Existential Video Games:

Proposal and Evaluation of an Interactive Reflection about Death

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Abstract

Philosophers and psychologists as well as popular media (novels, theatrical plays, movies) often propose reflections about human mortality. This paper aims at exploring how new media like video games could be used to encourage users to reflect about death, and about the impact of death awareness on their lives. After defining *existential video games* (EXGs), we propose and evaluate *Existence*, an EXG that aims to expose users to different attitudes towards death, and to encourage them to reflect about death and their own mortality. We studied the experience elicited by Existence through a qualitative analysis of users' interviews. Results show that Existence was able to elicit death reflection in participants. Furthermore, the game evoked both negative and positive emotions that, as explained by theories in social psychology, follow directly from mortality awareness and participants' attempt to cope with fear of death.

Keywords: video games, serious games, death, reflection, existentialism, qualitative study.

1. Introduction

Since Greek and Roman times, philosophers have reflected deeply on human existence as well as on the meaning and consequences of death. Existentialism, a school of thought represented by modern philosophers such as Heidegger, Jaspers and Sartre, gives a central role to the need of finding meaning in human lives constrained by the finality of death [1]. Reflection about death is often proposed also by traditional popular media, such as novels, theatrical plays, and movies. It is thus natural to think about how new media like video games could be employed to encourage users to reflect about death, and about the impact of death awareness on their lives. Video games with this purpose could be considered as a sub-genre of *serious games*, i.e. games with a purpose that goes beyond entertainment and involves education [2][3][4][5] and attitude change [6][7]. In addition, they can be a form of artistic expression [8][9]. Holmes [8] defines *art games* as interactive work by a visual artist that does one or more of the following: challenge cultural stereotypes, offer meaningful social or historical critique, or tell a story in a novel manner. Stalker [9] divides art games into *aesthetic games*, i.e., games that use the game medium to express an artistic purpose, and *agenda-based art games*, i.e., games that have some sort of ulterior motive other than aesthetics, such as bringing an issue to the public attention to attract support and understanding for a cause. However, Díaz and Tungtjitcharoen [10] highlight that it is not sufficient for art games to contain pieces of art, but they must also be able to provide an experience of reflection outside game play, i.e., to provoke feelings and reactions in the person interacting with the game. It is worth nothing that Holmes' definition seems to restrict the scope of art games unnecessarily, since it does not mention eliciting reflection as a possible goal. Stalker, as well as Díaz and Tungtjitcharoen, instead, acknowledge the role of reflection as a purpose of art games, although they do not explicitly consider existential reflection. Various examples of art games, e.g., the agenda-based art game *Escape from Woomera* [11], have been thoroughly analyzed in the literature (e.g., [9]). Some commercial video games such as *The Last of Us* [12] and *Bioshock* [13] can be also analyzed as

interactive experiences that, in addition to entertaining players, are able to elicit emotions and reflection [14][15].

This paper focuses on games which aim at encouraging existential reflection. We will use the term *existential video games* (EXGs) to indicate such interactive systems. To give a precise definition of EXGs, we resort to the psychological theory proposed by Yalom [16][17][18] who identifies four ultimate existential concerns that are able to drive human behavior, because people react by taking actions aimed at mitigating such concerns [19]. The four existential concerns are: death concern (i.e., the tension between the awareness of the inevitability of death and the wish to continue to be), freedom concern (in the existential meaning of freedom as "absence of external structure"), isolation concern (i.e., the tension between the awareness of one's isolation and his/her wish for contact and for being part of a larger whole), and meaninglessness concern (i.e., the dilemma of a meaning-seeking creature who is thrown into a universe with no apparent meaning). We define EXGs as video games that focus on at least one of the four existential concerns (death, freedom, isolation, and meaninglessness), and are designed to encourage users to reflect about the considered concern(s). It should be noted that a video game that may incidentally lead users to reflect about these concerns is not an EXG: for example, *Spec Ops: The Line* immerses users in wars and conflicts, and seems to encourage reflection on violence in video games and immorality of modern warfare [20]. However, the design goal of Spec Ops: The Line is not to elicit existential reflection: if such reflections possibly occur, they are an unintended byproduct of the interactive experience.

Yalom [18] highlighted how death awareness is capable of severely affecting psychological wellbeing by depriving some individuals of happiness and fulfillment. Therefore, coming to terms with mortality can contribute to individual wellbeing and more enjoyment of life. EXGs could be one of the means that help people reflecting about and changing their attitudes towards death. The goal of the study in this paper is to explore if this new media can promote such reflection, similarly to traditional media.

In the following, we first review currently available EXGs. Then, we propose and illustrate in detail *Existence*, an EXG designed to expose users to different attitudes towards death, and to encourage users to reflect about death and their own mortality. We analyze in depth through a user study the experience elicited by Existence, and discuss the obtained results. We focus especially on determining if the game is capable of eliciting reflections about mortality, and exploring how different elements in the game (such as the content and the game pace) can affect users' reflection. To the best of our knowledge, this paper provides the first in-depth study of an EXG.

2. Related Work

2.1. Reflection in serious games

In serious games for learning and education, users' reflection on the activities carried out during the game experience can support learners in deciding the strategies to apply in subsequent activities [21], effectively turning the game experience into learning [22]. To this purpose, *debriefing* is a frequently used strategy: during this phase, users are encouraged to reflect with an instructor on the game experience itself or, more specifically, on their performance in the game, to translate learning materials into knowledge [22][23]. *Coaching* is another strategy to improve the effectiveness of serious games for education [23]. The role of the coach, who can be an instructor or another learner, is to facilitate learning during the initial phases of the game. Virtual instructors can also be used for coaching [24].

Slow-paced gameplay has been described [25] as particularly suitable to encourage reflection, contemplation, and learning. The expression "slow technology" was originally proposed by Hallnäs and Redström [26] to describe technology that takes user time to: (i) understand why it works the way it works (reflection), (ii) apply the acquired knowledge (learning), and (iii) find out the consequences of using it (maintenance). This approach can be followed in any technology-based experience: for example, Hallnäs and Redström explore the use of slow technology in a work of art and in a piece of music. A design that implements slow technology can be exploited also in serious

games: Marsh [25] implemented an intentionally slow gameplay in a serious game that focuses on raising awareness of a specific environmental issue. Orji et al. [27] proposed a serious game for long-term dietary behavior change that exploits a slow interaction. More specifically, the game asks users to interact just once a day to choose the healthiest meal option among three possible choices. By presenting just a single challenge a day, the proposed game allows users to take their time to reflect, consult friends, and possibly find more information on the three meal choices [27].

2.2. Current EXGs

To find available EXGs, we performed web searches using Google, looking for video games that could match the definition of EXG given in Section 1. More specifically, we used the following search keys: "video game", "serious game", "reflection", "philosophy", "existentialism", "existence", "death", "meaning", "meaning of life", and "freedom". We excluded games in which existential themes (as defined in Section 1) are not the central ones. Table 1 lists and describes the EXGs we identified.

Title	Concerns	Plot	Interaction
The Graveyard [28]	Death	The user's character is an elderly woman who visits a cemetery, represented in 3D grayscale graphics. For most of her life, she visited the cemetery to clean the tombs and the gravestones. She walks slowly among the graves to reach a wooden bench on which she sits. During the walk, nature sounds are played (e.g., wind blowing, birds chirping), and the user can hear the sound of footsteps on gravel. Once she sits, a song plays, narrating the stories behind the death of different persons buried in the cemetery. In the same song, the old woman acknowledges that her time to join them may soon come. In the trial version, the user can let the character sit on the bench as long as desired, and can then get up and leave the cemetery to conclude the visit. The paid version of the game includes a possible different ending, in which the elder dies while seated on the bench.	The user can control the walking direction of the elderly woman in the 3D environment with the arrow keys; no interaction with objects with objects such as tombs and gravestones is available.
Every Day the Same Dream [29]	Meaninglessness, freedom	The user's character is a faceless, white-collar worker who must go through a monotonous day that keeps repeating unchanged in his life, as if it were a recurrent dream. A mysterious woman he meets daily in an elevator tells him that in five steps he will be a new person. During the game, the user can introduce small deviations in the preset path of the character, e.g., taking a different direction after exiting the elevator at the office. The user can try five different choices in five different days/dreams. During one of the days/dreams, the choice leads the character to commit suicide. In the final dream, the character is able to re-experience his suicide as a spectator, watching himself jump off the office building.	The user can control the man's movement (walking left or right) in the 2D environment through the arrow keys, and can interact with some objects in the environment by approaching them and pressing the spacebar.
One Chance [30]	Death, freedom	The user's character is a scientist whose laboratory has discovered a cure for cancer. However, he soon realizes that the cure ultimately kills any living cell. The cure is accidentally released out of the lab, and this will lead to the death of all living beings on Earth in 6 days. The user must decide how to spend his/her remaining days and, on the basis of the choices made, (s)he will experience different game endings. One of the possible endings shows the scientist surviving together with his daughter. The game shows disturbing scenes such as the suicide of a coworker and her wife.	The user can control the scientist's movements (walking left or right) in the 2D environment through the arrow keys, and can interact with some objects in the environment by approaching them and pressing the spacebar.
The End of Us [31]	Death, Isolation, Meaninglessness	The user controls a purple meteor traveling in space. After a short time, an orange meteor appears and interacts with the user. At times, the orange meteor seems friendly, "dancing" around the user's meteor. At other times, it appears hostile, bumping into the purple meteor. The user can interact with the orange meteor by moving the purple meteor or making it bump into the orange meteor. In the final part of the game, both meteors are on a collision course with Earth. The user can put the purple meteor in front of the orange one, or can hide behind it. The collision destroys the meteor in front, allowing the other to survive. The remaining meteor, worn out by the long trip, becomes greyish and its traveling speed slows down until the meteor eventually disappears, alone, below the bottom of the screen.	The user can move the purple meteor towards the top or bottom of the screen as well as to the left or right, by using the arrow keys. The purple meteor can interact with the orange meteor, as well as with other space debris, by bumping into them.
Drowning in Problems [32]	Freedom	This text-based game shows a list of various issues that human beings must deal with during their life. For example, the first issues the user needs to solve concern the need to learn and the need to play as a toddler. Each problem requires a certain amount of time to be solved, usually less than 5 seconds. Most of the successfully solved problems generate one or more resources that the user collects. Resources can be tangible (e.g., money, job, friends) or more abstract in their nature (e.g., knowledge, integrity, respect). Not all received resources look positive, e.g. stress or a broken heart, but can be considered as unavoidable burdens of life. Solving some problems (e.g., "You need to relax") consumes such burdensome resources. Some problems do not require any resource, and can be solved immediately; others require the user to collect a specific amount of one or more resources. For	The user interacts with problems by clicking with the mouse on the word "solve" near them, and seeing the effects of the action; no other interaction is supported.

