

Appeal and Interest of Video Game Use Among the Elderly

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May, 2002

Abstract

Based on previous research finding positive effects of video game use on the cognitive and neuro-motor skills of the elderly, researchers investigated the appeal and interest of video games among this population. Four focus groups were conducted with a total of eleven participants between the ages of 66 and 79 years of age. Participants were asked to play an assortment of video games while their reactions and responses were noted. The majority of participants showed a high degree of interest in technology. While appeal of the selected video games varied greatly based on individual preference and game content, 64% of participants stated that they were somewhat interested or very interested in playing video games again. Based on these findings the following conclusions were posited. There exists a potential market within this demographic group for the use of video games. Games developers should take into account a strong preference for familiar content, distaste for violent content, and preference for educational or historical information. In order to better target this population, a high degree of instructional support must also be provided. This preliminary analysis provides a point of departure for more specific investigations of the elderly population's use of video game technology.

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Introduction

Thirty-five million elderly adults, people 65 years of age and older, live in America today. This group represents over 12% of the American total population, and the number of people in the elderly demographic is predicted to continue increasing. In fact, the 75 million baby boomers (born between 1946 and 1964) will begin turning 65 in less than a decade, further inflating the percentage of elderly adults in America (Hetzel 2001).

People are living longer, as a result of better health options and living conditions. Contrary to common misconceptions, only 4.5% of people over the age of 65 live in nursing homes, a percentage that has been declining for over a decade (Hetzel 2001). The elderly population is increasingly better prepared to cope with aging, as disability rates drop and the elderly become progressively more active in their daily lives (Cable News Network 1996).

Despite a strengthened ability to cope with aging and continue to live actively, numerous changes can still take place in routines and skills in the latter parts of life. These changes may involve declines in social relationships, physical abilities, memory, and cognitive function. Previous studies have demonstrated that the normal aging process is usually accompanied by a decrease in certain neuro-motor and cognitive functions. Compared to their younger counterparts, elderly people commonly exhibit lower performance on tests that involve reaction time, motor coordination, short-term memory, and abstract or complex conceptualization (Lezak 1983). Often these changes result in a decline of an elderly person's quality of life.

Previous studies suggest that part of the decrease in cognitive and neuro-motor function of the elderly may be exacerbated by "disuse," or more simply, a decline in the number of activities requiring frequent cognitive processing. Furthermore, it has been shown that the central nervous system retains a significant amount of plasticity, or neural flexibility, well into old age (Schaie and Willis 1986). In one particular study, researchers from Pennsylvania State University were able to improve elderly subjects performance on a number of inductive reasoning and spatial orientation tasks, through a series of simple training programs. Subjects had previously been studied over a fourteen-year longitudinal study and had been documented to have significant decrease in certain cognitive skills as they aged. From the significant improvement subjects exhibited after the implemented training program, researchers concluded that plasticity continues well into old age (Schaie and Willis 1986).

Another common occurrence among the elderly, particularly those in senior residences or nursing homes, is boredom. Even participation in group activities does not necessarily alleviate this feeling and sometimes creates negative interactions for participants. However, activities chosen based on individual preferences and interests can have a positive effect on alleviating these feelings of boredom and increasing quality of life (Ejaz et al 1997). The challenge is to find innovative activities that engage the elderly and motivate them to continue activity. Understanding that avoiding "disuse" can help prevent declines in ability and that participation in activities based on individual preferences can decrease boredom, there is a need to develop activities that can bridge both of these areas. One area of possibility is that of electronic games.

The Elderly and Game Playing

Game playing has long been viewed as a common activity at senior centers, retirement communities and other social hubs for the elderly community. Games, including bridge, lawn bowling, and bingo, among

others, are frequently played in senior communities and often become a primary means for social interaction. Previous studies have examined the role that games play in these communities.

A 1995 study followed eight men and women at a senior citizens center during a two-hour evening session of domino play. Researchers found that the participants used the time to share biographical stories by engaging in conversation during game play that allowed them to “retell and reenact their life stories” (Mangrum and Mangrum 1995). In addition to being a form of socializing, the two-hour session provided the participants with a unique chance to deal with what was going on in their lives:

Game playing is more than a form of recreation, a pleasurable use of discretionary time, or a commentary on the social order; it may be an opportunity for teaching the elderly the importance of life-enhancing behaviors, such as maintaining a positive self-concept and understanding the stages of coping with loss (Mangrum and Mangrum 1995).

Similar patterns occur in Japan around the widespread game of gateball, a game similar to croquet but more oriented towards team play. Because of the early retirement age and long life expectancy, Japan has been faced with the problem of an increasing aging population. While television viewing is still one of the primary recreational activities for this population, gateball has become very popular and seems to have benefits beyond recreation. In addition to some physical strength and coordination, gateball requires mental strategy. It has become a social outlet for players who often meet daily for several hours of play: “Members of this group shared information, laughter, and a relaxed sense of belonging” (Kalab 1992). Safety is also a benefit of play. If a player doesn’t show up, the group will make every effort to account for his or her absence - sometimes sending a member to his or her home.

While these benefits are enormous, gateball has suffered from its own popularity. It has come to be seen as an old person’s game, which discourages some people from playing. While television shows often depict young and old playing together, this reputation still continues to serve as a deterrent. However, other games and activities have the potential to foster the same social and skill benefits without carrying the connotation of being an old person’s game. Electronic game play in particular may hold promise as the elderly increasingly become more fluent in their use of technology.

The Elderly and Technology Usage

Because the majority of the elderly today have spent a considerable part of their professional and personal lives without exposure to computers, it is a common perception that the elderly are not receptive to the use of technology. To test this preconception, a group composed of both senior citizens and young adults were given the Cybernetics Attitude Scale, a likert-scale-based survey to examine attitudes and conceptions towards technology (Ansley and Erber 1988). Despite the older adults’ lower level of experience with computers, their attitudes towards the use of technology were remarkably similar to those of the young adults in the study. Furthermore, it was found that the older adults were receptive to the use of technology and were willing to interact with computers. Similar findings have been discovered in studies on the attitudes of older adults towards technology (Krauss and Hoyer 1985). In one study, it was found that even nursing home residents were willing to repeatedly take part in simple, interactive computer game play as a recreational activity (Weisman 1983). This is encouraging, in that if computer game play can be introduced to the relatively frail segment of the elderly community, the potential for the use of these games in the more active or independent segment of the elderly community may be great.

