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A STUDY ON THE ATTENTION OF THE ELDERLY IN THE USE OF DIGITAL GAMES IN MULTIMODAL PLATFORMS

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ABSTRACT

The aging of the population is increasing and with this new possibilities of study through technology appear. Digital games may be a possibility for effectiveness in the physical, cognitive and psychic areas of the elderly. The objective of the research was to investigate the perception of the elderly in relation to the attention, in the use of digital games in different platforms. The design of this research is descriptive, qualitative and cross-sectional. Five elderly women, over 60 years old, participated in the study. The evaluation instruments were semi-structured interview scripts. Games sessions were held on tablets, computers and consoles. The results indicate that good choices of digital games in different platforms can stimulate the attention of the elderly, as long as they are motivators for this population.

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INTRODUCTION

The demographic changes that are occurring worldwide reveal increasingly long-lived individuals. Thus, according to Cosenza and Malloy-Diniz (2013a), the increase in life expectancy in all countries of the modern world has led to an international interest in how to age successfully. Thus, research shows that older people tend to be healthier than in earlier times, because according to the authors certain age-related diseases are occurring later, leading to decreases in disability, but each individual ages differently. However, Bicalho and Sintra (2013) report that during the aging process, several changes occur in sense organs, causing sensory deprivation and contributing to cognitive decline, including the focus of attention. However, according to Rivero et al. (2012) Recent research suggests that video game games, even when played for a relatively short period of time, promote improved player performance on a large number of visual perception and attention tasks.

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According to Gazzaniga and Heartherton (2005), the study of attention is the analysis of how the brain selects which sensory stimuli to discard and which to transmit to the levels of processing. The word attention is used in the sense of focusing on some activity, the opposite of distraction, but also exerts a duality when we focus attention on something and we disengage ourselves from the stimuli around us, occurring a distraction to these stimuli. For Brandão (2004), this is because the brain is able to determine focus through stimuli, presenting a high degree of direction and selectivity. Complementing this understanding of brain competence in "paying attention", Cosenza and Guerra (2011) point out that a part of this information that reaches our brain is not processed, not because it is unimportant, but because the brain can not examine all at once. In early Cognitive Psychology research there are references of attention as a focused action. Eysenck and Keane (1994) say that by presenting two or more concomitant stimuli and instructing them to process and respond to one, focused attention can tell us how to choose between stimuli. According to Brandão (2004) several neurotransmitters are involved in the integration of attention state: acetylcholine, noradrenaline, serotonin and dopamine.

When the subject is drowsy, for example, the reticular formation does not send impulses to the sensory thalamus, inhibiting alertness. According to how attention is operationalized, it can be divided into selective, sustained, alternating and divided. According to Malloy-Diniz et al. (2014) selective attention can be defined as the ability of the individual to privilege some stimuli rather than others. Sustained attention describes the individual's ability to maintain attentional focus on a specific stimulus or sequence of stimuli. Alternate attention is the ability of the subject to alternate the attention focus. Attention can also be divided into the ability of the subject to perform two simultaneous tasks, such as directing and listening to music. In one of them the execution is automatic. According to Cosenza and Malloy-Diniz (2013b) sustained attention in the aging process tends to be preserved for a longer time, while more complex attentional processes, such as selective and divided attention, usually present an earlier functional decline. Papalia and Feldman (2013) argue that in several older adults, a general decrease in central nervous system activity contributes significantly to information processing efficiency losses, and one of the most consistent and identifiable changes is "mental processing" (Gazzaniga, Heatherton, 2005, p. 376).

In the elderly, what happens is that some skills are impaired due to the rapid shift of attention, such as new learning. Thus, Cosenza and Malloy-Diniz (2013b) say that normal cognitive decline may be related to the impairment of the attentional systems. Papalia and Feldman (2013) argue that training can increase the processing speed of older adults and their ability to process increasingly complex information over progressively shorter time periods. According to Nouth et al. (2012) since brain-training games were first launched, the beneficial effects of these games are expected to improve cognitive functions, such as executive function, memory, attention, and processing speed. The authors further point out that although these results indicate that brain training games may improve cognitive functions in older people, scientific evidence of the beneficial effects of brain training games on the elderly is still sparse. However, studies in this area must be carried out in order to analyze the benefits of digital games in the attention of the elderly. In this sense, the main objective of this article is to investigate how the elderly perceive and attribute meaning to the experience with digital games in tablets, computers and consoles, from their attention.