		example, the user must collect 8 units of knowledge to "evolve" from a toddler to a child. As the user progresses, problems gradually increase in number and complexity in terms of resources required. The game touches different phases of life, involving success and failure, and eventually reaches a state of acceptance. This state is presented as another problem to solve to user's death. At this point, the only resource left is hope, which is consumed once the user solves the problem "You are forgotten", restarting the game. These last two problems require a significant amount of time (more than one minute) to be solved.	
That Dragon, Cancer [33]	Death	This autobiographical game follows a couple during some of the key moments related to the terminal illness of their son Joel, from cancer diagnosis to premature death. The user relives each experience, depicted as a scene within the game and narrated by the voices of Joel's parents, by playing short mini-games, and interacting with the environment. For example, in the opening scene the family is relaxing near a lake, while Joel is throwing pieces of bread to a duck. While the user moves the duck to reach the pieces of bread, Joel's illness is introduced by the voice of his father, who is trying to explain to another son why his brother, who is almost five, cannot talk. At the beginning of the game, the mother's voice reminds the user about "how short the time is", referring to how little time the parents can still spend with Joel. The game ends with a male voice saying a prayer while Joel, depicted on an altar inside a cathedral, disappears to symbolize his death. In the last scene, Joel's father addresses his wife with a monologue, in the form of a letter, in which he discusses dealing with life after the son's death.	The user can move in the 3D environment, interact with objects, and play the mini-games, by using a joypad or a mouse & keyboard setup. The mouse cursor changes shape to indicate what action can be currently performed: for example, the shape of a hand when hovering over an object that supports interaction; the shape of two footprints when hovering over a section of the environment the user can reach. To execute the action, the user presses the mouse button.

Table 1. The considered EXGs.

Death is the most frequently addressed theme in the examined EXGs, probably because it is one of the most obvious and common existential concerns [19]. In *The Graveyard*, the user controls a virtual elderly woman who is aware that her death is approaching, and faces the reality of her finiteness while thinking about people who died before her. *That Dragon, Cancer* focuses on knowing about the inevitable death of a loved one, illustrating the effects of a child's terminal illness and death on his family, and representing the tension between awareness of the inevitability of death and the wish to continue to be, a core existential conflict [17]. The inevitability of death is also a central theme in *One Chance*: Earth is just 6 days away from the death of all living beings, and the user can freely decide how the main character will spend those 6 days. Unlike *That Dragon, Cancer*, it is possible for the user to take a sequence of choices that leads to survival (of the main character and her daughter). Therefore, *One Chance* makes apparent also the existential freedom concern. This is further reinforced by the fact that, to highlight the importance of users' choices on the experience, the game can be played only once (hence the title), and cannot be restarted after completion. Existential freedom is the main theme of *Drowning in Problems*: to evolve as a human being, the user must make choices that may affect different aspects of his/her life, e.g., how long (s)he remains a teenager. No problem in the game can be solved without making explicit choices, not even a problem that brings to inevitable death. *The End of Us* emphasizes the existential concern of isolation: the two meteors in the game start and end their cosmic trip alone, and are isolated entities: the user controls only the purple meteor, without clearly knowing what drives the

behavior of the orange meteor, whether friendly or hostile. *Every Day the Same Dream*, as stated by its designer, focuses on alienation and the associated lack of perceived meaning of life. The main character lives a repetitive life whose meaning and purpose appear to be completely out of his control. However, the user is given the opportunity to introduce very small changes in the character's routine, like taking a different direction when walking out from the elevator. Player's choices can help the character realize that he has the freedom to "become a new person", as suggested by the woman in the elevator (who can be considered as a guide that starts existential reflection), and that he alone is responsible for giving a meaning to his life.

The End of Us differs from the other examined EXGs in its way of dealing with existential themes exclusively through metaphor: human beings and their life are symbolized by the purple and orange meteors, and their travel through space, respectively. The other EXGs are more direct about the discussed topics, in particular *That Dragon, Cancer* requires the user to experience as a spectator the dramatic events that actually occurred in the life of the developer's family, while *Drowning in Problems* goes through a sequence of problems that every human being is likely to face during his/her life.

In general, the analyzed EXGs do not strive for realistic or complex graphics. This can be partly due to lack of sufficient funding to develop EXG. In some cases, designers have chosen peculiar art styles as well as visual and audio effects that, although simple, can help in further conveying the intended existential message. For example, *Every Day the Same Dream* uses greyscale, very primitive graphics to better highlight the alienation and unhappiness brought in the character's life by the dull days that keep repeating themselves without any change. *The Graveyard* provides more realistic graphics, but rendered in grayscale to enhance the sense of melancholy the user should feel by visiting the cemetery that will soon welcome the old lady. In addition, it resorts to music with a closing song in which the old woman acknowledges her approaching death, and describes the death of some of the people buried in the cemetery.

In all the analyzed EXGs, the gameplay is designed to be very simple, and generally requires little user interaction. This can help users focus on the existential themes, rather than distracting them with complex tasks, controls, and features. In most cases, uses are only required to move the main character around the game environment (*The Graveyard*; *The End of Us*) and/or to engage in very simple interactions with other characters or objects in the environment (*Every Day the Same Dream*; *One Chance*; *That Dragon, Cancer*). In *Drowning in Problems*, users can proceed through the game by simply clicking with the mouse on the text "solve" placed next to each problem.

2.3. The conflict between life and death: a social psychology perspective

Terror Management Theory (TMT) [34] is a well-known theory proposed in Social Psychology with implications on attitude and behavior change, including in the health domain (e.g., [35][36]). TMT focuses on the effects of eliciting *mortality salience* (MS), i.e., an individual's awareness of his/her own mortality, by exposing people to reminders of mortality (*MS cues*). The theory models the basic psychological conflict between the desire to live and the realization (elicited by MS cues) that death is inevitable (mortality awareness), and posits that such conflict can generate emotions such as fear and anxiety [37][38]. According to TMT, one of the possible positive outcomes of a successful elicitation of mortality awareness can be greater motivation to enhance physical health [35] or adopt safer behaviors [39]. Further research on TMT has highlighted other positive effects elicited by specific MS cues. Cozzolino et al. [40] describe *death reflection* as a particular MS manipulation in which the relationship between death and self is made explicit by reinforcing the notion of facing an actual death, as opposed to being confronted with the abstract concept of mortality (traditional MS manipulation). Participants exposed to death reflection focused more about individual experiences, and less about abstract worldviews, than after a traditional MS manipulation. Additionally, participants in death reflection conditions have demonstrated reduced greed, heightened spirituality, and enhanced gratitude compared with participants in traditional MS conditions [40][41]. These results prompted Cozzolino to propose a

dual-existential-systems model [42], which suggests that individuals process their existence either via an abstract existential system (activated by abstract thoughts about death), or via a specific and personalized existential system (activated by specific and individuated thoughts, i.e., focusing on the circumstances surrounding death) [43]. These two systems induce different outcomes: defense-oriented motivational states (which are typically discussed in traditional TMT studies) as well as growth-oriented states (*Post-Traumatic Growth*) respectively. Similarly, Vail et al. [35] posit the existence of "positive" terror management outcomes, which can be defined by the existentially motivated attitudes or behaviors that minimize harm to oneself and others, and promote well-being in physical, social, and psychological domains.

Various studies in the literature proposed different models to categorize the content of an individual's reflection about Death. Florian and Kravetz [44] focused on classifying one's fear of personal death, proposing a three-dimensional model. According to them, people can attach intrapersonal, interpersonal, and transpersonal meanings to their own death. The intrapersonal dimension includes concerns and worries related to death consequences on one's mind and body (body decay, failure to accomplish personal goals…). The interpersonal dimension includes concerns and worries about effects of death on one's interpersonal interactions and relationships. Finally, the transpersonal dimension includes personal concerns related to the hereafter (e.g., fear of punishment in the hereafter). By carrying out a content analysis of open-ended questions in the context of death reflection, Cozzolino et al. [40] identified 15 categories of responses. The categories were: positive affect, negative affect, references to death pain, physical sensations, thoughts of past life, thoughts of others, selfish thoughts of others, religious references, goals in life, regrets, negative life comments, and positive life comments.

Although less known than TMT, it is interesting to mention also *Meaning Management Theory* (MMT) [45] for its contribution in outlining meaning-related processes needed to facilitate a healthy perspective of death acceptance. MMT posits that individuals must seek meaning for life and death in order to protect themselves from the terror of death (i.e., to manage death anxiety) and

to pursue a good life (i.e., to manage *death acceptance*) [45][46]. Death acceptance can be defined as a cognitive awareness of one's own finitude associated with a positive (or at least neutral) emotional reaction to this cognizance [45]. In particular, a neutral acceptance of death takes place when one neither fears death nor welcomes it, as (s)he simply accepts it as one of the unchangeable facts of life, and tries to make the best of a finite life [46]. According to Niemiec and Schulenberg [47], *meaning-seeking* processes concern the quest and discovery of meaning that involves tapping into creative, experiential, and attitudinal values. *Meaning-making* processes concern the construction of meaning through language, culture, story, goal-striving, and personal development. *Meaning-reconstruction* processes concern the integration of unpleasant and challenging events into a coherent, transformed worldview.

2.4. Death and Mortality in Human-Computer Interaction

In the field of *human-computer interaction* (HCI), different authors have explored the role of technology when dealing with death and mortality. Kaptelinin [48] identified two main topics explored in the available studies, i.e., bereavement and digital legacy. The first topic concerns the understanding of how people experience the loss of loved ones, and how technology can help people in coping with such loss, for instance by facilitating social support and bringing people together for collective remembrance (e.g., [49]). The second topic concerns how to manage digital assets (e.g., social network accounts) that belong to deceased users (e.g., [50]). As Kaptelinin observed, the current body of research does not fully address the possible role of technology in helping users dealing with their own mortality and the inevitability of their own death. While studies that focused on bereavement and digital legacy may have dealt with people's experiences of their own mortality, such experiences were not systematically investigated as the primary object of study [48]. The research presented in this paper is one of the first examples of studies in the field of HCI that specifically focus on *existential HCI* [48], a perspective in HCI research that investigates

the effects of technology (in our case, an EXG) as an instrument to support one in dealing with existential questions.

