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Examining Video Game Immersion as a Flow State

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ABSTRACT

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The cultural role of (video) games in society

Since their invasion of popular culture in the early eighties, video games have captivated, entertained and enthralled hundreds of millions of individuals. Yet the nature of human interaction with these magically beeping boxes has remained somewhat of an enigma. From the religious devotion of Pacman mavens to the Zen-like trance state Tetris aficionados enter, the video game offers an incredibly sustaining world of psychological interaction, unlike other forms of 'presentational' entertainment.

Across the centuries, games have been an integral part of the development of human culture (Csikszentmihalyi, 2000; Chick & Barnett, 1995; Loy & Kenyon, 1981;Piaget, 1951). Participating in games has traditionally been used to teach developing individuals about social systems in a relatively consequence-free fantasy environment. Although in its more negative forms, fantasy immersion can be used to dissociate entirely from daily life, games offer situations where mistakes can be repeated ad infinitum, until errors are perfected.

A conceptual model of a 'virtual' reality emerges which Schrodinger's cat would appreciate. Should a game provide them, all possible paths can be examined and re-played. In the Newtonian-Cartesian world model it is the distance between the world we anticipate and the world we experience which causes regret and suffering (Kahneman & Tversky, 1982). Yet suffering need not be prolonged in the video game realm.

In a driving video game one has just hurtled over a mountain side curve as a result of one's own (seemingly careless) error. The difference between success and failure at this task can be as simple as restarting the round and making the turn successfully. Video games have a tolerance for error professional rally racers could only dream of. Conversely, the amount of challenge and consequence can be amplified in a game to be greater than that of the real world. This capability creates a deeper sense of immersion, despite the relatively limited extent of control and frame of interaction (joystick/screen vs. actual racing car and mountainscape).

It would be naive to assert that video games do not create some form of emotional state in their players. Unfortunately, this state has been stereotyped by the non-game playing public as 'zombification', where players become desensitized automata performing repetitive acts of 'mindless violence'. This study chooses not to directly address the issue of video game violence (see Anderson & Dill, 1999 and Greenfield & Cocking, 1996 for in-depth analyses of this subject) other than to assert that games can be a very valid form of catharsis (Emes, 1997). Catharsis not only on an individual level, but more broadly as social parody or zeitgeist reflection. For example, Pacman as a symbol of the 1980's rampant consumersim or Missile Command as empowerment-play defense against the past horror of impending nuclear war (Rogers, 1982). More than likely, these are co-incidental political or social parallels. But, games, movies and literature eventually come to define eras, and in so doing provide 'insight' into the mentality of that culture for future generations. Roberts, Arth & Bush (1959) assert that games are used as non-threatening ways to enact the present conflicts of that culture. Perhaps violent, sexist video games are the social fallout of a military government without any wars to fight coupled by the Hollywood 'Baywatch factory' that dictates the desires of the populace.

Industry / Market

Despite their often ridiculous content, video games are very serious business. Nintendo was considered at one point to be a threat to American national security due to its status as a prominent Japanese electronics firm with control over the eyeballs of America's children. In the mid-nineties Sonic the Hedgehog (a once popular game character) had higher recognition among world children than Mickey Mouse. The world market has purchased 61.7 Million Nintendo Entertainment Systems, 48.36 Million Super Nintendo Entertainment Systems (377 million games), 100 Million GameBoys (300 million games), and 72 Million Sony PlayStations (630 million games)(Famitsu, 2000). Although home video game console sales alone would seem to be evidence enough of the financial power the game industry represents, the game hardware itself is customarily sold at a loss to encourage the purchase of software, the more profitable half of the business.

Currently, one in every four US households has a PlayStation. In 1999, sales of PlayStation game console software titles outsold the top five U.S. domestic grossing movies. In other words, PlayStation games made more money than *Star Wars Episode I*, *The Sixth Sense*, *Toy Story 2*, *Austin Powers: The Spy Who Shagged Me* and *The Matrix* – combined (Sony, 2000). After winning the internet web browser wars, Microsoft is now committing to a $500 million dollar promotion of their new PC-based game console - the X-box, as it advances on the next market paradigm.

Video games, are presently a multibillion dollar industry. The average commercial game has a two million dollar budget and a two year window to develop and publish before it is

rendered obsolete. As a result, game design is very heavily determined by what will sell in large volumes. Unfortunately, this has lead to specific stratification into defined, marketable, game genre and content. We are just now passing through a phase where violent content, über-pneumatic women and pretty explosions are too frequently the solitary selling points.