Video Game Play and Changes in Cognitive Function and Coordination

Recognizing that older adults still possess a certain amount of neural plasticity and have an interest in both games and technology, several studies have been conducted examining how regular exposure to video games affects memory, problem-solving, coordination, and fine motor skills in the elderly.

Encouraged by previous research showing that certain activities such as aerobic exercise can increase performance in certain mental tasks and reaction time in older people, one study investigated the effects of video game play on reaction time and cognitive performance in the elderly. Subjects between the ages of 60-79 years of age participated in regular video game playing sessions (a variety of Atari 800XL games) over an 11-week period. Although no significant effects were shown in the area of cognitive abilities, the elderly in the video game group showed significantly improved reaction time compared to a control group that did not participate in video game play (Dustman et al 1984). Another study that looked at the effects of video games on the elderly also led to a significant improvement in reaction time for those individuals that played the games (Clark et al 1987).

A similar study examined the impact of video games on the elderly by following a group of 13 elderly people playing Atari's Crystal Castles. This game was chosen because it had clear instructions, was non-juvenile in appearance, provided feedback, had varying levels of difficulty, and avoided violent depictions. As a result of game play the experimental group's coordination and cognitive function improved significantly, and they were able to play the game for longer periods of time indicating increased attention span. Additionally subjects showed improvement in "perceived" quality of life. They also reported better attention driving and fewer "mishaps" in the home. Some female participants reported that they were returning to previously abandoned hobbies like knitting and crochet as a result of the video game play (Drew and Waters 1986). Elderly adults have also reported a significant increase in self-esteem after regular game play (Danowski and Sacks 1980).

Another study put video game consoles in the homes of its participants. It included 10 experimental subjects and 12 control subjects over the age of 60 from a small town in the Netherlands living in an apartment complex for the elderly. The experimental group was provided with a Super Nintendo and the game Tetris and was asked to play the game for five hours a week over a five week period. Results suggested that 25 hours or more of video game play can have numerous positive effects:

Playing video games requires concentration, memory, coordination, and quick reactions. To the extent that they strengthen these skills, video games have potential benefits for the elderly. They may affect attention, hand-eye coordination, fine motor skills, short-term memory, problem-solving, and speed reactions to novel situations (Goldstein et al 1997).

Participants also seemed to enjoy playing the games. While they were only required to spend 25 hours playing games during the course of the study, all players surpassed this minimum. Two women even played 63 and 111 hours during the five week period. The study concluded that regular video game play could improve some physical and emotional responses and might provide similar benefits to exercise for those who couldn't engage in physical activity.

Previous Recommendations for Both Technology and Video games Aimed at Seniors

While regular video game use has been shown to improve various skills and abilities in the elderly, games are not typically designed with these users in mind. As a result, it may be hard to find games that would immediately appeal to them. Limited research has looked specifically at how older populations use video games and react to their presence in their home or living facility.

A 1986 study placed four Atari game consoles with nine game cartridges each in several assisted living communities. To gauge the value of these games as a recreational activity for the residents, activity coordinators tracked their use. It was found that younger residents – those 40 to 60 years old – were more interested in the consoles than those over 60. Residents with good hand-eye coordination and strong motor skills were more willing to play, but residents with limited motor skills or hand/arm mobility were also successful at playing if encouraged or assisted. It was also found that the consoles were used more frequently when the facility staff did more to facilitate activities involving them:

One nursing center held a Special Olympics video game tournament coordinated by the activity department and occupational therapy. This event generated media coverage and led to more community awareness of the facility. Another facility used the games during room visits for bed bound residents unable to participate outside of the room (Schueren 1986).

While these examples illustrate a certain amount of success for the use video games in assisted living facilities, the interface and graphics of games were sometimes inaccessible to certain residents. While certain adaptations like larger televisions or lap boards to hold the controller could improve usability, games designed for this audience should have clear visual graphics, be slow in pace, and have simple controls.

Consideration of the Elderly in Video Game Design

The elderly are not often thought of as major consumers of video games, and developers may not often consider that population when designing games. Chris Weaver, a co-founder of Bethesda Software and a designer of the popular series of computer role-playing games entitled “Elder Scrolls,” was interviewed for the purpose of this analysis (personal interview, April 2002).¹ After the 1993 completion of “Arena,” the first in the Elder Scrolls series, he noticed a surprising number of registration cards returned by elderly users.

Question: *Did you design “Arena” with the elderly population in mind?*

Weaver: *I can’t say that it was designed with the elderly in mind, but it has been designed with the elderly considered. In user testing, we found that we started getting registration with people over 65 and it surprised us—so we took the time to call them.*

Question: *Who was the target demographic [for Arena]?*

Weaver: *The standard demographic for these types of games is 15 to 30 [years old]. But we found out that we had people as old as 74 and 75 years old. I was clueless, so I spoke to six or seven of these people. They were shut-ins, infirm ... all limited in their ability to travel—so their kids gave them computers. They came across this game, a free form world, allowing for a huge amount of social determination. They were not interested in the quests [that provide the usual challenges in the game]; they went traveling. We had taken the time [in designing “Arena”] to*

¹ The title of the series, “Elder Scrolls,” was presumably chosen for its relation to the series’ narrative, and the title choice is not indicative of it’s relevance to an elderly population.

try to create a beautiful, or at least reasonably, nice looking universe. If you happened to stand near a brook, there was a certain amount of randomness in the world—a cloud would go by or a fish may jump out of the water. These people were itinerant wanderers ... The beauty of [the world] alone is enough to make you stop and calm down—when you are looking out over the water and it starts raining, it's a beautiful effect. It's that "quality of world" aspect that is really transcendent.

Weaver and his company have recently released the third in the Elder Scrolls series, "Morrowinds." He reported that while the company has not explicitly designed the newer installments for older players, the elderly have been considered in all stages of development. He believes that it is possible to create a game that will appeal to the usual role-playing game demographic, yet also intentionally feature elements that satisfy older generations.

Weaver: Pen and paper [role-playing] plays with the imagination and has the opportunity to help you transcend [reality], but [with the Elder Scrolls series,] you are assisted with visuals to help make it a little more real for you. We are little but iconoclasts in this industry. Seniors are frowned upon by the market. The interesting thing is that I think from an economic standpoint you are purposely ignoring a group that has the greatest disposable income of anyone. One of the questions I think that our industry should be asking is "are you intentionally [ignoring this group]? ... One of the concepts that I really like is from "Snow Crash" by Neal Stephenson. I'm talking about it more from the standpoint of what it is like to have had a very active life and now you are in your 70's, and you have physical limitations—you are obviously frustrated. What do you do? What are the logical places that you can move and what can you do? Part is going to be social; part is going to be mental. Keep your brain going. Computers are more and more pervasive—people are becoming less mobile—and telecommuting is becoming more pervasive. You have a large population that is, statistically, aging and living longer as a result of medical advances, et cetera. What are we going to do with our elderly?