3. Existence

Existence is a slow-paced, meditative video game aimed at encouraging users to reflect about mortality and death. The game is set in a cemetery as in The Graveyard (see Section 2). The user is accompanied by a character ("companion", in the following) in what initially looks like a visit to a cemetery. During the visit, the user hears and reads quotes about death by well-known philosophers and writers through the centuries. We chose the quotes carefully to deal with five different topics:

- Death as a natural event;

- Pointlessness of fear of death;

- Lack of relationship between pain and death;

- Connection with loved ones who have died;

- The "ripple effect", i.e., concentric circles of influence that an individual can create during his/her life and may continue to affect others after his/her death [18].

The chosen quotes are meant to encourage users to think about death from different perspectives, by helping them to focus on aspects that they might not usually take into consideration when reflecting about mortality. Each quote is visually presented to users through a translucent panel superimposed on the scene, or as a tomb epitaph. Moreover, each quote is read by a human voice.

Figure 1: Screenshots of the cemetery environment. (a) An overview of the cemetery, showing individual and family tombs; (b) burial niches, near the entrance of the cemetery.

The cemetery design includes cultural and symbolic references typical of the cultural background of the participants involved in our study, ranging from the architecture and aesthetics of the cemetery to the presence of religious symbols and use of decorations like flowers. Figure 1a shows a view from above of the 3D cemetery in Existence. Trees (cypresses and oaks, see Figure 1a) project shades on the tombs and graves, as well as users. After entering the cemetery through an iron gate, users can see six groups of burial niches (Figure 1b). Then, by proceeding along the road, they can see individual and family tombs that fill the central area of the cemetery (Figure 1a). Users

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can approach the tombs by following the side roads as well as smaller paved paths that cross the grass fields.

Game controls for moving inside the cemetery follow typical conventions for mouse and keyboard: the arrow keys or the W, A, S, D keys allow users to move forward, move backwards, strafe left, and strafe right; the mouse allows users to control their viewpoint and direction. No other controls are required to use the EXG.

3.1. The Companion

To guide users in the EXG, we implemented a coaching strategy (see Section 2.1) by including a companion, a virtual agent available during the entire experience. The companion is an adult male, dressed in dark clothes. During the walk through the cemetery, he walks and talks slowly as appropriate to a cemetery. Following the concept of slow technology mentioned in Section 2.1, this is also meant to help users focus on the environment, and reflect about the death-related quotes. While we designed a linear visit to the cemetery we do not force users to constantly follow the companion. When they linger behind the companion, or when they decide to freely explore the environment, the companion patiently waits for them, occasionally encouraging them to follow him. The companion's verbal narration is extended and reinforced by the specific quotes found along the way. Moreover, the inclusion of the quotes into the verbal narration does not require the user to read the text of the quotes. Control is temporarily taken from users only for three quotes described in Sections 3.2.3 and 3.2.6 (of a total of 16 quotes), and only for a few seconds. The reason we did this for those three quotes was to introduce an element (the camera automatically turning to show the tomb for a few seconds) to better connect users with the tombs, which are an essential part of the experience

We decided to employ a virtual agent to guide users among the quotes instead of allowing them to explore the environment in a completely unsupervised way for two main reasons. First, the companion provides guidance to users during reflection on sensitive topics. Second, the companion

tries to make sure that all users go through the complete experience. Without the companion, users may wander around the cemetery, failing to encounter one or more quotes, while our goal is to give all users the opportunity to reflect on all five topics mentioned at the beginning of Section 3.

3.2. Plot

At the beginning of Existence, users find themselves in front of the cemetery entrance gate. The plot develops along a sequence of eight parts. To reach the ending of Existence, users have to progress through all eight parts.

3.2.1. Part 1 (**"*Encounter with the companion*"**). Users start the experience in front of the cemetery entrance gate. The companion approaches the user, saying in a friendly manner: "Hi! Is it the first time you come here? I think so, I've never seen you around. On the contrary, I come here very often, I don't know why... but this place gives me a peaceful feeling, and allows me to reflect". The companion offers users to accompany them inside the cemetery: "Do you want to go in with me? I'll be your guide! You know, there are interesting things that, when you're in a hurry, can go unnoticed." Then, he heads towards the gate (Figure 2b), waiting to be followed by the user. The EXG shows a brief description of the controls (Figure 2b) that allow users to move in the environment. The weather is sunny as in Figures 1 and 2. Users can hear the sound of a gentle wind blowing through the trees, while a calming and slow melody is played in the background by string instruments. At times, a crow caws in the distance.

Figure 2. (a) The companion greets users at the cemetery entrance gate; (b) the companion walks towards the gate, and a text panel on the left of the screen presents the simple game controls.

3.2.2. Part 2 ("Naturalness of death"). After entering the cemetery gate, the companion heads towards a group of burial niches (Figure 3a). Once the user reaches him, he promptly provides coaching by guiding the user during these initial moments of the experience, pointing at the niches and addressing the user (Figure 3b): "We have just entered the cemetery, and so many people have already welcomed us". He introduces the topic of naturalness of death by adding: "Do you know that 200,000 people die every day?" Then, he quotes Arthur Schopenhauer ("*Death is as natural as life*"). The quote is also presented visually as shown in Figure 3c.
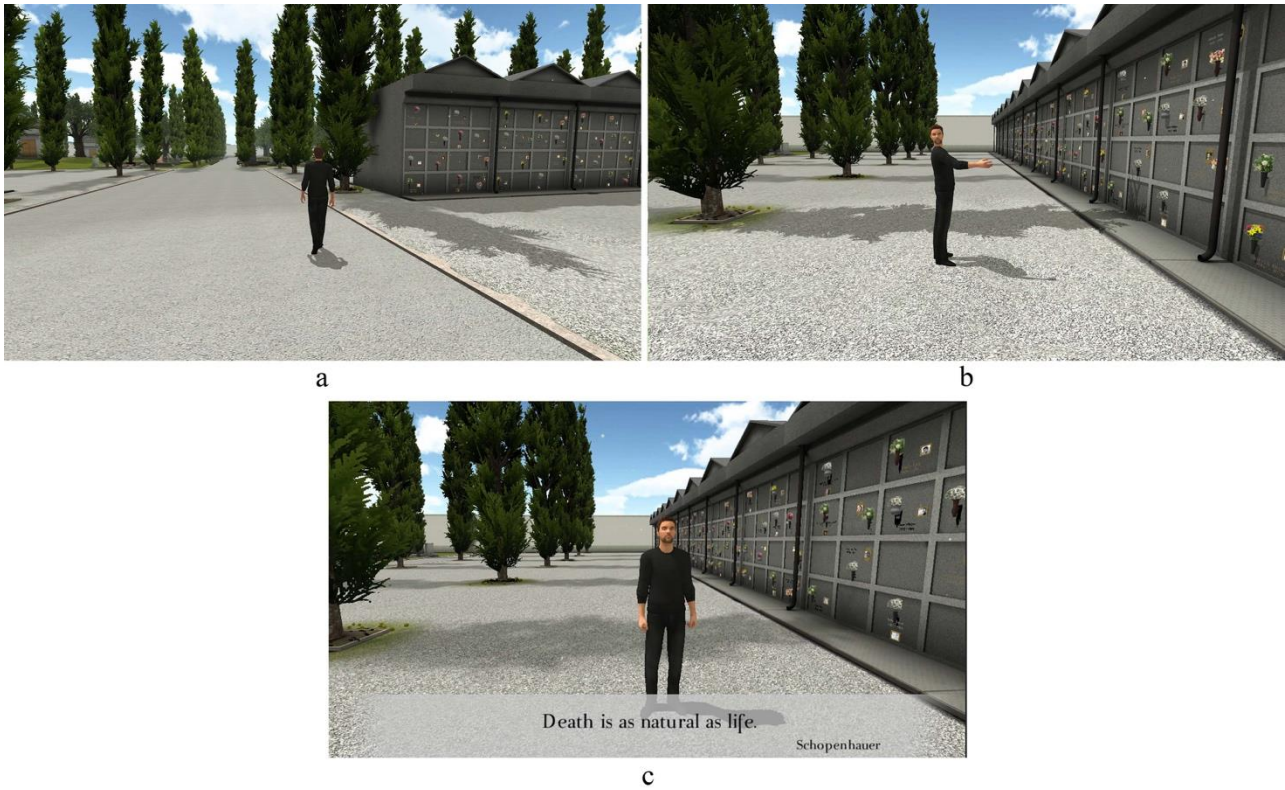
Figure 3. The companion leads the user to a group of burial niches (a), introduces the topic of naturalness of death (b), and cites a quote (b).

3.2.3. Part 3 ("Fear of death and pain"). After naturalness of death, the companion focuses on fear of death and pain: "Epicurus comes to my mind: *death is nothing to us, since when we are, death has not come, and when death has come, we are not*". Then, he leads the user among the tombs in the central part of the cemetery: "I have read other important quotes nearby. Some people have left them as their epitaphs. Come! Let me show you." He brings the user next to two epitaphs engraved on two different tombs (Figure 4). The camera frames each of the epitaphs, while the companion reads the quotes aloud:

1. "*If death causes you no pain when you are dead, it is foolish to allow the fear of it to cause you pain now.*" (Epicurus)

2. "*He who doesn't fear death dies only once.*" (William Shakespeare)

After reading Shakespeare's quote, the companion adds: "So, philosophers are not the only ones to think that!"

Figure 4. (a) The companion brings user to the tomb with the epitaph, (b) an engraved quote.