Yet, to assume that these are the only kinds of games is tantamount to assuming that Rambo is the only kind of movie character. The gamut of game genres [with current examples as of this writing chosen by popularity & quality] presently spans; Sport [NFL 2K, NBA 2K], One-on-One Fighting [Dead-or-Alive 2, Tekken Tournament], Puzzle [Tetrisphere, Chu-Chu Rocket], 1st-person Shooter [Quake 3 Arena, Half-Life], Driving [Grand Turismo 2, Crazy Taxi], Adventure [Grim Fandango, Riven], Real-Time War Simulation (RTS) [Command & Conquer, Starcraft], Role Playing (RPG)[Final Fantasy IIX, Zelda: Ocenaria of Time], Simulation [The Sims, Theme Park], and the platform adventure [SuperMario64, Crash Bandicoot] which this study used. Should one acquaint oneself with all of the aforementioned games, one would then begin to be in a position to formulate opinions about the nature and scope of popular video games.

Mortal Kombat (One-on-One Fighting), and Doom or Marathon (1st-Person Shooters), which are often trotted out as examples of violent video games, are not mentioned because are they no longer accurate representations of their respective domains. It would not be reasonable at all to even compare these games to the graphical realism of the present generation of console games. In an era where each new game must up the ante in graphical realism as well as (hopefully) innovative gameplay, last months blockbuster is often this months bargain-bin special, and therefore no longer 'cool' or worthy of playing. In a form of ironic justice, Mortal

Kombat's rampant fad-like popularity contributed to it's demise as it outgrew the spin-off capability of it's simple game narrative. It is rather the games which offer a consistent narrative worldspace, rather than merely a consistent linear narrative path, that prove to be timeless, motivational 'classics', e.g. the Super Mario series.

As the population who grew up playing video games continues to play, the age range of the gaming consumer has shifted upwards, heralding the present market offerings. Coincidently, the game industry is also maturing. Through the electronic software ratings board (ESRB, 1997) the industry has adopted a ratings system which parallels film ratings [Early childhood(3+), Everyone(6+), Teen(13+), Mature (17+) and Adults Only(18+)]. The market is no longer comprised solely of pre-adolescent male youth and the games reflect this.

Aside from the financial obligations of Moore's Law (which states that computer processing power will double every 18 months) (Schaller,1996), video games drive the progress of the personal computer market to a large degree. The only rational reason for consumers to purchase the speeds of average computers sold today [600 Mhz, Pentium Three] is for running games (word processing, spreadsheets and the Internet require much less computing horsepower).

The present round of game consoles surpass (Playstation2, StarCube) or equal (Dreamcast, Xbox) PC performance. Console systems are now becoming capable of displaying entire game world cities in perfect detail, from individual bricks on the street to a satellite view from space. Games may also incorporate accurate physics, weather, and an indigenous semi-

intelligent populace for the player to interact with. Still, there is little explanation why these environments (even when as simple as Pacman) are so compelling.

Play

The changing attitude towards the appropriate upper limit age to be playing video games is closely tied to the reluctance of adults to be seen engaging in any form of activity which could be considered play. Play is an activity associated with children and being frivolous. Although it is instrumental in learning and development, it is still seen as an inappropriate activity for adults (Provost, 1990). However, adults engage in what they linguistically term as playing games, e.g. sport, board games and cards, and although they receive great gratification from the task (Csikszentmihalyi, 1990), it would be anathema to suggest that they are at play. What then is play as concerned for adults ?

Reiber (1996) considers play to have the following four attributes: 1) it is usually voluntary; 2) it is intrinsically motivating, that is, it is pleasurable for its own sake and is not dependent on external rewards; 3) it involves some level of active, often physical, engagement; and 4) it is distinct from other behavior by having a make-believe quality.

Yet play is often difficult, and should no longer be considered the polar opposite of work - instead consider the dualities of play/not-play vs. work/leisure (Blanchard & Cheska, 1985). Nor is play necessarily always benign or voluntary e.g. bullying and peer pressure respectively (Smith, 1985).

More importantly, the (cognitive) effects of play are less evident in short term observation scenarios, but manifest as long-term intellectual and social growth (see Glickman,1984; Singer,1995). This would suggest that the long term effects of playing video games are more important than temporary ones. However, it is the quality of the temporary experiences which will determine the nature of the long-term experiences.