MATERIALS AND METHODS

This article is a descriptive, qualitative cross - sectional study. Five elderly women with a mean age of 66 years (60-74 years), who regularly attended a computer group, were included as part of the study: Study of successful aging in the elderly over 60 years old living in the municipality of Ivoti/Brazil, a partnership between the University Feevale and the Education Department of the Municipality of Ivoti. The study was approved by the Ethics Committee of Feevale University under the number 2,343,268. The research instrument was a semi-structured interview script based on guiding questions involving the perception of the elderly in relation to the attention, in the use of digital games in different platforms, specifically aiming at autonomy and accessibility. The issues involved the following perceptions: winning the player's interest to keep him attentive; *design* attractive games; capture attention based on problems and challenges; challenges of games in maintaining attention in the game; speed of games; capture of concentration from visual images; skill in the movements requested in the games; platform allowed ease in the use of the game; platform favored autonomy over the game controllers. Data collection was performed after the signatures of the Free and Informed Consent Term were collected. In the first stage, an initial interview was conducted to collect participants' personal data, as well as information on available and most used electronic devices at home, use of digital games and leisure habits. The application of the research occurred in 3 subsequent weeks, occurring once a week, lasting 1 hour and 30 minutes each session. This stage of the research was carried out in the facilities of the University Feevale/Brazil, in the laboratories of games. The first meeting was to familiarize with the venue, games and platforms, so that the elderly could interact with digital games on different platforms. The selection of the games was carried out in the observation about the capacity of the elderly to carry out the activities, that is, they were selected according to the criteria that it was a friendly interface and did not cause a perception of immediate frustration. The games *Navegática* and Grammar Race (Corrida Gramatical) were chosen because they were developed by the Laboratory of Learning Objects of the University Feevale/Brazil, and of easy modification in the speed and the content of the questions. The game of bowling, on the console *Nintendo Wii*, was chosen for providing a friendly interface with players and for enabling movements consistent with any age.

In the second meeting the old women played the Navegática game on the computer and the game GravéticaGramatical on the tablet. In the third meeting, they played the bowling game on the console *Nintendo Wii*. Grammar Race is an educational game in which the player's goal is to deflect obstacles while remaining focused on collecting as many stars as possible. As the player collects the stars and accumulates points, the game presents questions with four alternatives. The more questions the player responds, the more score he accumulates. The player can choose to handle the game through the accelerometer or by clicking on the screen. *Navegática* presents the player with an aquatic vehicle, where he must make the crossing to the other side of the scene. At the beginning, a question is presented related to the chosen theme, and the player has a determined time to read the question and navigate to the other side of the scene, diverting from several obstacles. Here you will find four possible answers, among which the player must direct his vehicle to the correct one. The game console used was the bowling of Nintendo *Wii Sports* that simulates a game of bowling, in which the participant, through a sensor, repeats the movements characteristic of a game.

RESULTS AND DISCUSSION

After the transcription of the interviews, the methodology used to analyze the data was the Bardin (2011) content analysis technique in order to perform the treatment of results, inference and interpretation, which consists of capturing the manifest and latent content contained in all the material collected. The initial interview demonstrated that cell phones and television are the electronic devices that all the elderly women have at home, as well as being the most used by all. Only one old woman said the computer and the cell phone were the devices she uses most at home. Regarding the use of digital games, two elderly women said they played memory, crossword puzzles, split games and games with time to

perform a task on the computer and cell phone, being both, just a regular player. One participant said that she sometimes plays on the computer, but prefers to make messages on the computer and send via WhatsApp and Facebook to other people and also help the grandchildren in researches. Two participants said they did not use the devices to play. One participant uses the mobile phone only to make and receive calls and take photos. The others use it in addition, for messages and dialogs in WhatsApp, Facebook and conduct searches on the internet. The participants' speeches were analyzed and then categorized according to the platforms used in the games: computer, tablet and console. Participants were identified by the letter P of the player, followed by the numbering of 1 to 5.