3.2.4. Part 4 ("Will-o'-the-wisps"). This part is organized as a mini-game whose goal is to expose users to additional death quotes by well-known artists and philosophers. In this part of the EXG, users are encouraged to freely explore the environment, and the game temporarily loses the linearity of exploration that characterizes the other parts. Part 4 was added to increase the appeal of Existence among users with more experience with video games. Furthermore, it gives users the opportunity to reflect without an explicit guidance: as suggested in [23], coaching can be scaled back as users progress along the experience. The companion says to the user: "This place gathers memories and thoughts of many women and men. One just needs to… look around with the right attitude." He indicates the presence of small, greenish will-o'-the-wisps in the area surrounding the user (Figure 5). "Go, and discover what they have to say! I'll wait for you here. Come back to me when you want to go on." When the user touches one of the will-o'-the-wisps, a voice reads a quote, which is also displayed on the screen. There are 10 different will-o'-the-wisps spread in the area, each one associated to a different quote read by a different (male or female) voice. A reverb effect is applied to these voices to give them an eerie tone. The ten quotes span all the themes of the different parts of Existence, and are the following:

- "*The more you fail to live your live fully, the more you fear death*" (Irvin D. Yalom)

- "*The fear of death follows from the fear of life. A man who lives fully is prepared to die at any time.*" (Mark Twain)

- "*It is not death that a man should fear, but he should fear never beginning to live.*" (Marcus Aurelius)

- "*While I thought that I was learning how to live, I have been learning how to die.*" (Leonardo Da Vinci)

- "*To live in hearts we leave behind is not to die.*" (Thomas Campbell)

- "*For life and death are one, even as the river and the sea are one.*" (Kahlil Gibran)

- "*Remember, there's no such thing as a small act of kindness. Every act creates a ripple with no logical end.*" (Scott Adams)

- "*What is great in man is that he is a bridge and not an end: what can be loved in man is that he is an overture and a going-under.*" (Friedrich Nietzsche)

- "*Some refuse the loan of life to avoid the debt of death.*" (Otto Rank)

- "*But is better to try to live each day like it could be the last, or – even better – like it could be the first.*" (Hélder Pessoa Câmara)

Once a quote is presented, the associated will-o'-the-wisp disappears. After touching the first will-o'-the-wisp, a message briefly appears on the top of the screen, reminding users that they can return to the companion to resume the visit at any time. If the user touches all the will-o'-the-wisps, a camera animation frames the companion to suggest that the user should rejoin him. At the start of the mini-game, the weather is still sunny (Figure 5a), but then it slowly turns to foggy and dark (Figures 5b). Once the user and the companion are together again, they can proceed further in the path. At this point in the plot, the companion resumes his coaching role, so that the EXG can expose users to further death-related topics in a more supervised way.

<div style="text-align:center">a   b</div>

Figure 5. Two examples of will-o'-the-wisps: (a) at the beginning of the mini-game when the weather is still sunny, and (b) after a while, when the weather has turned to foggy and dark.

3.2.5. Part 5 ("Loss of loved ones"). The companion brings the user near a monumental family tomb (Figure 6). "Sometimes, I think about the loss of loved ones I suffered," he reveals. "However, I then ask myself: if a friend, a brother, passes away, does he cease to be my friend or brother? And I… Do I cease to be his friend, his brother?" He then turns towards the monumental tomb and quotes Antoine de Saint-Exupéry: "*He who was gone, so we but cherish his memory, abides with us, more potent, nay, more present than the living man*".

Figure 6. The companion talks to the user about the loss of loved ones, near a monumental family tomb.

3.2.6. Part 6 ("Ripple effect"). The companion brings the user near a tomb that, despite being old, is still adorned with fresh flowers. "Many people in this place passed away long ago. However, what they did during their life still has a positive influence on the people who were close to them." He draws user's attention towards the tomb. The epitaph on the tomb is a Dalai Lama quote: "*Just as ripples spread out when a single pebble is dropped into water, the actions of individuals can have far-reaching effects*".

3.2.7. Part 7 ("The last tomb"). Rain starts slowly pouring over the cemetery. "There is a last tomb that I'd like you to see, that one over there", he says as he points at an isolated black tomb a short distance away (Figure 7a). Then, he looks again at the user, for a farewell: "It is time for me to go. Bye!" In an unexpected turn of events, the companion fades away in a globe of bright blue light (Figure 7b) that slowly ascends to the sky. The user, now alone, can walk towards the black tomb, and notice a question mark engraved on its surface (Figure 7c). At the same time, the calming

background music that has played during the whole experience turns into a dramatic crescendo and increases in volume. When users finally reach the tomb, they too turn into a light globe and ascend to the sky. With this event and the question mark on the grave, the video game aims at suggesting to the users, without explicitly mentioning it, that the last tomb is theirs.
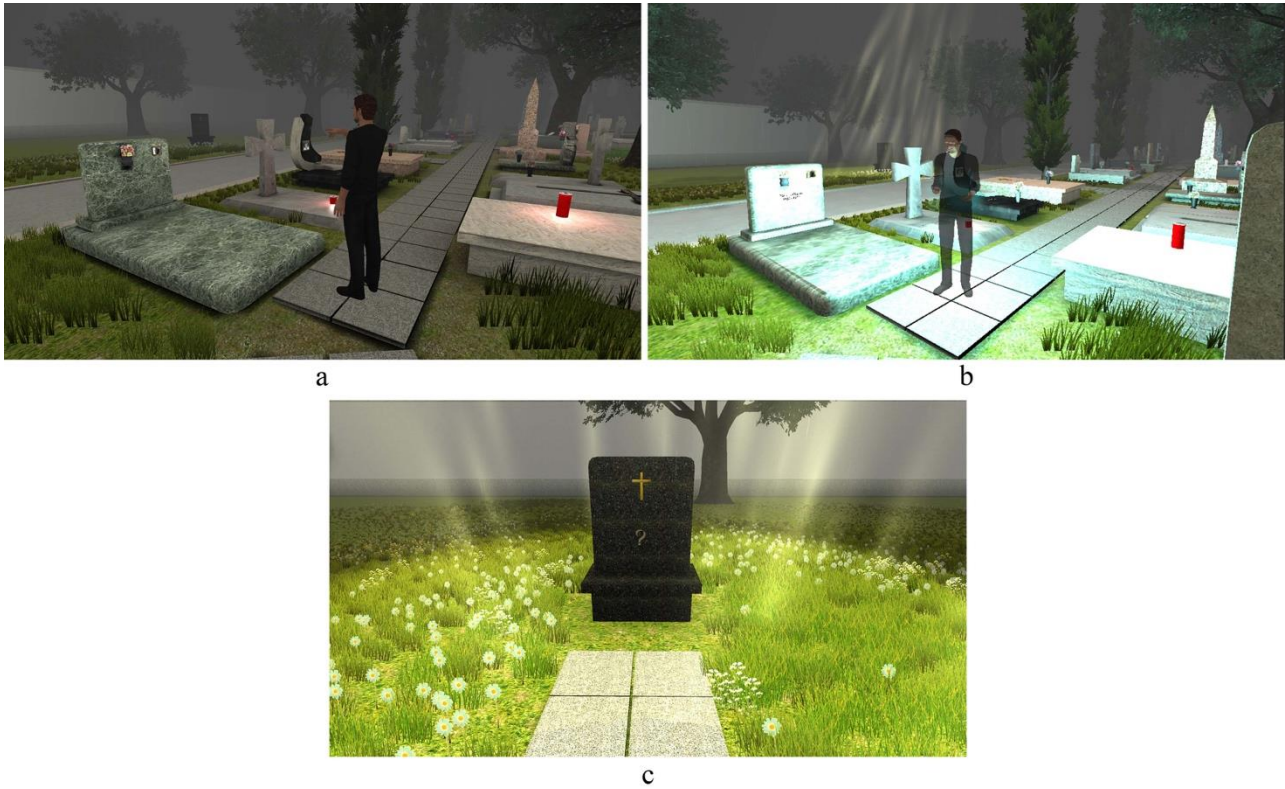

Figure 7. (a) The companion points at the last tomb; (b) the companion disappears after saying farewell to the user; (c) the user reaches the last tomb, which shows a question mark as deceased name.

3.2.8. Part 8 ("Is it the end?"). When the ascending user's viewpoint reaches the top of the trees, a black screen fades in, displaying "The end?" in white text. We added this question mark to leave two possible (non-mutually exclusive) interpretations open: (i) an encouragement to further reflect about the legacy that one's life has generated, and will survive the user after death, which could be inspiring to any user, (ii) the possibility of an afterlife, which could be inspiring to religious users of different faiths. After two seconds, the end screen fades out and the user can see

again the cemetery, this time from above (Figure 8). This is meant to avoid an abrupt end to the reflective experience and to allow each user to take his/her time to leave. Users are free to look around by moving the mouse, while a slow, subtle translation of the camera moves them automatically above the cemetery at a constant height. At the same time, it stops raining and the weather slowly turns sunny again. If the user keeps watching the screen, the camera translation continues on a preset path. By leaving the game running indefinitely, we want to give the opportunity to users to reflect on their experience with Existence while remaining immersed in the environment. Unlike serious games for education and learning, we do not guide the final reflections through an explicit intervention such as a debriefing or a test (e.g., asking users to recollect their thoughts about mortality and death), because we reasoned that it would have broken the subtleness of the experience and the flow of emotions it can evoke.

Figure 8. User's final viewpoint on the cemetery.

4. User Study

The goal of the study we carried out on Existence was to investigate in depth the experience it creates in users. We followed a qualitative rather than quantitative method, because open answers might allow us to understand how each user reacted to the existential themes, and to bring to light

nuances in how each user experienced Existence. In particular, we focused on four main aspects: emotions elicited by the EXG, reflections elicited by the EXG, content of the EXG, and usability aspects.

4.1. Participants

For the evaluation, we recruited 44 participants through convenience sampling among graduate and undergraduate students from our university, and among people from other occupations. The inclusion criteria was no previous knowledge of or exposure to Existence before participation to the study. One of the recruited participants did not consent to try Existence after he was informed about the death-related content of the video game. The 43 participants (20 M, 23 F) who gave their consent participated in the evaluation. Their age ranged from 20 to 38 (M = 24.60, SD = 3.87). A simple measure of frequency of video game use was obtained with a 7-points Likert scale (1 = never; 7 = every day). Figure 9 shows the distribution of participants' frequency of video game use.
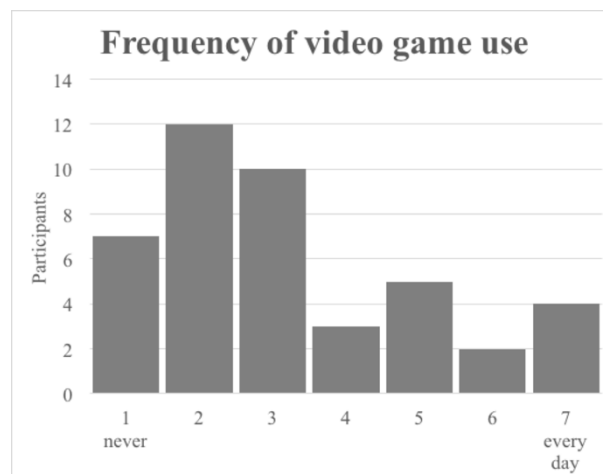

Figure 9. Distribution of frequency of video game use.