Video games map nearly directly onto all four attributes of play, with the possible exception of physical involvement. If motility is the defining characteristic of physical engagement, then there is a disparity from this definition of play. However, video games can cause considerable physiological stimulation, arguably more than a game of chess.

As an activity video games also map onto the four themes of play (Pellegrini, 1995) a) progression - finishing the levels of the game b) power - having characteristics which you do not possess in the real world, and using them to manipulate your environment c) fantasy - computer simulation games being marginal exceptions and finally d) as self - or rather an avatar or alter-ego.

Motivation

Video game play is an activity which lies in the domain of intrinsic (White, 1959) motivation. Intrinsic motivation tends to decline in relation to extrinsic rewards such as financial re-compensation. With a few exceptions, there are presently no extrinsic rewards for video game playing. Gamers are encouraged to self-teach the game system through incorporating challenge,

curiosity, fantasy & control, four key contributing factors to intrinsic learning (Lepper & Malone, 1987).

Once the rules of the game are established, there is little room for external influences to affect a players performance. Each game can be considered a controlled environment where, if the rules are adhered to, mastery and success is assured. McCelland (1985) found that high achievers prefer personal effort over randomness to determine their success. In the 'perfect' game world there is no other measure. Finally, if life satisfaction is co-relational with an intrinsically motivated job (Graef ,Csikszentmihalyi, & Gianinno, 1983) then intrinsic pursuits in general are important in increasing life quality and enjoyment.

The Yerkes-Dodson Law (Yerkes &Dodson, 1908) states that organisms will perform optimally when the environment provides a medium level of arousal. Video games would not seem to fit this model as the majority extol sensual overload. Broadhurst (1957) found that repetitive and simple tasks are completed most efficiently at high levels of arousal. Inversely, complex tasks are best accomplished at low levels of arousal. However, the present generation of video games, although highly arousing, are also highly complex in response to consumer's rising expectations of the possibility of the medium.

Given that video games provide some form of emotional/physiological high, opponent-process theory also offers a motivational perspective. If the initial game playing experience is one of over-stimulation and arousal, then the game will 'need' to be re-played to re-create that sensation. The gamer will need to play for increasingly longer periods of time at higher levels of difficulty, to compensate for the game's declining capability to stimulate.

Reconsidering the first generation of video games (Pacman et al.), an additional perspective behind video game play motivation emerges. Loftus & Loftus (1983) noted that the video game is a very good auto-conditioner. In their model, games offer partial reinforcement with a rapid resilience to extinction. To explain further, regular success at an arcade game would offer little challenge and allow the game to be finished quite easily. However, arcade games are seldom easy and quickly ramp up in difficulty as one progresses. Reinforcement comes in several stages and methods; a pleasant sound when a quarter is inserted, free lives (which only encourage further play) as well as a high frequency and magnitude of reinforcement, e.g. high scores and movie-in-game scenes as rewards for completing levels. Finally, as there is little delay between the stimulus and the feedback (joystick-control to screen) the strength of the conditioning is stronger than other methods in a similar amount of time.

As a word of caution, these observations are still applicable to many arcade games, whose purpose is to collect change, but console video games are many orders of magnitude more complex than Pacman or Space Invaders which fit the conditioning model quite well. The average home game, would fit a pure conditioning model less so.

Flow

Csikszentmihalyi's theory of flow is best described as a "…state in which people are so involved in an activity that nothing else seems to matter; the experience is so enjoyable that people will do it even at great cost, for the sheer sake of doing it." (Csikszentmihalyi, 1990).

From Chart One, flow can be seen as the perfect interplay between ones skill and the difficulty of the task at hand, when balanced, in an ever increasing linear relation.

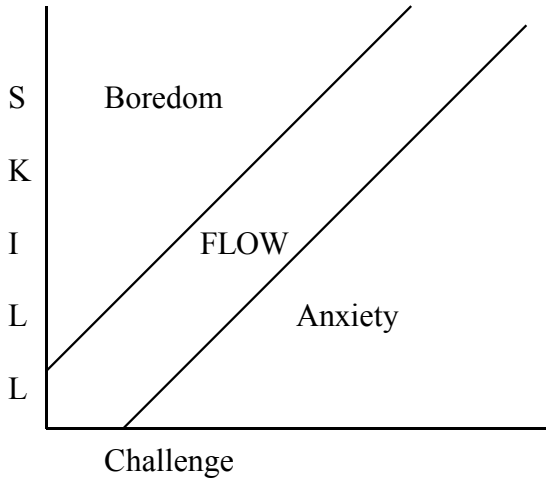

Figure 1. Skill vs. Challenge

Flow is not merely passive, but instead demands a proportional effort relative to the challenge or difficulty of the task at hand. If too much effort or mastery is exerted then boredom ensues. Inversely, if the task is too hard, a state of anxiety will result. However, like play, flow can also have negative facets, individuals can become addicted to the flow state and seek it through such venues as gambling or increasingly life endangering extreme sports.

