

Intelligence and video games: Attention theory

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ABSTRACT

The study aims to explore the perceived relationship between video games and intelligence among the selected individuals. The study uses of the video game "BRAIN AGE" as one of the tools of the research. At the end of the study, the collected responses of the informants show that video games can slightly contribute to mental development and a new theory was developed the "Dublin Game Attention theory" that as a person grows older, his time to attention span for playing video games becomes more shorter but does not necessarily reflect a loss of interest in the gaming hobby.

Keywords: *Video Games, Intelligence*

I. INTRODUCTION

In our generation, with the advent of computers, tablets and android phones, children are exposed to various video games. Video games are everywhere from Angry Bird, Flappy Bird and Plants vs Zombies. Even Casual Gamers, those who do not play, frequently are lulled into the idea of playing for the very first time. With all these modern video devices, parents are bent on labeling them as distractions, wherefore can one find the answers and turn to for help? There have been various researches on the effects of video games to the youth but rarely do they use an actual video game as one tools for testing. Different video games affect brain activity (Gentile, 2009) through playing First Person Games reduces brain activity but playing puzzle game increases brain activity. Douglas (July, 2009) supports the brain age principle but does brain activity really denote an increase in intelligence? The naval army funded study supports the relationship between video games and intelligence (Perez, 2010):

"We have discovered that video game players perform 10 to 20 percent higher in terms of perceptual and cognitive ability than normal people that are non-game players,"

BBC "Brain training experiment" (Fernandez, 2009) on the cognitive effects of video games which shows a favorable result on the effects of gaming actually contradict at least three other researches thus in essence the article recommended more researches are needed for the topic. Among the problem study noted was the length of time as much studies often used longer play time as a basis for brain effect; no study showed how a smaller and incremental play time affects actual academic performance. It is important to explore the phenomenon in the Philippine setting. *Pinoys* are gamers too and a shorter and more direct determination may show at least some perceived effects of video gaming to the academic standing of a student. Perhaps all

that time spent playing Super Mario is not after all for naught. Possibly, finding out that “the princess is in another castle” was not an exercise in futility but one that teaches patience.

II. PHILOSOPHICAL ASSUMPTION AND PARADIGMS

In most guides to making a qualitative research, one of the most basic is the creation of a philosophical assumption, paradigms and theoretical framework. Yin (2011) believes that selecting a philosophical assumption and the appropriate methodologies are tantamount to saving time and showing affection towards the disciple of research making. The study opts to use epistemology; as it allows the researcher to assume an “insider” role. By exclusion the other methods like ontology, axiology, rhetorical and methodological were considered but ultimately I decided that epistemology is more suitable as it is encapsulates the main crux of the paper.

I used the constructivist epistemology as the paradigm for the study, I as a researcher cannot have a detached appearance and cannot maintain an objective position as part of the study. The book *Qualitative Inquiry and Research design* (Creswell, 2007) defined the Social Constructivist as one who believes that each individual makes their own understanding of the world and it is their understanding that affects their perception and interpretations of their perceived relationships specially between video games and their intelligence. In the study, I am more concerned with how the informants view their perceived gains rather than the actual gain; it is in this vein of the study that I strive to show their perceptions via multiple case studies.

III. REFLEXIVITY AND RIGOR

Reflexivity Defined. It is defined “by its characteristics as careful interpretation and reflection” (Alvesson & Sköldbberg, 2009). Reflexivity is a continued process by the researcher. This means that the researcher acts

as a quasi source by selecting and interpreting the data. Hence, the researcher is just not a passive watcher but a very active participant. In it, the biases of the researcher are also made known thus, the researcher cannot just simply ignore the possibilities that the study can be affected by his perceived biases. The researcher instead opens his biases for all to see and acknowledge the relativity of truth/reality.

Official Residence. I am a resident of Cebu City Philippines and is a tenured faculty of the University of the Visayas. I have taught various social science subjects. I have a hearing impairment and is possibly one of the few empowered instructors from the aforementioned university.