One of the missing pieces in the puzzle of how to connect the elderly with video games is the specific issue of appeal. As Chris Weaver indicated, particular game play elements may be more attractive to elderly game players; it is important to recognize and develop those elements to capture this older market. To increase the regular use of video games outside of a study, it is important that games are created with a consideration and understanding of the content interests and the skill sets of this significant population. The purpose of this study is to gauge the interest and appeal of the elderly in playing video games and to identify barriers posed by current video game consoles and games to play.

Procedure

In order to ascertain the appeal and interest of video games for the elderly, researchers conducted a series of four focus groups between April 29 and May 3, 2002. The structure of these focus group sessions were based upon the following schedule:

- Pre-Play Questionnaire: 15 minutes
- Brief Introduction to Games and Game Play: 10 minutes
- Game Selection and Video Game Play: 45 to 60 minutes
- Post- Play Questionnaire: 15 minutes

Upon arrival at the focus group location, the participants were greeted by the researchers and read the following introductory script:

We would like to thank you for generously donating your time to our study. We are here today to collect information about your interests and preferences. We do not expect that you have any prior experience with the technologies that you will be playing with today. We want to assure you that we are graduate students at the Harvard Graduate School of Education and have no affiliation with the companies that manufacture these products. Today we are interested in learning your responses and reactions to these technologies, BOTH negative and positive. We are also very interested in hearing any suggestions that you may have for changing these technologies, as well as any difficulties you have using the equipment. We want to assure you that your skills are not being measured or tested and that it is understandable that you may experience some initial difficulty operating the equipment.

Prior to game play, participants were asked a series of questions by one of the researchers.² Participants were separated during the pre-play questionnaire portion of the session so that their responses were not influenced by other participants. After completing the pre-play questionnaire, the participants were reunited as a group and one member of the research team gave a brief PowerPoint introduction to the participants on the five games selected for the study (Tetris, Wheel of Fortune, Ecco the Dolphin, Tiger Woods PGA Tour, and Grand Theft Auto 3).^{3,4} A brief introduction to the PlayStation 2 console was also part of the presentation.

Participants were encouraged by the researchers to take turns and to play a variety of games within the one hour allotted time period. Although participants were not required to operate the controllers nor were they required to switch games, all of the participants played at least one game during the sessions. In an effort to make participants aware of the time frame, every 10-15 minutes researchers asked participants if someone else would like to take a turn or if they would like to change games. Participants selected the initial game and were given instructions on using the joystick controls or commands for that particular game. Participants were also provided with feedback and technical assistance during game play. Researchers observed the participants' responses and reactions to the individual games and recorded these observations and individual commentaries.

² See Appendix A for the questionnaire used in the study.

³ See Appendix B for a description of the five games selected for this study.

⁴ See Appendix C for an outline of the slides used to introduce participants to the video game console format, the games, and their controllers.

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At the conclusion of game play, participants were again separated and asked to complete a brief post-play questionnaire by one of the researchers. The researchers then asked the participants if they had any additional comments or questions and thanked them for their participation.

Subject Recruitment

The total number of participants was eleven. Researchers recruited participants who were over the age of 65 at the time of the study. The average group age was 73.5 years. The youngest participant was 66 and the oldest was 79 at the time of the study. Although researchers made an effort to recruit a more equitable gender split, females were much more willing to participate in the study, resulting in a skewed distribution. Participants ultimately consisted of nine women (82%) and two men (18%).

Two of the focus groups were comprised of individuals recruited from the Harvard Institute for Learning in Retirement in Cambridge MA. The remaining two focus groups were made up of residents from the Community at Pond Meadow retirement community in Wrentham MA. All of the subjects participated on a voluntary basis and none of the subjects received compensation for their time. The focus groups were conducted in two locations: 1) the Monroe Gutman Library at the Harvard Graduate School of Education and 2) at the Community at Pond Meadow. All of the sessions were conducted in a private quiet space without interruption; a television, a PlayStation 2 console, the five selected games, and two controllers were also provided. Three of the focus groups consisted of three participants each with one focus group having only two.

In order to ascertain that participants did not have any conditions that would interfere with video game play, the following screening questions were asked:

- Do you have any conditions that may prevent you from doing an activity such as dialing a telephone or using a television remote control?
- Do you have any problems with your vision that prevent you from doing an activity such as reading or watching television?

No additional screening criteria were employed.

Results

Background Information

In order to obtain background data on participants, a number of questions were asked prior to the game-playing portion of the focus group sessions. When asked whether they enjoy playing games, a large majority (91%) of participants responded positively with 100% of the participants mentioning either card or board games as the type they most enjoy. Over half (55%) of participants mentioned outdoor sports as a preferred leisure activity (tennis, golf and walking), and 36% mentioned watching television as one of their common leisure activities. Other activities mentioned included reading (36%), gardening (18%) and quilting or knitting (18%).

In order to determine participants comfort level with technology, participants were asked to rate how comfortable they were using technology on the following scale:

1	2	3	4	5
Very uncomfortable	Somewhat uncomfortable	Neutral	Somewhat comfortable	Very comfortable

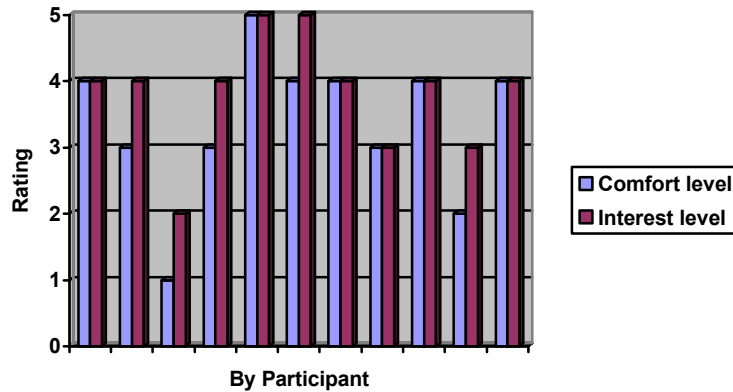
The average technology comfort rating for the group was 3.4 or somewhere between “neutral” and “somewhat comfortable”. The mode for this question was 4 or somewhat comfortable with a low score of 1 being given once and a high score of 5 also being given once.