Recently, flow has emerged as being an integral component for happiness and life satisfaction (Csikszentmihalyi, 1999). There are seven factors which contribute to flow, paraphrased in table one from the perspective of video games.

Table 1

Criteria for Games to Generate Flow

1)	Task is completable by the player
2)	Player is able to concentrate on task
3)	There are clear goal(s) for the player to accomplish
4)	There is immediate feedback for action
5)	Deep involvement, resulting in a 'no-self' experience
6)	Player experiences a sense of control over their own action(s)
7)	Self Concern disappears

Simply by reading through the list, it is evident that video games can provide many of the criteria to cultivate flow. This is, of course, with the a priori assumption that the game affords the possibility of achieving all of the criteria. Given that a game could incorporate all seven factors while exhibiting a limited range of control over their emergence, video games are particularly suited to outstrip similar real world situations in providing a flow environment.

Returning to Figure one, when beginning a video game, individuals may not begin with a zero flow score. Rather, they might start with a relatively low or skewed ratio of skill to challenge. Following this rational, after an accustomization period, the ratio should equalize over time and flow will gradually increases in a homeostatic positive feedback loop, until the challenge either becomes too great or the individuals skill outpaces the challenges the game can offer. A third possibility would be if the game was either a) exactly matched to an individual's skill (through game design testing or chance) or b)the game adjusted itself during play to the

challenge that player was accomplishing, especially in the case of the latter, flow could be extended near indefinitely. The most likely circumstance is that any game play period is composed of all of the above possibilities.

This study intends to show that in video game experiences a level of interaction described as flow is a viably expected outcome. In addition, flow will increase over time for a period of forty minutes until it eventually plateaus.

Method

Participants

The study was conducted on twenty-two students (M=10, F=12) enrolled in the first year psychology course at Brock University. Their age ranged from 18-27. All participants were novice gamers. A novice gamer is defined for the purpose of this study as having played at least one video game before, but play video games less than once a month. The second requirement was no past history of epilepsy, in the interest of the participants safety.

Materials

Each of two testing rooms had a Playstation game console with an analog controller, a copy of Crash Bandicoot 2, and 9” television monitors.

Design

To ascertain the level of involvement of video game experience, a modified version of Csikszentmihalyi's Experience Sampling Method (ESM) termed the Video Experience Sampling Method (VESM)(Appendix D) was utilized. After receiving instructions, pairs (one of each gender) of participants independently played the video game Crash Bandicoot 2, and completed a copy of the VESM questionnaire (Appendix D) every six minutes for an hour and a half. A six

minute interval was selected after pilot tests to determine how frequently the player could be interrupted without compromising the game experience. At the conclusion of the game period a series of questions (Appendix E) were asked to refine the understanding of their impression of the nature of video games.

Procedure

Upon meeting the subjects at the lab it was explained that the experiment was voluntary and they could leave at any time without repercussion. It was also explained that the game play was in no way a competition between the two participants. The basic game controls were demonstrated, as was how to fill out a sample VESM. The same instructions were then presented in the adjacent cubicle. Play was then initiated at which time the hour and a half timed session began.

Every six minutes, participants were instructed to pause the game and fill out a VESM scale. Once the scale was complete, they were to unpause the game and resume play. At the conclusion of the gameplay period participants then answered seven questions (Appendix F) about the nature of the experience and their opinion of it.

Results / Discussion

The VESM is composed of a) whether they were thinking about what they were doing and b) nine variables from the ESM; Depth of Concentration(DC), Hard to Concentrate(HC), Self-Consciousness(SC), Control of their Actions(CA), Challenge(CH), Skill(SK), Wish Doing Something Else(WE), Something at Stake in the Activity(ST), and Success (SU).

Before any calculation could be run, the fifteen time samples per subject had to be compressed into five samples of three (per variable, per person) as there was insufficient degrees of freedom to calculate any statistics on twenty-two subjects, given the high volume of data, when running a factor analysis. The time blocks are as follows : T1=0-18 min., T2=19-36 min., T3=37-54 min., T4=55-72 min., T5=73-90 min.