Full disclosure. I, the researcher, am an avid video gamer. I had played with Pac-man as my baptism to the video gaming addiction. Even at the age of thirty-five, I still buy and collect video games much to the chagrin of my wife, who often reminds me of the increasing expenditure of having such an expensive hobby. This may explain my inherent bias to bring the matter than indeed video games makes me smarter. I have been in constant communication with a least two local gaming community one in Cebu and the other in Manila. I, the researcher, am on a personal name basis with two of the popular video game shops in the City. I am an administrator of *www.pinoyn.com* a forum dedicated to the Filipino gaming community. Finally, I also own an X-box 360 with Kinect sensor (which ironically was a wedding gift from my sister), PS vita and three Nintendo hand held machines.

I used the following tools: the interview schedule, their Brain Age game score and actual observation of their gaming habits. The Brain Age game is not actually game intended for research purposes as it was made as a series of mini games that are assumed to stimulate mental activity. Granted that the Brain Age software does not give a stratum for performance as it merely describes performance by way of images that show speed like an image of a person walking, biking, riding a

car and ultimately a jet plane. These act as the in game scores; though these scores can be cheated in some way. The defect of this tool is remedied by interpretation of their habits when playing games through actual observation. Another tool that supplants the study is the interview schedule, a guide for extracting information from informants. The first step to the study was selecting informants through purposive sampling, when then proceeded to briefing, using the brain age software, interview schedule and analyzing the culled data through coding to find common themes or schemes in the responses of the six informants. From all the six informants, I selected the majority to act as representative generalization of the their collected view points.

Nintendo's official response. The Researcher tried to acquire an official approval from Nintendo, but due to the number of request, their standard reply it is to decline such request but it is noted that under Philippine and U.S. Intellectual Property laws this research invokes the principle for the fair use policy.

II. OBJECTIVES

This study seeks to answer the following concerns

1. To discover the perceived effects of gaming to the informants intelligence;
2. To identify the gaming habit of the Informants;
3. To determine if there is any effect of gaming to the lives of informants; and
4. To contribute to an understanding of the gaming hobby for non-gamers.

III. DESIGN METHODS

This research uses multiple case studies as a method of naturalistic inquiry. Multiple studies allow the researcher to attain a vast corpus of information that will then under go rigorous analysis, interpretation, and assessment. Varied tools are also employed in this study in order to collect data to name a few: written interviews

FLOW CHART OF THE STUDY

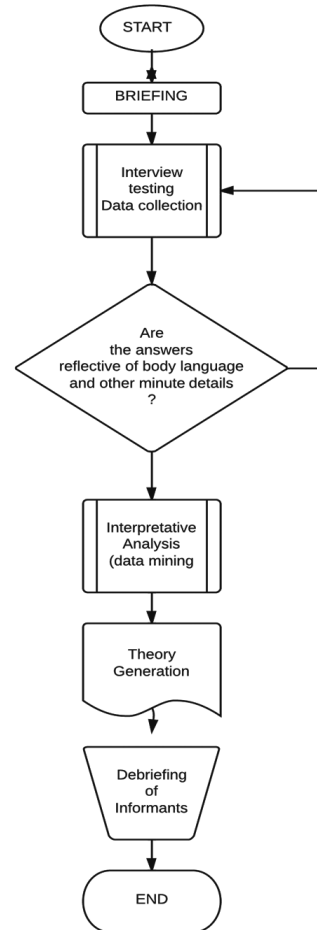


Figure 1 – Flow chart of the study

and actual interview schedules for conversations. Multiple Case Study was chosen so as to reveal a varied set of data; often you can acquired data. Yin, R.K. (2009) said “the rationale for multiple case designs derives directly from your understanding of literal and theoretical replications” (p. 59).

By naturalistic approach, the study tries to put informants in their native “habitat” with regard to the gaming hobby, since we seek to understand and explain their perceptions. What better way to do it than to observe them in their own “native” environment, by observing the informants game at their own residences or area of familiarity.

The study also tries to explain the phenomena of gaming and how they perceive its effect to informant's intelligence. They were assigned code name based on their favorite games or gaming genre to easy recall. A theory was then generated based on the gathered data. The theory was then debriefed to participants for their perusal. All culled data were treated with utmost confidentiality.

