure time in a fictional world through a screen or, as generation-Z prefers, multiple screens. Understanding this reality is vital to reduce the generational gap that is opening up between the international digital community and the generations that still remember the days of analogue. Video games are here to stay, and have already created dozens of new worlds inhabited by millions of beings. If Leibniz were writing today, he might well have based his theories around pixels rather than monads. His theoretical discourse would be current, although his ideas differ from the possible worlds of modern video games in that within many such games, the player has the real possibility of transforming their world.

As a caveat we must add that the resilience promoted by video games must be fostered by parents and educators, and to help us, there are, fortunately, numerous reliable and independent video game rating forums. It is not a question of allowing 8-year-olds to play any type of game, abandoning our obligations as parents or educators, but of ensuring that immersion in these new virtual realities is accompanied by education and at the same time encouragement to the enjoy real-world landscapes.

Children and teens are so called digital natives, almost more accustomed and confident in socializing via their devices than in person, as Wiederhold [60] pointed out: "The digital world is the real in which young people feel most at ease and linked to their peers" (p. 2). Therefore, the video game market will continue to grow in the coming years becoming simply another global entertainment form, just like international football and TV are now, and cinema and radio were before. It is yet one more feature of the evolution of human society that has been accelerated by the global health crisis.

This research should continue in the coming years to analyze the impact of COVID-19 on the production of future video games and the process of adapting the population to new virtual worlds.

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