Game on the computer: As for the game *Navegática* on the computer, player 1 said that the game was very good for the brain, at the beginning of the game she did not think could have difficulty, liked it very much, but needed to know how to control the game. Regarding the questions of the game, she did not find them difficult, but to find the right place was hard, she knew the answer, but to get to the end, she needed to take care: "We taken the control, but it was not going as we wanted , the head wants it right, but it do not go" (P1 - referring to the movement of the game), "Sometimes I did not remember what the right answer was, I took care not to hit the obstacles, and when I arrived I neglected the answer".Fernandes and Santos (2015) say that as meaningful as selectivity, it would be an individual's ability to select a stimulus from many others and be able to stay focused on it for a period of time. According to Cosenza and Malloy-Diniz (2013b) the elderly have difficulty in inhibiting distracting stimuli, which may be related to the decline of the prefrontal function. That was what happened to player #1. She inhibited the distracting stimuli like time, obstacles, but sometimes she could not reach the end and remember the answer to the question.

In the study by Calo and López (2016), in which the objective of the research was to investigate the effects of games on attention and independence in the elderly after stroke, the authors emphasized that it was positive in the program to provide information in audio and text. This allowed patients to choose the modality based on their abilities or their state. Thus, the meeting of familiarization of the elderly with games and platforms also occurred in a positive way, because it was possible that they played more in one or the other longer and chose the one they had more skill for the moment. This situation is confirmed in player 2's speech: "It was easy to understand the game, because you explained, I thought it was important to have that familiarization meeting". Another aspect observed was the related to the distracting elements of the games. In the study by Cecato et al. (2011) environmental distracting elements caused by the environment may have caused a lack of attention in the participants. In the present study the players referred to the obstacles during the course of the game: "On the boat you needed attention, because you had to divert" (P2). The player 3 found the experience quite interesting, but reported that she had to watch the boat not hit the obstacles. She commented comically that it was complicated, regarding to the questions of the game, as she read the question and, when she arrived at the end, she did not remember what was the answer. According to Rivero et al. (2012) in order to be successful in the games, players need to sustain attention for long periods of time, often avoiding distracting stimuli that aim to hamper the success of players. The player 3 showed insecurity, questioning several times what to do. Player 4 thought that the game of the boat stirred her memory, because she needed to pay attention, read the question and record the response in memory: "The boat was easy for me, the only thing I had to worry about was the question and the answer, you had to record it in your head" (P4). In the research by Osmanovic and Pecchioni (2016) one of the participants said that the game is giving a release and seems to free his mind as some levels can be challenged. When asked to the player #4 about how was her understanding of the game, she reported that, at the first meeting, she did not understand it properly, but, then in the second meeting, she paid attention when the researcher was explaining to the other participants and managed to understand. According to Costa et al. (2013) the sensory processes involved in the orientation of attention are relatively automatic, not requiring great mental effort. Selection, in turn, depends on controlled processes that require intentional engagement and mental effort. This is confirmed in the reported attitude of the player 4. Regarding to the time of the game, the player 4 said that this is a pleasant sensation, the fact of having to arrive at the end, at the given time. She reported that time was not negatively affecting her attentional focus. She managed to go through all phases of the game and told the other participants during the game: "You are talking, it's time for me to play". According to Bear et al. (2002) the establishment of attentional focus has an adaptive value, in that we discriminate the stimuli that are relevant from the irrelevant ones and selectively direct them to the limited resources of processing our brain information. Osmanovic and Pecchioni (2016) say in their research that the rhythm of the games surpasses the content and the technological interface. Games that are fast create greater cognitive load that can become challenging. Regarding to player 5, the boat game was too easy, according to her it could be more complicated. "With attention, I could already see where the obstacles were" (P5).