4.2. Procedure

Before the test, we informed participants that the system they were going to use was a video game that took place in a cemetery, and that contained thoughts about death. Then, we asked if they consented to try such experience. Moreover, participants were informed that they could interrupt and leave the test at any moment, without providing a reason to the experimenter. After filling the demographic questionnaire, participants were seated in front of a PC to try Existence, and wore headphones to listen to the audio. They were told that the experimenter was not going to interfere or answer questions during the session. After the session, participants were interviewed, following a semi-structured approach to gather information about their experience with the game (see Appendix 1 for the interview protocol). When participants spontaneously mentioned interesting topics or issues, further questions were asked to better understand the specific topics and issues. Interviews were recorded, under participant's consent. At the end of the interview, participants were thanked for their participation.

4.3. Qualitative data analysis

To carry out a qualitative analysis of participants' interviews, we first transcribed them verbatim from the audio recordings. Then, we employed thematic analysis to analyze transcripts, identifying and organizing common and salient themes following the steps outlined in [51]. The analysis involved:

1. Reading, and re-reading the transcripts to familiarize with the data;

2. Coding interesting features in the dataset, and collating data relevant to each code;

3. Combining all the codes into potential themes, gathering all data relevant to each potential theme, and organizing themes into different levels (e.g., main overarching themes or sub-themes within them). A theme was divided into one or more sub-themes when it was particularly large or complex;

4. Checking if the themes and sub-themes were meaningful in relation to the coded extracts, and to the entire data set;

5. Refining each theme and sub-theme, generating clear definitions and names.

The steps above were carried out by the two authors of the paper. However, since the process of defining the codes and applying them to the dataset can be biased by subjective interpretation, the validity and reliability of the themes identified must be verified [52]. We thus involved three external independent coders, not involved in any aspect of the design and development of Existence, and created a codebook that they used to code the data, following the indications included in [53]. The codebook included the themes and sub-themes identified with the thematic analysis, as well as the defined codes. For each code, we provided a label, a full definition, i.e. an extensive definition with inclusion and exclusion criteria, and an example extracted from the data set. The independent coders were told that they could apply multiple codes to the same fragment of text. The coding process was carried out with a Computer Assisted Qualitative Data Analysis Software (CAQDAS). In particular, the independent coders were instructed to use the Coding Analysis Toolkit (CAT) [54], an open-source web-based CADQAS. In total, there were four coders, as the two authors count as one.

5. Results

We analyzed the level of agreement among coders using Fleiss' kappa [55]. Results revealed an overall kappa coefficient of 0.64, which indicates substantial agreement [56]. In the following, we present the results of the thematic analysis, organizing them into four topic areas:

- *Elicited Emotions*: themes that capture positive or negative emotions elicited by Existence;

- *Elicited Reflections*: themes related to participants' thoughts and reflections elicited by Existence;

- *Content:* themes that describe participants' comments about different elements contained in Existence.

- *Usability*: themes that concern perceived ease of use, usability problems and suggestions.

In the following sections, we describe each theme in detail, also providing sample extracts from the interviews. In the interview extracts, the parts in round brackets are additional questions asked during the interview, while the parts in square brackets are words or phrases added to clarify the sentence.

5.1. Elicited Emotions

Table 2 summarizes the themes and sub-themes that belong to the *Elicited Emotions* topic area.

Theme	Sub-theme	Description	Participants
Positively-valenced emotions	Tranquility	The participant felt tranquility, serenity, calmness, peace or relaxation.	P2, P3, P13, P15, P19, P21, P29, P30, P32, P34, P36, P37, P39, P40, P41
	Surprise	The participant felt surprise or astonishment.	P11, P14, P18, P26, P29, P33, P35, P40
	Engagement	The participant felt that the EXG was engaging, captivating, exciting or interesting, or able to keep him/her focused on the play activity.	P4, P5, P6, P20, P22, P30, P32, P33, P35, P41, P42, P43
	Curiosity	The participant felt curiosity and desire to see how the plot unfolded.	P15, P29, P41
Negatively-valenced emotions	Stress	The participant felt stress, anxiety, agitation, uneasiness, discomfort or distress.	P2, P4, P5, P8, P9, P11, P14, P16, P17, P18, P20, P23, P24, P25, P27, P30, P31, P32, P33, P34, P35, P36, P40, P41, P43
	Boredom	The participant felt that the EXG was boring, not engaging, or that it left him/her uninterested without eliciting particular emotions.	P6, P7, P9, P10, P12, P14, P15, P25, P26, P27

Table 2. Themes and sub-themes of the *Elicited Emotions* topic area.

5.1.1. Positively-valenced emotions. Twenty-eight participants experienced positively-valenced emotions during the play session. Fifteen of them found that the game was able to elicit tranquility, serenity, calmness, peace or relaxation, with nine participants feeling such emotions during the entire session, e.g.:

I liked the game because it was relaxing more than anything, while playing. (So, you felt a sense of relaxation…) Yes, […] the more I proceeded through the game, yes. – P40

27

Two participants (P34 and P36) reported that they did not feel immediately such emotions, but only after a few moments, e.g.:

> *(What thoughts and emotions did you feel while playing the game?) I felt anxious at the beginning, then I relaxed. – P34*

A few participants attributed the elicitation of tranquility to specific elements of the game, such as the background music (P15, P32, P37, P40), the companion's voice (P19), and the quotes (P32), e.g.

> *You could feel quite a lot of serenity, in part because of the music, in part because of the quotes. – P32*

> *There's the soundtrack that relaxes you. This thing is very… very calm, this music that… it's like… there is a requiem, at the end, a tranquil thing, that relaxes you, so [there was] this very beautiful thing… - P37*

Twelve participants found the EXG to be interesting, exciting, engaging, captivating, or able to keep them focused on the activity, e.g.:

> *[I liked] that everyone can play [this game], its simplicity, and… Despite this simplicity, [I liked] the fact that it was very captivating. (What do you mean?) I mean, it was able to catch [my] attention, it leads one to stay focused on the play activity [...] – P32*

A few participants attributed the elicitation of these emotions to specific elements such as the music (P20, P42), the quotes (P6), the cemetery settings (P22), the last tomb (P5), and the presence of the companion (P33). For example:

> *(Did you feel particular emotions and thoughts in specific moments of the game?) In one moment, yes, when [the game] says 'those who aren't afraid of death, actually… have a better life', that's true, I think so too, and that's the only moment during which I said 'that's good.' (Did you feel…) I felt like sucked more into the game. – P6*

> *I felt involved because [the cemetery] is a place that was always part of me, it always provoked certain emotions in me, so… I was particularly moved, absorbed by trying to*

understand where this guide would take me, or, in other words, where this journey among

the different quotes, the sequence of different thoughts, the different authors presented [by

the game], would take me. – P22

When I reached the last tomb… that was the moment when I felt a sensation of… excitement,

because I was able to reach the final goal of the game. – P5

In general, I liked all the game, because it encouraged me to proceed, to listen to the guide,

that is, if I had to proceed without the companion, it would have been a little boring;

honestly, [the game] wouldn't be stimulating at all. – P33

According to eight participants, the experience was also able to elicit emotions like surprise and astonishment, especially during the events in Part 7 and Part 8 (five and four participants, respectively). For example:

I was astonished when the guide disappeared, and the light that appeared was something

mystical, surreal, and… Let's say that it caught me off guard, I never thought that there

would be something like that [in the game]. (Did you expect something else? That the game

would end differently?) Yes, honestly, I thought that the game would end differently, for

example with the companion leaving the cemetery normally, not like that. – P11

Two participants reported that a sense of surprise was also elicited by the tombs in the cemetery (P18) and by the weather change during the will-o'-the-wisps mini-game (P40).

Finally, three participants revealed that they felt a sense of curiosity about the entire experience (P41) or to specific moments of it, i.e., the first moments (P15), the final parts and the tombs shown during the visit (P29).

P29 reported a general sense of curiosity related to the tombs she saw while visiting the cemetery:

To tell you the truth, I was curious to know… what was written on the other tombs. […] It

was a bit macabre, but it was a curiosity I had while I was playing. – P29

Also, the finale left her intrigued about what happened:

I felt intrigued when… the character, I suppose it was Charon, vanished, I don't know, I

didn't expect that, and… even more surprised when I reached the [last] tomb, and it was me

who vanished next. – P29

5.1.2. Negatively-valenced emotions. Twenty-five participants experienced negatively-valenced emotions related to stress, such as fear, anxiety, discomfort and apprehension. For example:

(What thoughts and emotions did you feel while playing?) A latent sense of discomfort, […]

a sense of restlessness, uneasiness […] – P8

Among them, 13 participants said that such emotions were temporary. In particular, three participants (P34, P35, P43) reported that they felt stress-related emotions only at the beginning of the game, e.g.:

At the beginning [of the game I felt] a little bit of anxiety, and then I relaxed. – P34

Participants P11, P30, P40 and P41found that Part 8 of Existence was the most stress-inducing one. Two of them (P11 and P41) explicitly linked such emotions with the death awareness elicited by the sight of the final tomb. For example:

[…] And the tomb with the question mark, it unsettled me so much! (How?) Because you

think about your future death… so yes, it scares a bit. – P11

Other specific elements were reportedly able to elicit stress-related emotions in participants. Six participants felt that Existence audio was a source of distress and unsettlement. For example:

(Did you find the audio of the game pleasant or unpleasant?) Audio was appropriate given

the theme of the game… It was a bit unsettling, though… - P14

Two participants (P16, P32) commented about the role of the background music, e.g.:

Audio was very pleasant, and… Also the change… at the end, when [the game] shows you

the [last] tomb and the… the music became more… How can I say it… distressing, so to

speak. – P32

The companion played a role for a few participants, in particular its voice (P18 and P33), and its behavior (P11, P18, P25), e.g.:

> *[I found] A little distressing, this [companion's] voice, a bit… it penetrates you […] (So you are telling me that it was the voice to be unsettling…) Yes, the voice [was] a bit distressing, I mean, you feel it […]* – P33

> *I suppose that one of the factors that made me so unsettled was the age of the speaker[1], in addition to his voice tone and the way… the levity with which he approached the place in which we found ourselves.* – P18

Participants P18 and P23 explained that they found the cemetery tombs unsettling because they displayed photos of the deceased, e.g.:

> *I felt a little bit of unsettlement, and amazement at the same time, when I stopped to look at some of the tombs… On one hand, the amazement and the pleasure in noticing that it was very realistic as a cemetery; on the other hand, a little bit of apprehension because [such amazement and pleasure] was due to the fact that some tombs displayed real photos of people […]* – P18

Elements reported by single participants as inducing negatively-valenced emotions were the weather change during the mini-game (P40), the lack of a clear goal during the play session (P4), the controls (P5), and the quotes (P11). It is interesting to note, in the case of P11, how death awareness was elicited not only by the final tomb, but also by the different quotes included in Existence, which evoked a general sense of anxiety:

> *Honestly, I was a bit scared because death is a topic that scares me a lot, and so all the reflections included in the game were a bit unsettling, and sometimes the guide… seemed a bit… unsettling.* – P11

---

[1] Participants had actually no information about the age (53) of the speaker who dubbed the companion.