To ascertain participants’ interest in technology, participants were asked to rate how interested they were in technology on the following scale:

1	2	3	4	5
Not at all interested	Somewhat Uninterested	Neutral	Somewhat interested	Very interested

The average interest rating for the group was a 3.8 or just below “somewhat interested”. The mode for this question was 4 with a low score of 2 being given once and a high score of 5 being given twice. Figure 1 lists the individual rating scores for technology comfort and interest for each of the participants.

Figure 1: Pre-Game Comfort and Interest in Technology

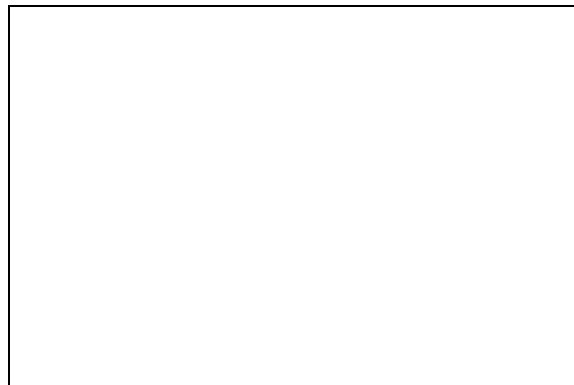


In order to assess participants’ prior experience with technology, researchers asked participants which of the following they used on a weekly basis:

- Computer
- Television with Remote
- VCR
- Radio
- Video Game Console

All of the participants stated that they used a television on at least a weekly basis. Participants further specified that they most commonly watch news, sports, sitcoms and financial programming. All of the participants responded that they listen to the radio on a weekly basis and specified that they listen to both news and music programming. Just over three quarters (82%) of participants stated that they currently use a computer on a weekly basis with the most common uses among those who responded positively, being email (67%), word processing (56%), research (33%) and game playing (22%). Seventy-two percent (72%) of participants stated that they use their VCR on a weekly basis; but of those who responded positively, only two participants specified that they used the VCR to both play and record videos. None of the participants stated that they use a video game console on a weekly basis, but three participants (27%) indicated that they had played a video game console at least once before. Figure two summarizes the percentage of positive responses to this question.

Figure 2: Percentage of Participants Using Various Forms of Technology



In order to assess participants' preconceptions and attitudes towards video games prior to game play, they were asked what thoughts and images came to mind when they heard the term "video games." Nearly two thirds of participants (64%) mentioned youth or age in their response to this question. Furthermore, nearly half (45%) mentioned their grandchildren in their response. Typical responses included:

- "I think of the kid under sixteen in the corner store playing pinball."
- "Those (video games) are things that kids play, there not for adults."
- "I think of my grandsons and granddaughter, I really don't know about them."
- "Id love to know what they are because then I would know what to get the grandkids."

Over one-third (36%) of participants mentioned violence of some kind in their response, such as:

- "I think of shooting mostly, violent war like things."
- "I think about a large amount of violence."
- "It brings to mind action games with lots of violence."
- "I see little people shooting everything they can."

Almost half of the participants (45%) mentioned that they either didn't have any idea what video games are or had not had any interest in finding out what they are. Typical responses included:

- "Forget it, I have no idea what those are about. I really don't have any interest in them either"
- "I don't know anything, I can't visualize anything."
- "I don't really think much about them."

Other responses included references to developing hand eye coordination and pictures on a television screen.

Appeal

Participants were given the choice of which games they wanted to play, resulting in each of the four focus groups playing a different combination of the selected games. Wheel of Fortune was the most frequently played game, being chosen by three out of the four focus groups. Ecco the Dolphin and Tiger Woods PGA Tour were each played twice, while Tetris and Grand Theft Auto 3 were played only once each.

Figure 3: Number of Participants Playing Each Game



When asked why they chose the games they did, 82% of participants said they chose based on familiarity. For instance, many participants had seen Wheel of Fortune on television; one participant commented, "Wheel of Fortune I watch so I know the concept." Several participants were also interested in golf; one participant said of her choice, "Golf is something I really enjoy." Another group chose Tiger Woods PGA

Tour after discussing whether or not Tiger Woods would put his name on a low-quality game. As can be seen by this example, group dynamics also affected how participants decided which games to play. Thirty-six percent (36%) of participants mentioned coming to a consensus or taking the group dynamic into account when choosing games. An aversion to violence also affected game choice for 27% of participants. One participant commented, “I don’t like those cop [games] or those killing [games].”

Participants were asked to rate how much they liked or disliked each of the games that they played on the following scale:

1	2	3	4	5
Disliked very much	Somewhat disliked	Neutral	Somewhat liked	Liked very much

Overall, Tetris received the highest rating. However, only one group decided to play it because one member of that group was already quite familiar with the game before the session. This participant helped the others to understand and play it. These participants mentioned enjoying the challenge presented by this game. Of participants who did not choose to play Tetris, three participants mentioned having little or no interest in playing it. One described it as looking “totally dead and boring” while another commented, “It would drive me crazy.” Only one participant mentioned having a desire to play it saying “I like puzzles.”

Table 1: Appeal of the Games Played

Game Played	Rating
Tetris (n=3)	4.7
Grand Theft Auto 3 (n=2)	3.5
Wheel of Fortune (n=9)	3.3
Tiger Woods PGA Tour (n=6)	3.2
Ecco the Dolphin (n=6)	2.6

Grand Theft Auto 3 received the next highest rating. However, it was only played by two participants. Of these participants, one enjoyed it very much. She was a fan of television programs like “The Sopranos” and found it exciting to play: “It looked exciting. I’m a follower of those kinds of programs. It gets rid of aggression.” The other participant who played Grand Theft Auto 3 did not particularly enjoy it saying that it was “too real.” Of the participants who did not play it, 56% said that they would not want to play it, unanimously citing the violent content as their reason. One participant said, “I don’t like the fast car games, and I don’t like games with violence. Anything with a gun – forget it.”

Wheel of Fortune was chosen by the most participants, but they tended to have neutral reactions after playing it. Participants tended to enjoy playing the game but often had trouble with the controls. Another area of particular trouble was differentiating the puzzle themes from the overall theme. At the beginning of the game, players are prompted to choose a theme; this theme affects only the graphics, and not the puzzles. This complication was mentioned in two of the three focus groups that chose the game. Of the two participants who did not play Wheel of Fortune, neither had a desire to play it because they either disliked or were unfamiliar with the television show.