IV. PRESENTATION OF CASES AND SUMMARY OF CASES

Case No. 1 -The Call Guy

A 20-year old guy who just happens to be engrossed in video games since he was young. His answers to the questions were quite engaging as they point to specific time lines of his age. Currently, he is employed in the Business Product Out Sourcing field, and in his break time he "steals time" by checking up on his games either on android phone or a portable hand held device. How the informant does this, despite strict company policies, is best left to our imagination. He opined that he started playing video games around three to four years old, in his primary school where it was only allowed to play on weekends, coming college life he played it everyday to such point, as later to be revealed, he failed some of his minor subjects on account of excessive gaming. His choice of video games ranges from First Person Shooters (Doom) to Role playing games like final fantasy and fighting games. I noted his selections are games that are very conducive to social interaction and may explain his people relationship skills. When quizzed on his perceived causal effect of video games to his intelligence he attributed it to making who he is, his love for video games contributed to his appreciation of the art of making pixels, pixels are small dots that when lumped together will give a shape or things. He attributed the same for his engaging in the 3D art profession though I can only surmise which came first: his love for drawing stuff or his love for video games. On fifth query, I saw the glint of the informant social skills. He narrated

how he would go to his neighbors house to play video games and go to various internet shops in his place just to compete with his friends on a simulated killing game (first person perspective) that involved shooting mechanics and team cooperation. Informant was referring to a game when you play either as a terrorist or a member of a para military special force team. Informant made mention of an arcade game called "Tekken Tag", which can only be found around popular arcade hang outs in shopping malls in the city like SM Cebu and Ayala Center Cebu. He also participated in an official Tekken tag tournament. The game tekken is a fighting game where you can "tag" or swap between two characters, the game is known for its combo system that requires memorizing move sets. Generally he viewed that gaming has a positive impact on his life except that he attributed excessive gaming to his failure in a minor subject. When he was tested for brain age, gaming may have been a factor to developing intelligence, his level of intelligence is average.

Case No. 2 -Girly Gamer

The Girly Gamer attributed her gaming to her parents who exposed to the Nintendo family computer at the age of 4. She games incessantly between three to eight hours per day, she plays Role Playing Games. These games are often similar to a fictional novel in depth and in the number of readable text. Not surprisingly, her favorite genre is puzzle games. She can often be seen playing a Massive Multi-player Role Playing game like league of legends on her PC during her free time mostly in the evenings, she also owns a hand held console Nintendo 3DS, which she says "never leaves my side to most of the time." It was noted that her selections of games are those center on either a strong story driven plot themed game or a puzzle game. She considered gaming as a double edged blade: positive and negative. The former teaches her micro management, when quizzed on particular examples she cited that as a woman she must be able to do and notice

more than one single task like performing all assignments in her class. She noted that as a student, she cannot answer all of these task if these pending works all occur on the same day and with the same dead line. However, gaming taught her that one should be able to concentrate on a single task than moving on the next and proper time management was her key to micro management. She also made mention of the importance of budgeting as she preferred original game. She considered gaming as an expensive hobby one that requires constantly protecting her hard earned money so she can spend more than one hundred hours to finish a certain game. The only bane of gaming for our girly gamer is the decrease of social life. When a new game has been acquired, she rarely goes out with her friends choosing to spend her time finishing a good game and at times even playing at the crack of dawn. When given a Brain Age she scored almost perfect score. Gaming may have improved her mathematical intelligence.

Case No. 3 -The busy father

Informant three is a tad tricky to deal with as his answers were sent via e-mail and may have been busy tending to the needs of his baby. He said that he started playing video games at the age of three years old. He plays daily but cannot give actual specifics regarding his actual play time. He owns at least two hand held devices a PS VITA and a Nintendo 3DS. In his youth, his idea of a social gaming was limited only to his cousins and friends. He views gaming as a positive contribution to his mental development as his reading skill, reading comprehension and vocabulary. Although I noted that most of his responses via e-mail are often made using text-speak and at time have a grammatical error. Due to his busy nature as a father, family man and quite possibly a wage earned, he was not able to participate in the BRAIN AGE testing session. I noted his reluctance as this informant can be considered as a reluctant one.