Participant P31 highlighted that she considered the negative emotions elicited by Existence as a meaningful element of the experience:

> *[The game] distressed me a bit… it unsettled me. (You mean…) Nothing more. (OK, so you perceived emotions that were negative…) No, not really negative. I mean, I was unsettled, but… I think that a spiritual motion is always positive, [it is positive] if a game moves you, doesn't it? […] If it were completely dull, it would be a bad game. – P31*

Finally, 10 participants found the game boring and uninteresting, unable to elicit emotions. For example:

> *[I felt] especially boredom, [the game] didn't particularly engage me. – P25*

Participant P12 provided a possible explanation:

> *Let's say I felt boredom, because I'm used to a completely different [game] genre, so I was a bit bored. – P12*

Three participants (P14, P15, P25) reported that they felt an initial interest in the game due to curiosity that quickly turned into boredom due to lack of sufficient action, e.g.:

> *(What thoughts and emotions did you feel while playing the game?) Attentiveness, at the beginning, and then… it turned into… boredom, because I realized that there was not going to be a goal to achieve, so… Disappointment, at the end, because everything ended with a lifeless [scene] that didn't evoke particular feelings. – P14*
>
> *I didn't feel specific emotions… Except for curiosity, at the beginning, to understand what I had to do… Curiosity that… let's say it disappeared because I realized that I only had to follow the guy. – P15*

5.2. Quotes and Reflections

Table 3 summarizes the themes and sub-themes that belong to the *Elicited Reflections* topic area**.**

Theme	Sub-theme	Description	Participants
Memories		The participant commented that the EXG or specific elements like the tombs or the quotes made him/her recall personal memories from the past.	P9, P14, P23, P28, P35, P37
Reflections	EXG-elicited generic reflections	The participant commented that the EXG or specific elements like the tombs or the quotes elicited generic reflections about life and death.	P1, P4, P5, P16, P17, P19, P23, P28, P29, P32, P33, P35, P36, P38, P39, P41, P43
	EXG-elicited reflections about life	The participant commented that the EXG, or specific elements of it like the tombs or the quotes, made him/her feel a will to live, or helped him/her approach more positively the death theme, or elicited other specific reflections about life.	P21, P28, P29, P33, P34, P38, P41, P42, P43
	EXG-elicited reflections about fear of death	The participant commented that the EXG or specific elements like the tombs or the quotes made him/her reflect specifically about fear of death, and about how such fear is a consequence of living an unsatisfying life.	P36, P39
	EXG-elicited reflections about relationships and ripple effect	The participant commented that the EXG, or specific elements of it like the tombs or the quotes, made him/her reflect specifically about relationships and the ripple effect.	P28, P33, P37, P39, P41

Table 3. Themes and sub-themes of the *Elicited Reflections* topic area.

5.2.1. Memories. Six participants reported that the video game or some of its specific elements like the tombs or the quotes evoked personal memories from the past, i.e., when they were young, as well as memories of relatives, such as their grandparents, that passed away. For example:

> *(What thoughts and emotions did you feel while playing?) I thought about my grandparents, and… Yeah, some thoughts about them came to my mind, as well as thoughts about when I was younger. – P23*

Four participants did not specify if these memories evoked specific (positive or negative) emotions, e.g., participant P23. Participant P14 said instead that such memories were unpleasant:

> *Well, given the topic of the game, there were a… couple of unpleasant memories that came to my mind about people that passed away. – P14*

Participant P35 reported how the game helped her recall memories of relatives with a more positive feeling:

> *I have relatively little experience with… recent deaths, these [experiences] are more related to my childhood, my adolescence… Thinking about them now… […] I currently don't think about them with sorrow, with… discomfort, as it could once have been the case. I think about them with a lot more distance, a lot more… tranquility, so to speak. – P35*

5.2.2. Reflections. Seventeen participants reported about how Existence allowed them to reflect in general about life and death. For example:

> *At the end, when [the companion] goes to heaven, [the game] made me think. (The game made you think… about what?) Well… it made me think about the meaning of life, the different sides of… life, the pros and the cons. – P17*

For five participants, in addition to make them recall memories of the past as reported above, Existence made them reflect about how their relatives' legacy may still affect them today. For example:

> *Sometimes [during play] I was thinking about when I was young, yeah, the quotes… make you think about what the ones who died have left to me […] What is the influence they had on me and… in other words, now that they have passed away, what these people have given to me. – P37*

Among them, participant P41 reflected about her own ripple effect:

> *[I reflected] about connections, I mean… the part about the connection… the moment when I lose a friend and that connection disappears, remains… this made me reflect. And also [I reflected about] what I want to leave to others when I will eventually be gone. – P41*

Nine participants reported how they felt an enhanced will to live while using Existence, how the game let them approach the topic of death more positively, and in general how it made them reflect more specifically about living in the present, focusing on the things that are truly important in one's life. For example:

> *In my opinion, one should focus more on… worldly things, I mean, […] on relationships, because when it's over it's really over, I mean, a game like this, that looks like nothing [special], makes you understand that you have to stop, hold on for a moment, talk [to others] more, play around, joke around, I mean… social relationships. – P33*
>
> *(What kind of thoughts [this game elicited in you?]) [I thought that death is] like a transition […] that happens only once during life. […] And also [that] you don't have to*

always think that one day you'll die, that every illness brings you to death, because this is

not true. […] Because if you do, then you die… you die continually. – P42

Finally, participants P36 and P39 reflected specifically about fear of death. For P36, the reflection

was apparently started by the second Epicurus quote in Part 3:

I thought about… […] one should not be afraid of death because death is a purely physical

thing, when we are, death is not, and vice versa… So it makes no sense to be afraid of death.

– P36

P39 reflected instead on how fear of death originates from an unpleasing life. For example:

For example, [I reflected about] the fact that… fear of death originates from… not living

well your own life. – P39

5.3. Content

Table 4 summarizes the themes and sub-themes that belong to the *Content* topic area**.**

Theme	Sub-theme	Description	Participants
Novelty		The participant found the EXG or the discussed topic to be strange, peculiar, or original.	P20, P36, P38, P41
Topics	Topics appreciated	The participant appreciated the EXG topics.	P12, P13, P14, P15, P41
	Topics criticized	The participant did not appreciate the EXG topics.	P24, P27
Quotes		The participant appreciated some or all the quotes in the EXG.	P2, P3, P4, P5, P10, P19, P21, P23, P25, P29, P30, P31, P34, P35, P37, P39, P42
Actions and plot	Actions and plot appreciated	The participant appreciated the actions and/or the plot.	P1, P6, P23, P32, P38
	Actions and plot criticized	The participant criticized the EXG as not interactive enough or too guided.	P3, P6, P8, P10, P11, P12, P14, P15, P24, P29
Pace		The participant perceived the pace of the EXG as slow, because of the walking pace of his/her avatar or the companion, or because of the pace of the sequence of events.	P10, P11, P16, P18, P19, P20, P31, P35, P37
Goal clarity		The participant felt that the goal that (s)he had to achieve in the EXG was not clear enough.	P4, P7, P9, P14, P25
Virtual environment	Atmosphere appreciated	The participant appreciated the general mood and atmosphere of the virtual cemetery.	P8, P22, P28, P31, P35
	Setting criticized	The participant did not appreciate the use of a cemetery as setting.	P5, P13, P24, P32
	Weather appreciated	The participant appreciated specific elements or the evolution of the weather.	P31, P33, P38
	Weather criticized	The participant did not appreciate specific elements or the evolution of the weather.	P2, P16

Table 4. Themes and sub-themes of the *Content* topic area.

5.3.1. Novelty. Four participants described the game as strange, peculiar or original. Participants P20 and P36 found Existence to be original because of the cemetery setting, e.g.:

> *I liked the type of game, it was interesting, rather unusual, I mean, it's a game [that takes place] in a cemetery. – P20*

According to participant P41, the video game was original because of the death-related topics. Participant P38 appreciated the fact that Existence included quotes from well-known authors:

> *(In general, what did you like, and what did you dislike, about the game?) Well, [it was] original, I mean, the fact [that it shows] the sentences, the authors, yeah, it was original. – P38*

5.3.2. Topics. Five participants appreciated the death-related topics included in the game. For example:

> *[…] I liked the topic, in the sense that it's a peculiar topic, that makes you reflect… – P41*

Two participants did not like the topic of the game. Both expressed their dissatisfaction during the entire interview. One of them commented:

> *(In general, what did you like, and what did you dislike, about the game?) Well, what did I like [about the game], you ask? Close to nothing. I didn't like the setting, the topic. (What did you dislike? I mean, what details, what particular element…) I precisely mean the general topic. – P24*

5.3.3. Quotes. In general, participants appreciated the quotes that Existence uses to encourage reflection. Seventeen participants commented positively about them, e.g.:

> *The [quotes] were very well chosen and really deep, so… [they were] something that I definitely appreciated. – P37*

> *(In general, what did you like, and what did you dislike, about the game?) I liked… I liked the sentences, some of the sentences… because they make one think. – P39*

5.3.4. Actions and plot. Some participants explicitly commented about the actions they had to do to proceed in the plot. Positive comments about specific elements focused on the will-o'-the-wisps mini-game (P1, P23) or the plot (P6, P32). For example:

> *I liked when one has to follow the green lights, look for them, get close to them and listen to the quotes. I liked that a lot.* – P1

> *I liked how the game develops. (What do you mean?) The […] sequence of events.* – P32

Participant P6 liked the plot, but found it too short:

> *I liked the [game] story; I didn't like the ending. (What do you mean?) It was too short. I mean, there should have been something else that motivates [the user] more, like a follow-up.* – P6

Participant P38 considered the actions appropriate for the context of the play experience:

> *I thought that I should have done… more during the game, I mean… That there would be more… (More things to do, you mean?) Yes, more things to do. (And you consider this to be negative or positive?) Well, all things considered, it is positive, given the purpose of the game, because [Existence] was not a game that wanted the player to be involved… physically, it was more a… mental thing, in my opinion. (In what sense "mental"?) I mean, the use of quotes… [The game] wants you to reflect rather than interact.* – P38

Most (nine out of 10) of those who criticized the actions needed to advance in the plot perceived Existence as too guided (despite the fact that one can freely visit the cemetery without following the companion) or not interactive enough, for example:

> *What I didn't like… too many automatisms, in the sense that a person should be free to wander without a guide.* – P3

> *(In general, what did you like, and what did you dislike, about the game?) Well… [I didn't like] the fact that it was very meditative, while I generally prefer games with more action… I mean, there was little interaction [in the game].* – P8

5.3.5. Pace. Nine participants reported that they perceived Existence as too slow. For example:

[The game] was quite slow, it was… maybe also too guided, and there was little discovery inside the cemetery. – P10

Three participants (P18, P31, P35) perceived their avatar's walking pace as too slow. For example:

(In general, what did you like, and what did you dislike, about the game?) I didn't like that the character was so slow at moving… the player's character was very slow and, even if I wanted to go faster, for example, to follow the guide more easily, it wasn't possible, and this made the game a little slow. – P35

Participants P20 and P37, while still finding the game too slow, realized that speed could be appropriate for the context:

I didn't like the [game's] slowness; despite that, I must say, it goes well together with the type of game. – P20

5.3.6. Goal clarity. Five participants perceived lack of a clear goal while using Existence. Two of them underlined how their perception contrasts with the goal clarity typical of commercial video games. For example:

What I didn't like was that there wasn't an explanation saying "That's the game", "You have to do this, you have to do that"… Instead, you have to follow [the companion] and wait for things to happen. […] (So you did not like the structure of the game, the fact that you had to follow…) There was little explanation at the beginning; I mean, games usually explain what you have to do, the target you have to reach; this game, however, doesn't do that, in the sense that [it only says] "Follow me", that's it. – P9.