Tiger Woods PGA Tour also received a neutral rating. However, there was wide variation in ratings between the two groups that played it. One group gave it an average rating of 2.3, while the other group gave it an average rating of 4. It is interesting to note that all members of the latter group were avid golfers, while only one of the former group was interested in golf. Several of the participants mentioned that they would like to get better at playing it. Another participant was interested in Tiger Woods and

seemed to enjoy taking on his character. After playing the game, she said, “It gave me a vicarious experience.”

Ecco the Dolphin had the lowest rating. Participants tended to dislike or be neutral about it. One participant commented, “It was rather boring and sort of frustrating.” While many participants seemed to dislike moving Ecco through the ocean, several commented on enjoying the music and the general atmosphere of the game. Of those who didn’t get to play Ecco the Dolphin, half (50%) expressed interest in playing it mentioning that they liked or were interested in dolphins.

Across all games, participants seemed to find four main characteristics that appealed to them. Forty-five percent (45%) mentioned enjoying the challenge of playing the games. One mentioned “it would be rewarding to get competent at a game.” While they tended to enjoy the challenges presented by the games, they had differing views of what sort of challenge they wanted. One participant commented, “I don’t want the games to be too complicated. Make it as easy as possible to use. I don’t want to stop and think.” Another enjoyed the “mental alertness” of “trying to get ahead of the thing.”

Twenty-seven percent (27%) of participants enjoyed the involvement of the games. One commented that each game “removed you from your problems.” Another said, “You could really get involved with them and go on for a length of time without getting bored.” Several participants also cited the social activity of playing the games together and the technology as being appealing characteristics of the games.

While participants seemed to enjoy the games overall, several themes emerged to detract from their enjoyment of the games. Sixty-four percent (64%) did not like using the controls. They typically described the controllers as “difficult,” “clumsy,” “confusing,” or “unfamiliar.” One participant commented, “There were so many buttons. That’s the hardest part.” Eighteen percent (18%) commented that the games could be “a waste of time” or that they were “time consuming.” However, one participant found that this may not necessarily be bad for her: “I would never have that much time ... or maybe I would now.” She later continued, “I’m sure if we had the time I’d have that thing going until two in the morning.”

Usability

Participants were also asked if there was anything they found “difficult” or “easy” in order to address issues of usability and interface design. Eight-two percent (82%) of respondents commented on the difficulty of operating the controls or joystick. Only 18% of respondents said that they had no difficulty mastering the controller. One participant qualified his response by stating “I’m more used to working with a mouse.”

Just under half of participants (45%) remarked on the dexterity required to operate the joystick and buttons. One participant commented that the joystick was “too small,” while another qualified her response by stating “I had difficulty coordinating... and it has nothing to do with my age” indicating that he felt the design was faulty. However, other participants demonstrated no difficulty when using the controllers. One participant commented “I’ve never held one of these [controllers] in my life, but it’s obvious when you look at it that it’s meant to be held this way.”

Eighteen percent (18%) of participants recommended making the joystick larger. Despite initial difficulties, all participants were able to operate the controller effectively and learn the necessary functionality for the games they selected in the relatively brief period of allowed for in this study.

Suggestions

When asked to make suggestions to game designers and developers, two participants recommended modifications to the controllers, such as making them larger or “improving the joystick.” In addition, several participants (18%) indicated desiring more information in the games; one participant commented, “Make the games more educational.” Another 18% had concerns about the high costs of buying games and suggested that this would affect their appeal of the games.

When asked what sort of content they would enjoy in games, 36% of participants were interested in playing sports games such as tennis, candlepin bowling, or baseball. Another 27% of participants also showed interest in card games such as bridge. However, one participant expressed concern about the difficulty of games like bridge commenting “I have played bridge on the computer, and the defense is not very smart.” Two participants also expressed interest in historical games. One commented, “I might enjoy historical games like being ‘Hannibal in the Alps’ or ‘Caesar.’”

It should also be noted that several participants commented that they did not feel they could make suggestions with their limited knowledge of video games.

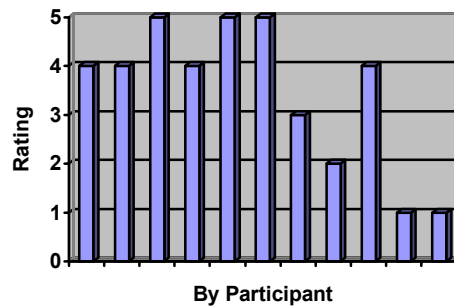
Interest in Future Play

Participants were asked to rate their interest in playing video games again on the following scale:

1	2	3	4	5
Not at all interested	Somewhat Uninterested	Neutral	Somewhat interested	Very interested

A majority of participants (64%) responded favorably saying that they would be “somewhat interested” or “very interested.” Overall, the average rating was 3.5, mid-range between “neutral” and “somewhat interested.” Figure 4 lists the individual ratings for interest in future video game play.

Figure 4: Interest in Future Game Play by Participant



Participants were then asked to rate their interest in video-game play a second time after being informed that, “Research has shown that video games can increase both cognitive function and motor skills.” Participants did not change their initial responses. However, this information elicited the following comments:

- “I think people in my age bracket need stimulation, too. Many of us are sitting around letting our brains get old and not work.”

- “It’s true. I can see [it in my friend who plays video games regularly]. Even though she’s got a cane, her mind is so quick.”

Observations from Game Play

Participants’ comments were noted during three successive parts of the focus group session: the instructional PowerPoint presentation, the game selection process (occurred at least twice for each group), and the game play session. While the comments should ideally offer an overall context for the participants’ immediate reactions to the video games, they may have additional meaning for readers who have familiarity with each of the games.

The following chart indicates the number of times a particular game was chosen by participants, though the individuals did make their decisions as a group. One game, Grand Theft Auto 3, was selected by a group to be played a second time in their session.

Table 2: Game Selection

Title of Video Game	Participants Selecting Game (N=11)	% of Participants Selecting Game	Typical reactions of participants during the selection process	
			Participants who <i>did</i> choose the game	Participants who <i>did not</i> choose the game
Wheel of Fortune	9	82%	“Wheel of Fortune is the only game that interests me.” “That would be fun.” “Is Vanna White in it?”	“Oh god!” (said in a tone implying disdain for the theme)
Tiger Woods PGA Tour	6	55%	“Tiger Woods wouldn’t put his name on a bad game.” “All of us are going to agree on one – we’re all golfers.”	“I don’t know anything about how to play golf.” “Why are all golf games geared towards men?”
Ecco the Dolphin	5	45%	“Let’s do something that looks very different.”	
Tetris	3	27%	“It’s one I play every single day on my Gameboy.”	“I’ve played Tetris before.” “I don’t understand it.” “I don’t like blocks.”
Grand Theft Auto 3	2	18%	“That one looks exciting.”	“Let’s not get into the violence.” “That’s what I don’t like.”