Game on the tablet: In the statements of the participants, all considered that the game Gramatical Racing and the handling of the tablet demanded of them greater concentration. This is confirmed in the speech of the players: "Sometimes I laughed so hard I lost [...]. This little dude is running! [...] I needed more attention on the tablet, but I was interested in the question" (P1). In Brown's research (2017) there were participants who reported being frustrating, very quick buttons, not getting left or right, not wanting to dominate, almost giving up. In order for the elderly player to gain attention, it is necessary first of all that there is no initial demotivation, that the elderly does not get frustrated at the beginning of the game. According to Lent (2001) the attention involves fundamental aspects such as the state of alert that represents the sensitization of the sensorial organs and the establishment of the cortical tonus for the reception of the stimuli. The other aspect according to the author is the very attention that involves focusing the alert on certain mental and neurobiological processes. Player 2 did not find the game difficult because she concentrated, she wanted to hit so much in the game, she did not think of anything else. "Controlling the tablet was more difficult, because the doll was very light, so you could squeeze and lose" (P2). But she still managed to concentrate on being motivated. According to Rivero et al. (2012), in the frequent users of videogame, there is a greater capacity of visual attention and of finding objects in its field of vision with greater speed than we non gamers. In the research by Carvalho and Ishitani (2012) the elderly experienced difficulties in using the touch screen. In the present study the

participants also felt difficulties with the device, but it was not an obstacle to play: "On the tablet, I needed to focus more attention, because it was very light, depending how you turned it went too much or less. So I had to have a very focused control to get it right" (P2). Player 2 said that for all she had a solution was just to concentrate. In this device the game demanded attention focus while the movement was done with the hands. According to the study by Martel et al. (2016) video game requires the elderly to be aware of objects that appear on the screen and at the same time perform body movements. The player 4 found the tablet harder to handle: "This thing to move the tablet to get the stars, sometimes I turned a lot and escaped all the stars and when I did, I did not get all of them, just a part. I needed to focus more on this". According to Rivero et al. (2012) players need to manage various tasks in the game, while maintaining the central goal of the game, alternating between tasks. All of these features, in a fast-paced, unpredictable environment, make gaming tools powerful in attention training.

Player 3 also reported that, in the tablet game, she needed to be more controlled, if she moved more, the doll went to the other side. Nap et al. (2009) also had in their research reports that the games used were very fast. This is also confirmed in the speeches of the player 3: "On the tablet I needed to focus more attention, it may be that one person is different from the other, but we played little, if I had played more, I would have more experience". Player 3 also reported that her impression was that the first meeting was more of an amusement in order to know everything, but in the second meeting she had to concentrate. In Brown's study (2017) one participant shared that she once tried to play with family members and found the accelerated nature of the game was very challenging for her to continue. The frustration was enough to give up any future game. This may be associated with the fact that it is very fast and requires a lot of attentional focus to play, which makes it tiring. The player #5 reported that, in order to use the tablet, she had to be very careful, it took time to understand how to play. According to Rivero et al. (2012) video games present a rapid succession of stimuli (visual and auditory) to which players need to focus their attention. In the study by Carvalho and Ishitani (2012) the elderly were desperate when the time was running out and they could not finish their activities. During the game on the tablet the player 3 commented alone: "It goes very fast! It obeys nothing! It wants to go where it wants!.

Things are down and it goes up, I pull, it goes and it does not go when it is gone!". Player 4 reported that regarding to the challenges that were proposed, she was attentive. At first it was very fast, so she needed to concentrate, she reported that she felt the game fast because she had not yet used both the game and the device. During the tests, the research by Carvalho and Ishitani (2012) found that, in the beginning, most of the elderly had great difficulty and reluctance to deal with the smartphone, but soon after, they managed to concentrate attention on the game itself, without difficulties. Player 5 emphasized that the device of the tablet was completely new to her, even making use of the smartphone, also said that the game was very fast, needing more control. Carvalho and Ishitani (2012) suggest in their research that to develop serious and mobile games for the elderly, there is the option to disable the time feature, since there are users who prefer not to have time limit.

Limits can go through all the stages just by overcoming the obstacles of the activities in each phase, without worrying about the time. In summary, it should be taken into account that there is a decline in the speed of information processing in the elderly. According to Gomez (2013) the behavior of the elderly is slow and sometimes inefficient. Thus, it is interesting that the speed in digital games must be adjusted according to the conditions of the elderly so that he or she can play, catching their attention and not giving up.