5.3.7. Virtual environment. Five participants commented positively about the mood and the atmosphere created by the cemetery setting. For example:

38

I liked the mood of the game… Yes, the mood, because [the game] is well organized, it really immerses you in a mood… let's say a cemetery mood. – P28

Four participants commented negatively about the use of a cemetery setting, e.g.:

I didn't like the fact that [the game] was set in a cemetery, probably because it can turn out to be macabre. – P5

Five participants commented specifically about the different weather conditions in the virtual environment. Three participants (P31, P33, P38) appreciated the weather. P33 appreciated the fog that was shown during the second half of the game:

The fog at the end was beautiful, it was very evocative. It made sense in the context [of the game]. – P33

Two participants (P31, P38) appreciated particularly the weather change during the mini-game, e.g.:

I liked how the weather changed, also… I mean, I noticed it, and I liked it. [I liked that] at a certain point it started raining, and then the weather turned sunny when I was dead. – P31

Participants P2 and P16 did not like the weather conditions in Existence. In particular, participant P2 would have preferred a weather change in the opposite direction compared to the proposed one:

[I did not like] the weather, I'd reverse it. I mean, if [the game] has to reflect about death, to inspire one to be philosophical about it, and to take it easy, maybe the weather should initially be cloudy and then it should progressively clear up. Instead, it does the exact opposite. – P2

5.4. Usability

Table 5 summarizes the themes and sub-themes that belong to the *Usability* topic area.

Theme	Sub-theme	Description	Participants
Ease of use		The participant did not find any difficulties in using the EXG, and made remarks about specific elements (s)he found easy to use.	P1, P2, P3, P6, P7, P9, P10, P11, P14, P15, P16, P17, P18, P20, P21, P22, P23, P24, P26, P27, P28, P29, P30, P31, P32, P34, P35, P36, P37, P39, P40, P43
Usability problems	Spatial disorientation	The participant lost at times his/her bearings in the virtual cemetery.	P36, P37
	Control issues	Once ore more than once during the experience, the participant had trouble with the controls or did not understand what was the action required to proceed.	P4, P5, P8, P12, P13, P19, P33, P38, P41, P42
Suggestions		The participant provided suggestions about the EXG controls and/or actions required to proceed.	P1, P5, P13, P19, P41

Table 5. Themes and sub-themes of the *Usability* topic area.

5.4.1. Ease of use. Most participants provided positive opinions about usability. In particular, 32 participants reported that they did not encounter any difficulties in using the game, and that Existence was easy to use and suitable for any user, with simple controls and clear play mechanics, e.g.:

> *[The game] was intuitive, simple, very simple. – P28*

5.4.2. Usability problems. Two participants said they lost their bearings while searching for the will-o'-the-wisps. In particular, they found it difficult to find the companion once they stopped playing the will-o'-the-wisps mini-game:

> *I got lost, because I was wandering around to listen what the green fires were saying, so I lost track of where the companion was. – P36*

Ten participants had difficulties in understanding the controls (seven participants) and the actions required to proceed through the game (three participants), e.g.:

> *I found some difficulties at the beginning because I didn't understand very well how to use the [keyboard] arrows, so it took me a while to go through the gate. – P5*

[I found the game difficult] at a certain point when I couldn't understand if the game was going to proceed automatically or I had to do something to make it proceed, but no, in general [I did not find the game difficult]. – P19

At times, I had the feeling that I didn't know if the guy [the companion] was going to move by himself or it was me who had to make him move. – P38

Five participants (P4, P8, P38, P41, P42) had difficulties with the controls only at the beginning of the game, e.g.:

(Did you find any difficulties while using the game?) No… Well, just at the beginning… the controls. (What do you mean? Was the explanation of the controls not clear enough?) No, it was clear, just… I couldn't turn. [I had problems] only with the first turn, then I understood [how the controls worked]. – P42

5.4.3. Suggestions. Five participants gave suggestions about how usability problems could be solved with regards to the controls (P5, P13, P41) and the actions the user must perform during play (P1, P19), e.g.:

It would be easier if the [control] instructions, the ones at the beginning [of the game], were a bit clearer, maybe more visual with some colors, just to explain better how to begin [interacting with] the game, given that it is a game that is new for everybody. – P5

6.   Discussion

The qualitative study showed that Existence was able to encourage a good number of participants to reflect about mortality and death. During play, seventeen participants reflected about life and death in general, while nine participants felt an enhanced will to live at the fullest, and approached the subject of death more positively. Six participants reported that Existence made them remember personal memories from the past about friends and relatives that passed away, and five participants reflected about their relationships with friends and relatives as well as about the ripple

effect, which can be considered as a potent answer to the feeling of meaninglessness [16]. Finally, two participants said that they had reflected specifically on fear of death. Of the five topics addressed by the quotes in Existence, two of them, i.e., naturalness of death, and lack of relationship between death and pain, were not brought up by the interviewed users.

Participants reported a wide range of emotions, both positively- and negatively-valenced, elicited by the game. A central role in eliciting the negatively-valenced emotions was played by MS cues, i.e., elements of the game that were designed to remind participants about death, such as the tombs, the quotes, and the cemetery environment. We can explain participants' reported emotions by resorting to TMT, which attributes a special importance and function to MS cues (see Section 2.3). The MS cues in Part 7 of Existence makes the relationship between death and self explicit (participants could see what is suggested to be their own tomb). As reported in Section 2.3, such MS cues may reduce greed, heighten spirituality, and enhance gratitude compared to MS cues in which the relationship is less evident to the individual. We can thus hypothesize that the final MS cues in Existence, which make an explicit reference to users' own death, may have played a role in eliciting an enhanced will of living life at its fullest in nine participants after the session with the proposed EXG.

Positive emotions reported by participants could also be explained by the concept of death acceptance described in Section 2.3. Death acceptance may give another possible explanation for the enhanced will of living perceived by some participants. One should also consider that some of the quotes included in Existence explicitly try to promote such acceptance. For example, the quotes by Epicurus and Schopenhauer in Part 2 and 3 of the game encourage users to think of death as a natural element of life. Similarly, some of the quotes included in the will-o'-the-wisps mini-game explicitly contrast fear of death by encouraging people to live their life at the fullest (e.g., the quote by Mark Twain).

An existential resource that individuals can exploit against death awareness is *nostalgia*, which bolsters a sense of meaning in life [57]. In the present study, nostalgia arose in the form of

personal memories of the past, often related to remembrance of loved ones who have died. These reflections appear to be potentiated by the content of the game: participant P37 explicitly mentioned how the quotes included in Existence helped him in remembering his relatives' legacy. In addition to evoking memories from the past, nostalgia appears to have helped participants in reflecting about the ripple effect. As reported in Section 5.2.2, participants' thoughts about one's legacy after death were always associated with thoughts about relatives that passed away. Positive emotions were facilitated also by the calming and contemplative background music that participants could hear during most of the play session.

The data gathered about participants' reflections and emotions elicited by the EXG seem to suggest that, among the various elements of Existence, the death-related quotes and the soundtrack were the ones that had the greatest impact in encouraging some of the participants to reflect about mortality and death from an existential point of view. Moreover, the effectiveness of Existence could also have been favored by its interactivity, making it more similar to video games rather than traditional media such as books or movies. Indeed, in the serious games literature (e.g., see the review by Girard, Ecalle, and Magnan [58]), interactivity and engagement have been highlighted as elements favoring effectiveness, and many participants in our study mentioned feelings related to engagement and captivation due to game use (see Table 2).

Some criticism about aspects of Existence emerged from twenty-two participants (10 of them found the game boring or uninteresting, 10 of them found the game not interactive enough, and nine of them found the game too slow). This might be due to the fact that Existence does not offer the kind of gameplay that is usually found in commercial video games (see the comment from participant P12 reported in Section 5.1.2): if participants have more video game experience, Existence might not fully meet their expectations. Existence has been designed on purpose as a slow-paced, meditative experience, which is an approach similar to The Graveyard. As reported in the literature [26][27][25], a slow game play promotes reflection as well as mental rest, and might be appropriate in the case of serious games and video games for learning and reflection. On the

other hand, fast and highly interactive games might be more suitable for expert players, i.e., users with better gaming skills and knowledge [27]. Such approach can be found in other EXGs analyzed in Section 2, e.g., The End of Us is a more fast-paced action game that exposes the user to mortality through the metaphor of the meteors wearing out. To get an indication about the possibility that frequency of video game use played a role in the above mentioned opinions of participants, we divided them into two groups (*low video game use* and *high video game use*) following a median split approach [59], i.e., on the basis of whether participant's frequency of video game use was above or below the median (3) of the reported frequency. As a result, 19 participants were assigned to the low video game use group, and 14 participants were assigned to the high video game use group. The number of participants who expressed criticism in the low video game use group was eight (42.11% of the group), while it was 10 (71.43% of the group) in the high video game use group. Such percentages would be consistent with the suggestion that the proposed EXG may be preferred by users with low gaming experience rather than users with high gaming experience.