One female participant started a discussion during the selection process about the frequency of golf video games using male statistics to simulate a golf game. She felt it was inaccurate and distorted her own game play because she was accustomed to hitting the ball a shorter distance than male golfers with more strength. This discussion may have led to the group not choosing Tiger Woods PGA Tour.

Participants were given basic instructions during the PowerPoint presentation on how to use the PlayStation controller. None of the participants had held a game console controller before the session, and most of them seemed eager to practice holding it during the PowerPoint presentation. Additional instructions and assistance were provided as needed during the game play session. Eight (73%) of the

participants made at least one remark regarding the nature of the controller during the focus group session, included those below.

Positive participant remarks regarding the controller included:

- “The controllers seem well-designed.”
- “I’ve never held one of these [controllers] in my life, [but] it’s obvious when you look at it that it’s meant to be held this way.”
- “Wow! This [controller] is something, isn’t it?”
- In response to controller’s vibration feedback feature, “the controller moves with the ball.” (This seemed to imply enjoying the feature.)
- “I think we are comfortable [using the controllers] because we have seen the kids use it.”

Negative participant remarks regarding the controller included:

- “Where is the start button?”
- “I’m used to using a mouse, which is much faster.”
- “The controller is different than my Gameboy [and hard to adjust to].”
- “My fingers are getting tired.”
- “I’m not fast enough to get the buttons going.”

In general, the participants were able to become somewhat comfortable using the PlayStation 2 controller, though they often needed to cease looking at the television display so that they could search for a particular button. The participants were not aware of the controller’s vibration feedback feature; most seemed pleasantly surprised when they experienced the feature, particularly in Tiger Woods PGA Tour where the vibration of the controller matches the bounce of the golf ball. However, one participant showed some irritation remarking, “Why can’t this thing behave itself? It’s very rude.” Overall, the participants were able to hold the controller in an effective way with minimal assistance, and felt relatively comfortable doing so.

While most of the participants were somewhat comfortable with the physical design of the controller, there were a significant number of comments regarding the complexity of the controls (the use of buttons and joysticks to correspond with desired actions on the screen) needed to successfully play the games. The following are typical comments indicating difficulty or frustration with controls.

Participant remarks indicating difficulty or frustration with the controls (use of buttons and joysticks to correspond with desired actions on the screen):

- “I’ll never be able to remember the controls.”
- “Steering is very complex [in Grand Theft Auto 3].”
- “This is really hard. It’s not you. This game is very complicated” (speaking to another player frustrated by poor strokes in Tiger Woods PGA Tour).
- “Oops...I have already forgotten how to do that” (in regards to spinning in Wheel of Fortune).
- “That’s a lot of work” (in regards to entering each letter into a puzzle in Wheel of Fortune, with a 60 second time limit).

Participants seemed to find some games more complicated to control than others, most notably Ecco the Dolphin and Grand Theft Auto 3. Other games, such as Wheel of Fortune and Tetris, demanded less complex controls but did rely more on the participants’ speed using the simpler controls.

Wheel of Fortune required players to input answers using an on-screen cursor-like highlight to select letters. When choosing a letter for the puzzle, players have a 30-second time limit to select their desired letter. This process proved to be difficult for some of the participants, as many of the players either ran

out of time or nearly ran out of time when selecting letters. Several participants knew the correct answer to a puzzle, but were unable to select the letters one-by-one to solve the puzzle within the 60-second time limit; this was somewhat frustrating to the players and disrupted the flow of the game, since the answer was then apparent to the participants competing in the game. Five of the nine participants (56%) who played Wheel of Fortune ran out of time at least once in their play session.

While most participants did have some amount of difficulty with either the physical controller or the controls within a game, five of the participants (45%) mentioned at some point during the game play session their recognition that players can improve their abilities over time. While not all of the participants vocalized their recognition of potential improvement over time, there was a clear improvement in the ability to control the games for most of the participants. Following are typical comments indicating a recognition that player’s control abilities could potentially improve over time, in regards to a particular game.

Table 3: Recognition that Players Could Improve Over Time

Game Title	Comment
Grand Theft Auto 3	“If you play around with this, you could get good.” “You can see that with some time you could get good.”
Ecco the Dolphin	“You really have to play it more than five minutes to get it.”
Tiger Woods PGA Tour	“This is something you really have to work at.”
Tetris	“That was fun, and I am starting to understand the game.” “I like Tetris, one you can play [and start to] get good.”

The video game play sessions resulted in a notable amount of participant coaching and socializing. Since all of the games used in this evaluation allowed for only one participant to use the controller at a time, the other participants usually watched the player’s performance on the screen. The non-playing participants would usually make remarks in regards to the playing participant’s performance, and occasionally offer verbal coaching or motivational support to guide the playing participant to greater success in the game. These remarks indicate playing and non-playing participants’ engagement with the video games and the capability of the games to act as a social centerpiece. Nearly all of the participants (82%) made at least one socializing remark to another player. Following are typical non-playing participant comments regarding the player’s performance, and instances of non-player coaching.

Table 4: Comments from Non-Playing Participants on Game Play

Game Title	Typical non-playing participants’ comments to the player participant		
	Coaching	Motivational Support	Competitiveness
Tetris	“Move that block to the right.”	“You’re amazing at these games!”	“I can beat you on that one.” “This is what you do with you spare time?”
Wheel of Fortune	“Where’s the T? Where’s the T?” “Pick the ‘P’. Move the thing over to the P and press X [button].”	“We’re going to do well on this one.” “You really gave that one a spin. Wheeeee!” “Go \$1000!” “You got [the puzzle]!” (followed by applause from the group)	
Tiger Woods PGA Tour	“Get over that sand trap.” “Put it right between the trees.” “Go way back with the club.”	“Good shot!” “I didn’t know you could hit it that far.”	“Right into the bushes.” “Don’t laugh. You’re next!” “She’s not that quick a learner.”

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Grand Theft Auto 3	“Get in the car, use the triangle [button].”		
Ecco the Dolphin	“Point towards the top, and press X [button].” “Flip out of the water. That was nice.” “Do a jump! Do a jump!”	“This is your game!” (implying it was the one the participant was successful with) “You’re a good jumper!”	