Game on the Nintendo *Wii:* In the reports, participants stressed that bowling on the Nintendo *Wii* was a new and very fun experience. The trickiest part was that they initially should understood how to handle the controller of the game: "It was not difficult. [...] We would let go sooner or later, but not because we did not know it, but because of the very handling of letting go and pressing ahead of time. But after we did a little, it was calmer, look how we scored, I was silly "(P1). According to research by Rivero et al. (2012) the results demonstrated that the video game exerts an influence on the users that goes beyond the behavioral aspects, acting directly in the development of several cognitive functions. A study participant of Osmanovic and Pecchioni (2016) says that the game makes the brain operate in different ways.

The player 2 questioned how the other players could not understand, because she found it smarter (referring to the Nintendo controller *Wii*). But she was one of the participants who understood the organizations better, quickened, attentive, paid attention to the explanations for others, knew whose was the time to play, and never lost. Regarding to the game of bowling, the player 3 found it very amusing, said that she also needed to concentrate, but it was not so much as in the other games. "Bowling is concentration, I made ten pins, but then I did not let go of the little thing" (referring to button B of the control). At the end of the experience the player was confused with the control of the game and it took time until she understood it again. The same happened to player 1, she needed a lot of focus to be able to make the movements of the controller, release one finger and press with the other. According to Rivero et al. (2012) study data suggest possible causal relationships of cognitive skills training such as visual selective attention, visuospatial attention, auditory attention, visual and spatial perceptual processing, mental rotation, contrast sensitivity, cognitive flexibility, operational memory and time reduction of information processing.

The player 1 found the bowling funnier, even taking time to handle the control, she said that other games demanded her to concentrate more. In the research of Kaufmann (2017) it is suggested to take into consideration the *design* of the games, which are often for a relatively younger audience. They should take into account functional limitations related to age. For player 4 to handle the control of the *Wii* occurred only at the time of the explanation, because she was paying attention while the researcher explained to others how it had to be. So, when it came her turn, she already knew a little how it worked. The Calo and López study (2016) showed that older adults prefer to receive training before adopting a new technology. For the player 5 the fun of the game overcame the obstacles of understanding and handling the control of the *Wii*: "In the first bowling I did not know how to handle the control, but it was just fun". Ryan et al. (2006) say that the results of the research suggest that the experience with the games achieves two objectives: to allow the players to concentrate their energy in

the game and that the presence is directly related to the way the game meets the psychological needs.

Conclusion

There has been a significant increase in the elderly population in recent times, as well as the contact of this group with cell phones, internet and computers. As a result, the number of older gamers has increased. In this study it was verified that it is necessary to take into account the type of game regarding to the platform used. The bowling game for example was a fun and motivating game for the participants. The game considered entertaining by the participants was motivating to stimulate the concentration in the handling of the controller. We also realized the use of the controller *Wii* for alternate attention, because the participants had to be able to push a button and release the other in a faster movement. All participants were able to accomplish this task because the game was motivating for them, so, attention is directly related to motivation. Another relevant aspect in this study was the speed of the games. Fast games require the player to focus more attention and concentration. But, at the same time, the game should be fun so that what is called initial frustration does not occur, causing the player to lose interest in the game. A healthy level of speed in the game stimulates sustained attention, in which the subject can focus on the stimulus or a sequence of stimuli. However, regarding to the distracting elements of the games, they may or may not contribute to players sustaining attention for longer periods of time. Thus, it is understood that it is necessary in the stimulus of attention to take into consideration the choice of games, which will cause the elderly player to be able to maintain his attentional focus in order to don't feel discouraged, thus contributing to the development of his cognitive functions. By the design of this study the results cannot be generalized for the whole population, since the participants were selected intentionally. Finally, it is considered relevant to continue the studies with a larger audience, as this has the advantage of helping to verify what characteristics of the games and platforms brings the elderly closer to the game, and keeps them involved.

Acknowledgments: Capes

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