Age might be another factor that could be taken into consideration to explain why some participants were critic about Existence: younger participants might be more attracted by fast-paced and highly interactive video games rather than slow-paced, meditative experiences. To get an indication about this possibility, we divided participants into two groups (*younger* and *older*) using the median split approach, i.e., on the basis of whether participant's age was above or below the median age (24). The younger group was made of the 21 participants whose age was less than 24, and the older group was made of the 19 participants whose age was greater than 24. In this case, the difference between the two groups was negligible: the number of participants who expressed criticism in the younger group was 11 (52.38% of the group), while it was 10 (52.63% of the group) in the older group. Such percentages do not support the suggestion that the proposed EXG may be preferred by older users in the considered sample.

To deal with negative comments about perceived lack of interactivity and excessive guidance through play, one could be tempted to make changes in game design such as remove the

companion and let users navigate freely in the cemetery, interacting with objects in the environment. Such design changes, however, may raise three potential issues. First, as we mentioned in Section 3.1, by letting users freely navigate the cemetery, one cannot guarantee that all quotes are presented, and that users have the opportunity to reflect on all the topics mentioned at the beginning of Section 3. Second, one must consider that guidance is important in a game that aims at making (potentially inexperienced) users reflect on sensitive themes like death, and to examine all the different topics presented (see Section 3). Third, a more engaging narrative can distract users from the main goal of the EXG, as suggested by studies in the field of serious games (see [4]): learners may use too much of their cognitive capacity for processing the narrative information that is not directly related to the learning content, withholding from cognitive activities that yield learning.

Three participants felt a sense of curiosity during play, e.g., due to the cemetery tombs and the finale (Section 5.1.1). The fact that Existence is able to elicit curiosity is promising, given that such feeling is one of the primary factors that drive learning [60]. Garris, Ahlers, and Driskell [61] include, among the cognitive learning outcomes of serious games, reactions related to feelings of confidence, attitudes, preferences and dispositions. Death reflection, promoted by Existence, can belong to these learning outcomes, because it can support attitude change in users. A game elicits curiosity when it modulates appropriately the discrepancy between users' knowledge and the new information it provides [61]. We can hypothesize that, in some participants, Existence was able to balance their previous knowledge (i.e., what they knew about death and mortality before trying Existence) and new information (i.e., the novel attitudes towards death and mortality proposed by the companion and the quotes). Mystery, a feature of the game itself that evokes curiosity [61], is enhanced not only by incongruity between the provided information and user's knowledge), but also by complexity, novelty, surprise and violation of expectations [62]. In particular, surprise forces learners to reassess the events in the narrative and organize them in a mental model in order to fit in the unexpected surprising event [4]. From this point of view, it is encouraging that eight

participants reported a sense of surprise during the session, in particular during the events related to the last tomb.

For 15 participants, the excessive discrepancy between their knowledge about the topics discussed by Existence and the information provided by the game itself may have contributed to make it difficult to understand its purpose, its goal, and the death-related topics, or tomake the game not interesting enough. If the level of discrepancy is too high, such information may be too confusing or bewildering to incorporate [61]. The difficulties reported by the 15 participants could thus be explained by the fact that the introduction to the discussed existential themes may have been too steep for them. Personal differences in how participants responded to the MS cues included in Existence may also have played a role in determining the negative perception that some of them experienced. The psychology literature highlights approach and avoidance as two basic modes of coping with stress, i.e., two modes of cognitive and emotional activity that are oriented towards or away from threat respectively [63]. EXGs like Existence and The Graveyard, which employ explicit death-related cues, may be suitable for users who are more approach-oriented, but not for avoidance-oriented users, who may actively try to suppress death thoughts and reject games that use explicit MS cues. Other EXGs may be more suitable for them: for example, The End of Us exploits death-related metaphors that could give users more freedom to approach the game both as a simple entertainment experience and as an experience that elicits death reflection. In this way, Existence could let users interpret the death-related metaphors at their preferred pace and depth while still enjoying the game.

7.   Conclusions and Future Work

This paper focused on existential games (EXGs), a category of video games about topics that are traditionally at the core of existentialism. In order to propose a rigorous definition of EXGs, we resorted to Yalom's existential psychotherapy theory [16][17][18]. The paper proposed and evaluated Existence, an EXG that aims to expose users to different attitudes towards death and to

encourage them to reflect about death and their own mortality. Our qualitative study showed that Existence was able to reach this goal: for 23 participants, Existence was both capable to encourage generic death-related reflection and to elicit reflection on more specific topics, such as memories, and the desire to live life at the fullest. The experience evoked both negative and positive emotions, which may be related to death and mortality awareness, and participants' attempts to cope with fear of death respectively. Indeed, the interactive visit to the cemetery, while inherently eliciting death awareness, could at the same time guide and enhance participants' coping responses through death reflection. In light of the results of the qualitative study, we have introduced some improvements in the EXG, and made it publicly available [64]. In particular, the companion has been re-dubbed by a professional narrator to increase the emotional impact on players. During the will-o'-the-wisp mini-game, the EXG now suggests at different times with a text overlay (instead of just one time at the beginning) that players can return to the companion, and also, the walking speed during the mini-game has been slightly increased.

Participants' answers were also a source of useful information that might guide future EXG design. For example, a considerable number of participants commented on how the background music was able to elicit positive emotions, making it a fundamental component of the entire experience. Others, however, commented negatively on the music. These observations highlight the importance of carefully choosing a suitable background music during the design of an effective EXG for death reflection, as well as the need for user evaluations of this specific game element.

While the results of our study are encouraging, it must be noted that the population sample was limited to a relatively narrow age range, and did not include elderly participants (see the Section 4.1). This seems also to be a relatively common limitation of TMT studies [38]. As reported by the literature (e.g., [65][66]), fear of death varies with age, and thus affective responses as well as death reflection may be different between young and older adults. In particular, mortality cues seem to elicit death anxiety (which is related to fear and dread about their own mortality) in young adults, while the cues appear to elicit more death reflection (a cognitive state of death awareness in

which individuals contemplate their meaning and purpose) in older adults [67]. To better understand the impact of users' age on emotional response and death reflection to the EXG, we are planning to conduct a study based on the "research in the large" [68] method that could allow us to reach users in a larger age range.

Another limitation of the study is that we only considered participants' death reflections that took place during the session. It would also be important to evaluate the possible long-term impact of the exposure to an EXG. Moreover, it would be interesting to study the effects of repeated exposure. To these purposes, we plan to carry out a longitudinal study in which we evaluate how Existence influences the coping responses to death anxiety in participants over a period of time, as well as the effects of the EXG on the meaning-oriented responses of participants, such as a possible reconsideration of the sense they make of death. Such kind of investigation could take benefit from the adoption of instruments such as the Death Anxiety Scale [69] or the Death Attitude Profile Revised [46]. Alternatively, the TMT literature [38] offers more implicit measures such as assessing one's worldview defense and self-esteem boosting as typical coping responses to death anxiety [34]. As reported in [38], it seems that the effects of mortality awareness may grow stronger as time from its induction passes, when the death prime has more time to recede from consciousness. It would thus be valuable to assess how long attitudinal changes last (minutes, hours, or even days following mortality awareness induction) [38].

Finally, the qualitative analysis showed that some participants did not appreciate the EXG we proposed. As they hinted in their comments, they seem to prefer a different kind of interactive experiences, e.g., more fast-paced and more similar to commercial action games. Such participants might find some game designs seen in Section 2.2 more appealing. For example, the pace of The End of Us is faster than Existence, while That Dragon Cancer proposes a sequence of mini-games integrated in the main narrative as a way to introduce death-related themes to players. During the development of Existence, we took inspiration from this approach when we added the will-o'-the-wisp mini-game. The collected qualitative data suggests the need to further explore how different

approaches to narrative, content, and interaction can appeal to different types of users in order to help EXGs reach a larger population. One must also consider that growing familiarity with video games in the general population will likely make expectations of more frequent and different types of interactivity and structure in EXGs grow accordingly, making it important to explore the EXG design space. To this purpose, we plan to assess the impact of different designs on users' existential reflection. In particular, we plan to compare Existence with an EXG based on similar visual elements but with game dynamics that could appeal more to participants who are more used to play video games. This second EXG would use the same environment as Existence, but it would be more similar to video games in the platform or action genres, including ideas such as:

- The possibility to unlock new areas of the cemetery by collecting specific amounts of will-o'-the-wisps (and the associated quotes);

- The unlocking of additional will-o'-the-wisps, based on the amount of those collected;

- The inclusion of timed mini-games. For example, a mini-game could require users to collect a number of objects that are mortality reminders (e.g., flowers, prayer cards, crosses, shovels, …) placed around the cemetery within a time limit. Another mini-game could require users to find the oldest man buried in the cemetery;

- The inclusion of "existential enemies", i.e., ghosts that prevent users to collect specific will-o'-the-wisps. These ghosts embody people buried in the cemetery who were not able to accept death as a natural part of life. The role of users is to find the right quote for them based on each ghost's story: for example, a ghost may be tormented by the loss of a loved one, and may find peace (allowing users to collect the will-o'-the-wisp) only if users can find a quote about that topic (e.g., the one mentioned in Section 3.2.5).

Future studies may also explore the use of an explicit debriefing as a strategy to encourage death reflection. As discussed in Section 2.1, the effectiveness of debriefing is well known in the context of serious games for learning and education. However, as we explained in Section 3.2.8, we preferred to give users time to freely reflect on death while flying over the cemetery, without an

explicit debriefing intervention by a virtual agent. An interesting way to explore debriefing in the EXG could involve a social element. Indeed, according to Crookall [22], a way to debrief a game experience is to discuss and share it with others: therefore, future EXGs for death reflection may give users the possibility to share their thoughts about the game with their friends, e.g., through social platforms like Facebook or Twitter. This would also connect with and reinforce the natural tendency to being part of a group, which can be elicited by MS cues as predicted by TMT [70][71].

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Appendix A. Interview protocol

I am going to ask you some general questions to gather your impressions about the game.

1. Did you find any difficulties in using the game? If so, please describe the problems you encountered.

2. In general, what did you like, and what did you dislike, about the game?

3. Did you find the graphics of the game to be pleasant or unpleasant? Did you encounter any problems with them?

4. Did you find the audio of the game pleasant or unpleasant? Did you encounter any problems with it?

5. What thoughts and emotions did you feel while playing the game?

6. Did you feel particular emotions and thoughts in specific moments of the game? If so, which ones?

7. Did you feel particular emotions and thoughts when you were near a tomb or when a quote was shown?

NOTE: if during the interview the participants reported problems with using Existence or with specific graphics or audio elements, they were asked an additional question: "Do you have any suggestions on how to solve these problems?"