Case No. 4 - The Gamer Historian

This particular informant is perhaps one of the most cooperative in the study often giving his opinion at certain times, to such extent that volunteering unneeded information. Exploring his responses was a chore as his responses to the interview were verbose and the length were astounding (see VII Transcript). His first exposure to video games was with arcade gaming cabinets, later to Mortal Kombat, then a fighting game. He recalled playing from 5:30 to 11:00 pm but played the whole day during weekends when he was young. Currently, his play time has decrease due to family concerns. He plays video games competitively to such extent that his cousins would rather not play with him, often avoiding his invitations for playing. He often spends time with a Real Time Strategy genre, this is a genre best described as playing with a toy soldiers with enemies moving thus when playing one needs to change tactics or plans at moments notice. Informant was also very conscious about the nature of the research as he often suggests other researches without citing proper citations. This is not to say that the informant was an obstructionist rather his enthusiasm was welcomed and considered refreshing from the rest of the informants. He attributes his "multi tasking skill" to playing video games. In fact, he says that video games made him more interested into the study of history and world war two. He considered video gaming both a positive and a negative effect. Positive for reasons stated above and negative as it leads to a corrosion of relationships between family and his love life, his girlfriend who would later become the mother of his child. I never bother asking his marital status as I considered it as of no consequence to the study. Video games also led to his poor eye sight and at often neglecting his physical needs like food and exercise due to excessive play time. Based on the Brain age software, his brain performed at par with his age, (there might be an indication of an affirmation as to the perceived

positive effects of gaming to the brain).

Case No. 5 – Mr Nice Guy

This informant is similar to case 3 as his answers were short and direct to the point, answers were delivered only via e-mail. No data were received regarding his brain age testing as he declined using the software. He considered the usage of video games as a positive experience with playing Role Playing games as his forte, he attributed gaming for making last minute decisions when driving be it to out run the other car, driving defensively and other skills such as backing to the garage. This information was culled after a post interview. In addition, Pokemon helped him in his zoology subject by helping him identify the various animals in consonance to the Pokemon designs. He played socially with the presence of a local support group that met weekly at an industrial park in the City and with his cousins.

Case No. 6 - The Pokemon Maniac

This informant is the oldest with a 32-year age, as his code implies he is a certified Pokemon addict playing on international events. He started playing around the age of seven or eight.

His favorite genres were Role Playing games

and puzzle games. He clocked his play time to “Around 5 to 8 hours on weekdays, 12 to 18 hours on weekends but modified by availability to play”. He attributed the playing of puzzle games to the development of his prefrontal cortex, a part of the brain concerned by brain activity. In his review he supported the effect of video games to his intelligence by careful and meticulous planning to damage his opponent in Pokemon games. To such extent, he even managed to memorize the damage formula made by the creator of Pokemon. Informant even volunteers this formula to the researcher.

$$\text{damage} = \left(\frac{(2 * \text{level} + 10) * \text{attack} * \text{basedamage}}{250\text{defense}} + 2 \right) * \text{modifier} * \text{stab} * \text{rand},$$

$$\text{stabbonus} \in \{1, 1.5\},$$

$$\text{modifier} \in \{0, 0.25, 0.5, 1, 2, 4\},$$

$$\text{rand} \in [0.85; 1.00]$$

Adding that video games enhance his puzzle solving skills. When we was asked to use the brain age software, the informant swears that this formula has helped him log so many wins in an official online Pokemon tournament and being an official registered Pokemon player online, he expects to be able to play with various Pokemon

Table 1.0 Summary

SUMMARY OF INFORMANT				
Informant	General play time	Perceived impact of gaming	Genre played	System owned
1	inverse proportionate to age	Mixed	Shooter, Role playing	Nintendo, Personal computer
2	3-8 hrs / day	Mixed	Role playing, Puzzle	Personal Computer, Nintendo
3	inverse proportionate to age	Positive	Action, Role playing	Sony, Nintendo, PC
4	variable to age	Mixed	Strategy games	Computer, Android, PC
5	inverse proportionate to age	Positive	Role playing	Nintendo, Personal computer
6	inverse proportionate to age	Positive	Role playing, Puzzle	Nintendo, Personal computer

players in an official Pokemon match online (March, 2014). Viewing that gaming has its ups and downs. He is positive that gaming did have a positive impact on his life citing the fact that he became an officially registered Pokemon player, and adding in jest during the post interview that the amount of information in Pokemon is more than enough to wallop anyone who calls Pokemon as child's game or even a glorified game or rock paper and scissors.