In addition to remarks from non-players, the participant players themselves made comments indicating their engagement and interests in the games. The following are typical comments that revealed the player’s immediate emotional responses to the games’ graphics and sound, particular events and actions in the game play, and their general interest in the games.

Table 5: Positive Comments Made During Game Play

Game Title	Typical playing participants’ positive and engaged verbal reactions to the games		
	Graphics and Sound	Events and Actions in Game Play	General Interest
Tetris			“That was fun.”
Wheel of Fortune	“I like how you can see which letters have already been chosen.” “It amazes me that they can get our names on TV.”	“I’m really going to spin this one.” “I’ve got it!” (thinks she knows the answer to a puzzle) “I can figure this one out.”	“This is a fun game. I like this!”
Tiger Woods PGA Tour	“That was funny.” (a response to the Tiger Woods character reacting to a poor putt)		“I find this fun. I like the whole thing of him hitting the ball, the green, I could spend some time playing this.” “It gave me a vicarious experience, and that’s definitely better than no experience.”
Grand Theft Auto 3	“He’s mean looking.” “That’s why it is so fun!” (a response to the negative comment “This is too real for me.”)	“He’s going to steal a car with only a bat?” “I want to make him dance.” “Run, run you fool!” “I hit that person on purpose!”	“I feel like the son of the Sopranos.” (referring to the TV series about the mob) “Absolutely intoxicating!”
Ecco the Dolphin	“I have a screen saver that looks like this.” “I like the music, it’s really nice and soothing.”	“It’s really fun to jump.” “I’m looking for Captain Hook’s treasure.”	

Table 6: Negative Comments Made During Game Play

Game Title	Typical playing participants’ negative and disengaged verbal reactions to the games		
	Graphics and Sound	Events and Actions in Game Play	General Interest
Tetris		“Holy Toledo!” (in regards to the seemingly complex nature of the game)	

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Wheel of Fortune	“The visuals are repetitive”	“I don’t understand how the theme has anything to do with this puzzle.” “Oh dear!” (daunted by having the select letters one-by-one to solve the puzzle) “Too many things to think in this one. That’s why I like Tetris.”	“I think this is a stupid game, if it can make money, it’s a crime.” “This is all very fun, but I would not care to play it again.”
Tiger Woods PGA Tour			“I’m not the least bit interested.” “There’s other things I’d rather do [than play this game].”
Grand Theft Auto 3	“This is too real for me.”		“Before I became frustrated, it was a good game.”
Ecco the Dolphin			“This doesn’t compare to car theft – it’s no fun.” (referring to her previous play with Grand Theft Auto 3) “Is this fun for the feeble minded?”

Overall, participants’ comments during the PowerPoint presentation, the selection processes, and the game play sessions seemed to indicate their enjoyment of the challenge and engaging qualities of the selected video games. Some participants were frustrated by confusing game play features and complex controls, and a few did not find any of games interesting. However, nearly all (91%) of the participants made at least one positive comment about a particular game or their engagement with a particular game.

Summary and Discussion

Many participants had no prior experience with video games before the focus group sessions of this study. In addition, they tended to associate video games with youth and violence. Few had a prior interest in playing video games. Despite these negative preconceptions about video games, a majority of participants indicated after the game play sessions that they would be interested in playing video games in the future.

The main motivation for selecting games was based on participants' prior knowledge or familiarity, with few participants voicing an interest in unfamiliar games. Participants' suggestions for future game content reaffirmed the pattern of familiarity; they mentioned an interest in sports games, card games, and games with historical content. Many of the games suggested already exist on the market and are currently available for various video game consoles.

To appeal specifically to an elderly audience, existing games may need some modifications. Particular aspects of the games caused confusion with some of the participants. While most participants were able to familiarize themselves with the controller and controls in a short period of time, many of them either mentioned or exhibited problems during play. Modifications to the sensitivity of controls or simplifying complex tasks such as inputting text could help alleviate some of these frustrations. Physical changes to the controller might also be needed; for instance, participants suggested a larger joystick. However, some participants remarked that they would have become more comfortable with the controller and controls if they were allowed more time with the games. In the course of each session, participants were presented with directions for each game and individual assistance. This on-demand support helped participants to acclimate to the controls of the games, alleviating potential confusion and frustration. While there are some scaffolds in place for learning various video games, ideally there would be greater support built into the games to help guide inexperienced players both in learning the controls and guiding them through game play. The precise adaptations or modifications that would best accommodate this demographic are beyond the purview of this study; future study could help to determine exactly what changes to the controls or the controller would be most helpful for those over the age of 65.

The participants in this study shared a strong background in their use of technology; 82% used a computer on a weekly basis, and a majority of participants indicated a general interest in technology. These characteristics represent a potential for adopting other technologies, such as video games. The appeal of the video games in this study varied by participant; some remarked they enjoyed the games as "mindless" entertainment, while others expressed the benefits of using the game to "stimulate" their minds. Some participants also hoped to use video games as a medium for educational and informational content. In total, 64% of the participants showed interest in playing video games again in the future. However, cost appeared to be a deterrent to participants' willingness to invest in video game technologies. Further analysis of this demographic group's discretionary spending patterns would clarify what the elderly may be willing to spend for this type of entertainment.

This study demonstrates that video games have a strong appeal to elderly adults. This paper highlights the key areas that caused this population to experience frustration with video game technology. It also highlights their enthusiasm and enjoyment of game play. However, additional research is needed to explore the following:

- Modifications to the controls and controllers that might make game use easier;
- The types of educational content that might appeal to elderly audiences;
- How the long-term effects of game play serve the cognitive skills, creative skills, and motor functions of the elderly; and

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- The elderly response to communities surrounding interactive game technologies, such as online gaming communities.

Ideally, researchers and video game developers can work together with the strengths and weaknesses of the medium and to ultimately better serve an elderly population on the rise.

Appendices

Appendix A: Questionnaire

Screening Questions:

1. How old are you?
2. What is your Gender?
3. Do you have any conditions that may prevent you from doing an activity such as dialing a telephone or using a television remote control?
4. Do you have any problems with your vision that prevent you from doing an activity such as reading or watching television?

Pre-Play Questionnaire:

1. Do you enjoy playing games? YES NO (If so, what games?)
2. What other leisure activities do you commonly engage in?
3. Rate how comfortable you are using technology on the following scale?

1	2	3	4	5
Very uncomfortable	Somewhat uncomfortable	Neutral	Somewhat comfortable	Very comfortable

4. Rate how interested you are in technology, on the following scale?

1	2	3	4	5
Not at all interested	Somewhat uninterested	Neutral	Somewhat interested	Very interested

5. Which of the following do you use on a weekly basis: Computer, Television with Remote, VCR, Radio, Video Game Console? What do you use them for?
6. When you hear the term “video games”, what thoughts and images come to mind?