The collected data represented in Table 1.0 is not exclusive. Body languages, mannerism and the likes were included in the analysis.

V. DISCUSSION

Harrel (2010) reporting for TIME cited another study by Journal nature reporting that various brain exercises has no direct impact on the brain intelligence rather the improvement was attributable to the phenom of "practice makes perfect; based on the study theses factors: repetition and practice were attributed to such mental growth. This particular study found no relationship, leading the TIME writer to almost state the oft mentioned quote "no approved therapeutic claims". The study focused the six facets of brain reasoning like memory, non-verbal reasoning, spatial, attention and visual spatial. The participants of that particular study underwent three hours of mental activity for a six week period. Some neuro-scientist who commented on the result mentioned the number of hours spent was a too short period for brain development. On a study developed by the Institute of Development, Aging and Cancer (Kawashima, 2008) connected to the Tohoku University, Japan co-funded by the German Institute for Japanese studies showed a key to "curing" dementia or even unlocking the Alzheimer's disease. In his study, Dr. Kawashima (June, 2008) focused his study with a sample size of 32 with an average age of 82. He focused on the elderly as he believed that a brain that is not used frequently will lose its "muscles" due to age decline. Among the tools of his study were

the creative use of Magnetic Resonance Imaging for various activities like watching television, reading, or solving Sudoku puzzles, where it was found out that passive activities like watching TV does not promote circulation of blood in the prefrontal cortex of the brain whereas, solving quick math problems induced more blood flow to the brain. At the end of the study, Dr. Kawashima (June, 2008) developed a set of brain training game which were picked up by the Nintendo and was further developed into a handheld game. This tool was later used in 700 nursing homes and 56 in Japan. The end result was astounding as there was an improved cognitive function among the elderly. It seemed that dementia can be fought based on his studies.

It would seem that Dr. Kawashima's finding is akin to a midnight sensation or a newly-discovered talent over YouTube but his research was not without criticism. Japan was noted as a country with a very high life expectancy where people can live more than 80 years old. It was believed that this is attributable to the diet of the Japanese hugely consisting of soy beans, fish and tofu. Some say that the study may not be repeatable as other countries have a low life expectancy. Another criticism on his study is the development of "Faux theories" which are aimed to vertically increase the sales of his brain training soft wares; his peers in the neuroscience world, those outside of Japan, would mock his ideas as if he was selling a herbal medicine. The lack of scientific research on video games, brain exercise in relation dementia is a new research topic. Reeling from a seeming "over night success" Dr. Kawashima (June, 2009) is afraid that his study will be scrutinized with an over bearing eyes from the academic and scientific community. Another criticism was the selection of tools used. It would seem overkill to use an expensive tool like a Magnetic Resonance Imaging just to determine blood flow to the brain, does a higher blood flow really mean better brain activity? Isn't blood flow attributable to anxiety specially in older people?

VI. FINDINGS, CONCLUSION AND THEORY GENERATION

The study shows that video game may slightly affect brain development in relation to their speed or mastery of solving random math problems as generated by Nintendo's Brain age software. The culled result cannot give a cohesive representation of their answers. Informants perceive gain on their intelligence was slightly contributed by video games. Still, their responses were enough to say that the gaming community was indeed alive in the Philippine culture. In the study, I can see the following categories of importance: income earning capacities, time investment on the hobbies, and the age of informants. These factors are related to the theory generation since they will be playing an important part in the proposition making. From the culled data, I can surmise the following propositions, to wit:

Proposition No. 1

At the childhood stage, the parents are the number one buyers of video games. This is attributable to the fact that the children do not have income generating capacity. Thus, their free time is used entirely for playing games. Hence, the parents play a crucial role in the development of the interest of their child when it comes to gaming. Parents should be more proactive in choosing the game for their child. A study in the Economic Journal by Hao, Hotz & Jin (2008) showed that parents act as a model for their child further stating that the various factors, like economic models and emergence of birth control methods to control the growth of the family, degrade the prevalence of the "spoiled brat" syndrome where the influence of parents decreases but is still a factor in the selection of the gaming habits of the child. Narine & Grimes (2009) also identified the contributions of Hollywood movies and video games to the perception of as a violent delinquent, hardly a stereotype that can be attributed to gaming thus the need for guidance of the parents when it comes to video games.

Assuming parents decide on the gaming

purchases of the child it leads to the second proposition that shows the growth of a person from childhood to adolescence stage.

Proposition No. 2

Upon reaching the age of employment, those who played video games continue to do so. This proposition is supported by the number of informants who admitted to playing video games at a young age but still continuing to play video games. In a study taken from the Psychology Marketing Journal (Niu, Chiang, & Tsai, 2012), they were able to identify the factors that decide the decision making process of an Otaku, an Otaku is a sub-genre of the Japanese culture wherein an adolescent would purchase games, anime and manga based on anime franchises. These factors further are the willingness of their respondents to invest time and emotional investment to participate in the series or franchise. In the Human Communication Journal (Scharrer & Leone, 2008), it was identified that rules set by parents as a deciding factor on the positive perception of the teenagers towards self and others; various factors were also indicated but what made the study engaging is the use of varied games of different ratings by the Electronic and Software Rating Board of America.

By these, I have established the proposition as that as the child grows the hobby continues. As the saying goes: "You can take the child out of gaming, but you cannot take the gaming out of the child".

Proposition No. 3

The prevalence of the other modes of piracy such as burning and ISO burning are not considered in the development of the theory, as it is a negative factor that hurts the gaming industry as a whole. From the Journal of World Intellectual Property (Kariithi, 2011), it was postulated that the absence of the usage of Critical theory on the subject of piracy contributed to a myopic causal relationship between piracy and gaming, it further criticizes the British Government Body: The Business Software Alliance for using unjustified application of previously published

data pertaining to piracy. From the Journal of Communication (Ki, Chang, & Khang, 2006), a study was presented identifying the factors that contribute to music piracy, factors like earning capacity, income level and market size.

Finally, from the Business Ethics Journal (Lau, 2003) showed a shocking revelation that in 2001 the piracy rate at the Asia-Pacific region was at a sky high of 54 %. Showing that half of the software used in business establishment as well as that of educational institutions was found to stolen or pirated software thus establishing a huge loss of profit for the software industry.

The Emergent Theory. This study shows the emergence of a new theory “Dublin Game Attention Theory”. In this new theory, it is posited that as a person grows older his time to play video games is often inversely proportional to his age that as he grows older his attention span to play video games is affected by a plethora of factors like family life, work, and school.

$$K \propto I^{-1}$$

Where:

K = Chronological age

I = Interest in gaming

The Attention Theory

Conditions. The following are the identified conditions for the existence of the attention theory. The subject must have maintained a group of friends who shares his gaming hobby. The parents of the subject has inculcated a love and appreciation of technology. The third condition is that a person must have the means to sustain the hobby thus gamers who pirate may not be inclusive of the attention theory.

Impact of the theory. The stated theory explains a wide range of behavior in relation to the gaming hobby. It explains the propensity of children to play video game although they may not have the drive to actually finish the game. The theory also explains the emergence of video

game collectors who buy games left and right but hardly have any time to finish the actual game. Furthermore, it explains that gaming as hobby as a social element, although it can be said that gaming is an individual experience; still it explains the existence of various gaming online fora and threads for the bragging rights on the discovery of cheats, codes and other secrets that a game may have.

The study hopes that another more in depth study can be performed using a much wider variety of samples and a longer time frame for a more cohesive output for theory generation, testing and application of the theory generated.

Originality Index:	100 %
Similarity Index:	0 %
Paper ID:	412967624
Grammarly:	Checked

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