Post-Play Questionnaire:

1. Rate how much you liked each of the video games that you played on a scale from 1 to 5. Why did you rate them this way?

1	2	3	4	5
Disliked Very Much	Somewhat Disliked	Neutral	Somewhat Liked	Liked Very Much

2. What did you like most about the video games?
3. What did you like least about the video games?
4. Why did you choose the games you played today?
5. Are there any games that you didn't get a chance to play today that you would have liked to play? If yes, why?
6. Were there any games that you really wouldn't have wanted to play? Why?
7. Was there anything you found particularly difficult or easy about the video games?
8. What would you suggest to the designers of these video games that would make them more appealing?
9. Do you have any suggestions or ideas for other types of video games or content that you would be interested in playing?
10. Now that you have played these video games, please rate how interested or uninterested would you be in playing video games again?

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1	2	3	4	5
Not at all interested	Somewhat uninterested	Neutral	Somewhat interested	Very interested

11. Research has shown that video games can increase both cognitive function and motor skills. Knowing this, please rate how likely would you be to play video games in the future?

1	2	3	4	5
Not at all Likely	Somewhat Unlikely	Neutral	Somewhat likely	Very likely

Appendix B: Description of Video Games Used

The games used in this study were chosen because they were representative of different genres of available video games. Tetris is a timed, abstract puzzle game which has been used in past studies by other researchers. Wheel of Fortune is a word game that is based on a popular television game show and involves solving word puzzles. Tiger Woods PGA Tour is a golf game that incorporates golf celebrities and existing golf courses. Grand Theft Auto 3 is an adventure game that incorporates driving and exploration of a simulated city where the user assumes the role of an escaped criminal. Ecco the Dolphin is an adventure and exploration game that allows the user to navigate a dolphin character through a three-dimensional, underwater world.

Appendix C: Outline of Slides Used to Introduce Format, Games, and Controls

Thank you for your participation!

Harvard University Graduate School of Education:
Video Game Evaluation

This Presentation...

- Assumes that you are completely unfamiliar with this type of entertainment
- May seem complicated at first, but I will walk you through every step
- PLEASE ask questions!

What is a Video Game?

- Electronic
- Interactive Entertainment
- Involves a display, like a television screen or computer monitor
- Operates on a computer, home console, or in a video game arcade
- Average age of a person who plays video games is 24-years-old, but people of all age groups play

What is a Video Game?

- Many types of video games, spanning various genres
- The player controls one or many elements of the game
- Challenging goals

What We Will Use

- Home console
- Consoles play many games, purchased separately
- Playstation 2 - Sony

Playstation 2

- Machine that runs the games, connected to a television

Playstation 2 Controller

- Joysticks
- Shape Buttons
- Side Buttons

Games We Can Play

- Tetris
- Wheel of Fortune
- Tiger Woods' PGA Tour Golf
- Grand Theft Auto 3
- Ecco The Dolphin

Tetris

- Puzzle game where the player must arrange falling blocks of varying shapes into full lines of blocks. When a line is completed, it disappears. The goal is to complete as many lines as possible.

Wheel of Fortune

- Based on the popular gameshow, the player must attempt to complete the phrases to win virtual money and prizes. More than one player can participate in this game.

Tiger Woods PGA Tour Golf

- The player assumes the identity of the famous golf player, Tiger Woods. The goal is to play a fun round of golf on your choice of golf courses. More than one player can participate in this game.

Grand Theft Auto 3

- The player takes on the role of a violent career criminal. The players need to explore a busy city in stolen cars and run a variety of errands for gangsters.

Ecco the Dolphin

- In this game, the player assumes the role of a dolphin character named Ecco who must save the Earth. The player explores an undersea world to solve puzzles and fight dangerous sea creatures.

Games Review

- Tetris
 - Puzzle game, create lines
- Wheel of Fortune
 - Like popular game show, solve word puzzles
- Tiger Woods' PGA Tour Golf
 - Features famous golfer, play golf
- Grand Theft Auto 3
 - Play as a criminal, run errands for gangsters
- Ecco The Dolphin
 - Play as a dolphin, fight dangerous creatures

Tetris Briefing

- Goal is to score as many points as possible, and stay in the game as long as possible
- To score, try to form a horizontal line of the falling blocks. Each complete line will disappear from the chamber, making room for more blocks. Points are awarded for clearing horizontal lines, and bonus points for clearing several lines at a time. If the blocks reach the top, the game is over.
- Left and Right Directional buttons move falling blocks
- Down Directional button moves blocks down faster
- X button - rotates blocks counter-clockwise
- button - rotates blocks clockwise

Wheel of Fortune Briefing

- Goal is to win virtual money and prizes by playing the classic game show, Wheel of Fortune
- All the features of the game have prompts, with the corresponding controller button symbol underneath.
- After spinning, to select a letter: use the directional buttons, select your letter, and press X to confirm selection.

Tiger Woods Golf Briefing

- Goal is to play a virtual game of golf, with the best score possible.
- Swing
 - Target arrow (yellow) - O button zooms in

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- Directional aims target
- Birds eye view of hole with R1
- Change clubs with L2 and R2, but game starts you with a standard club for given conditions
- Pull back joystick, push forward - Left power bar
- Putting
 - Directional buttons aim
 - Move target to compensate for slope of green
 - X exaggerates slope, shows topography of putting green

Grand Theft Auto 3 Briefing

- Goal is to explore city and run missions for mafia criminals. The game starts with you having recently escaped from a van headed to place you in jail. Police will be after you if they see you commit too many crimes.
- On Foot
 - Walk with the left joystick
 - Jumps
 - enters a car
 - fights
- In Car
 - Drive with the left joystick
 - X accelerates
 - brakes
 - exits car

Ecco the Dolphin Briefing

- The goal is to explore the undersea world in search of missions to help various creatures in need of assistance.
- As Ecco the dolphin, you swim through the water.
- Turn in the direction you want to look by using the left joystick - up/down reversed
- Accelerating and Swimming: Press X repeatedly to make Ecco swim faster
- Charging can be used as a weapon to attack sharks, eat fish, or move a bit faster. Charge by pressing O
- Communicate by point your nose at another creature and pressing
- Realign the camera by pressing
- Look: Left Joystick
- Swim: X
- Charge: O
- Communicate:
- Realign the camera:

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