Flow is customarily measured over the span of a day, with each variable maintaining independence. In the efforts of expediency, the nine chosen variables DC,HC,SC,CA,CH,SK,WE,ST,SU were attempted to be summed into a total flow score. A co-variance matrix was generated for each of the nine variables, to see if they could be combined into a cumulative flow score. However, with over 50 rotations, the factor analysis failed to extract the expected four factors. Reliability was less than 0.4 for all variables. Ideally, one of the factors would have been a combination of skill and challenge, but this was not found.

Along the same line of logic a flow ratio was then calculated where the variable Skill was divided by variable Challenge. This ratio became the tenth variable. Repeated Measures analysis of each of the variables across the five blocks of time showed the following.

Per Variable Factor Analysis (Within T1-T5 per variable)

Hard to Concentrate (HC), p=.02, .026, df=1 * Figure Four

Challenge (CH), p=.003, df=1 * Figure Seven

Skill (SK), p=.049, df=1 * Figure Eight

Something at Stake in the Activity (ST), p=.007, df=1 * Chart Four

All other variables & the calculated variable ratio, showed no significant difference over time. A cumulative Chart of all variables is presented below.

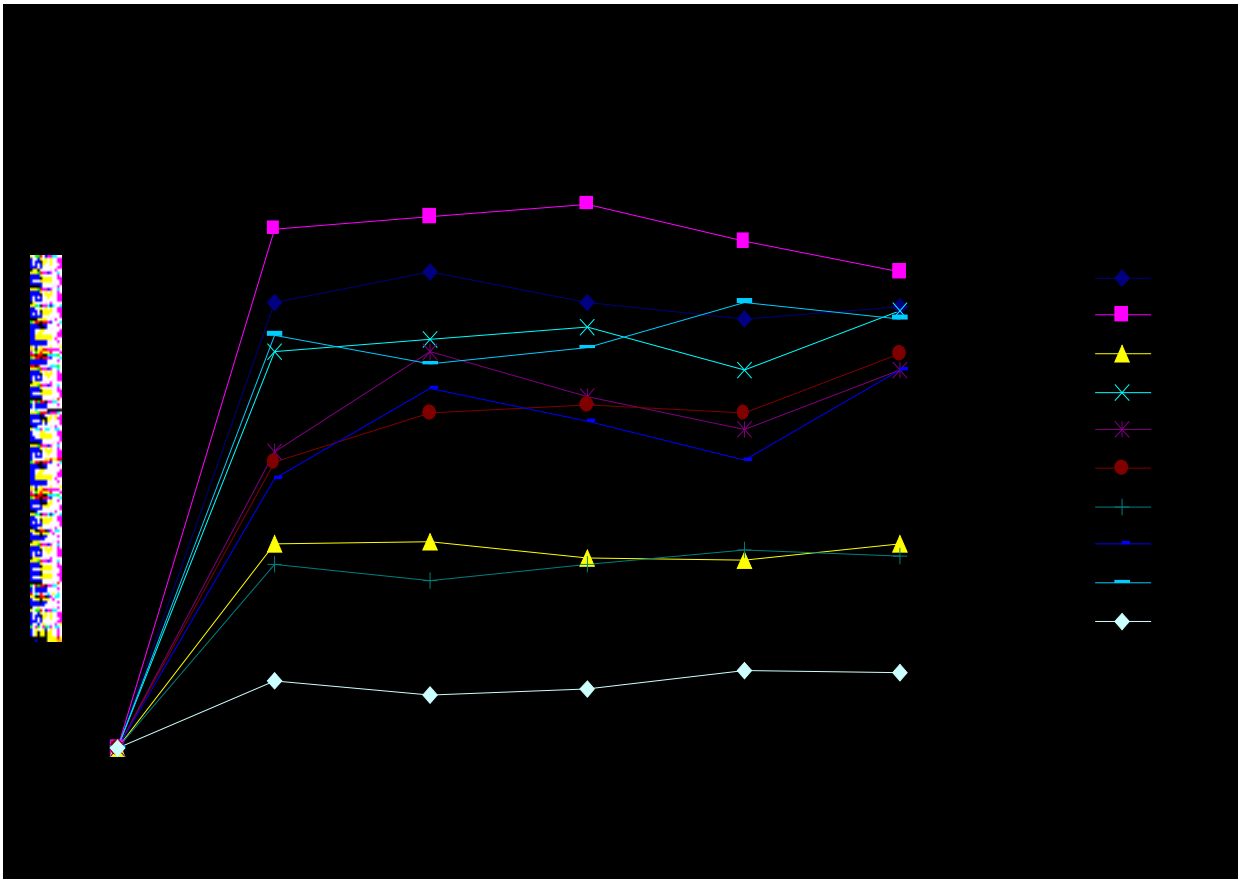

Figure 2. Ten Variables Overview

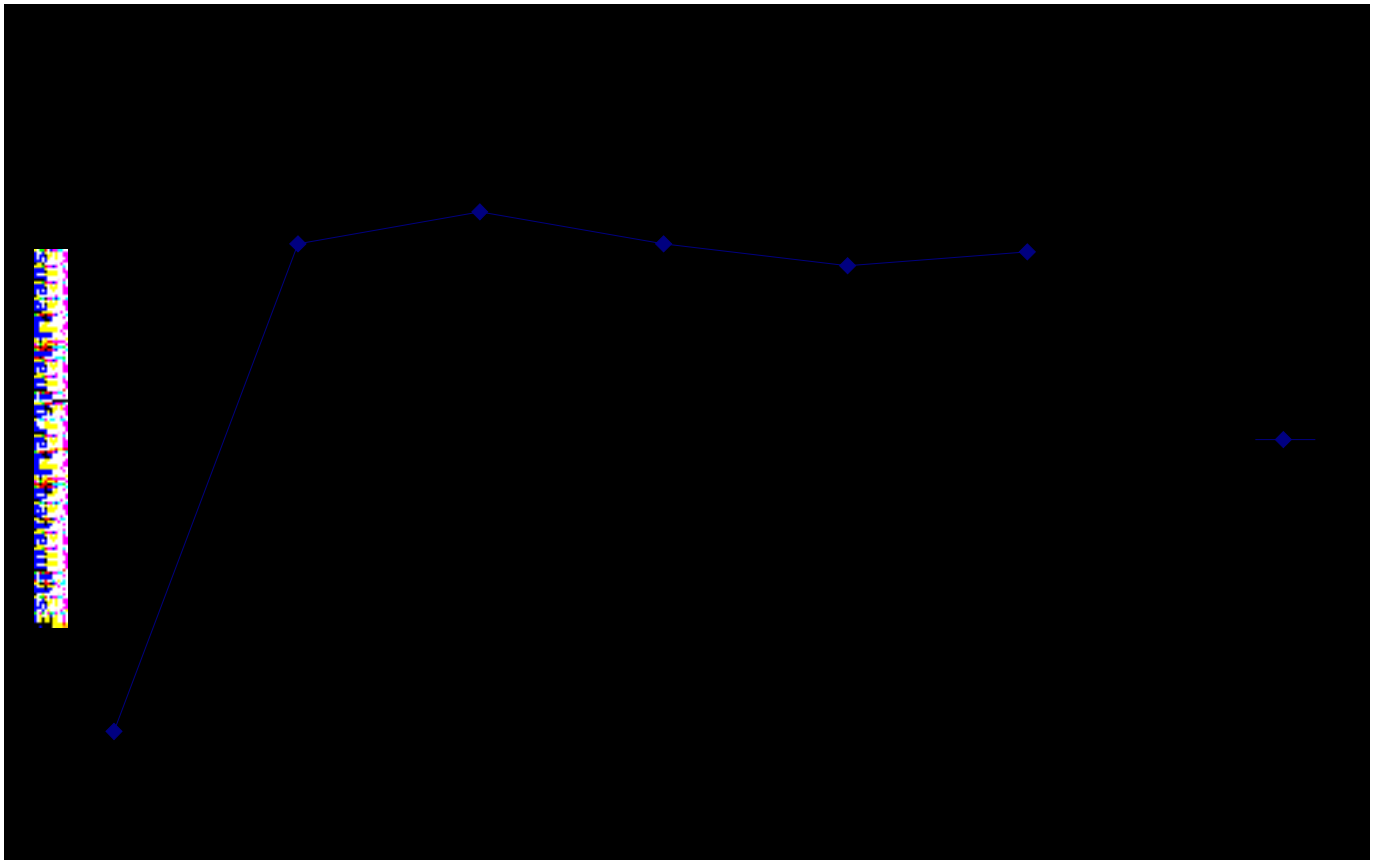

Figure 3. Depth of Concentration (DC),

Subjects were able to maintain a surprisingly high level of concentration, even over the course of an hour and a half. Peak concentration appears at the 36 minute interval, after which it wanes slightly, but is constant between a mean score of seven and eight (out of ten).

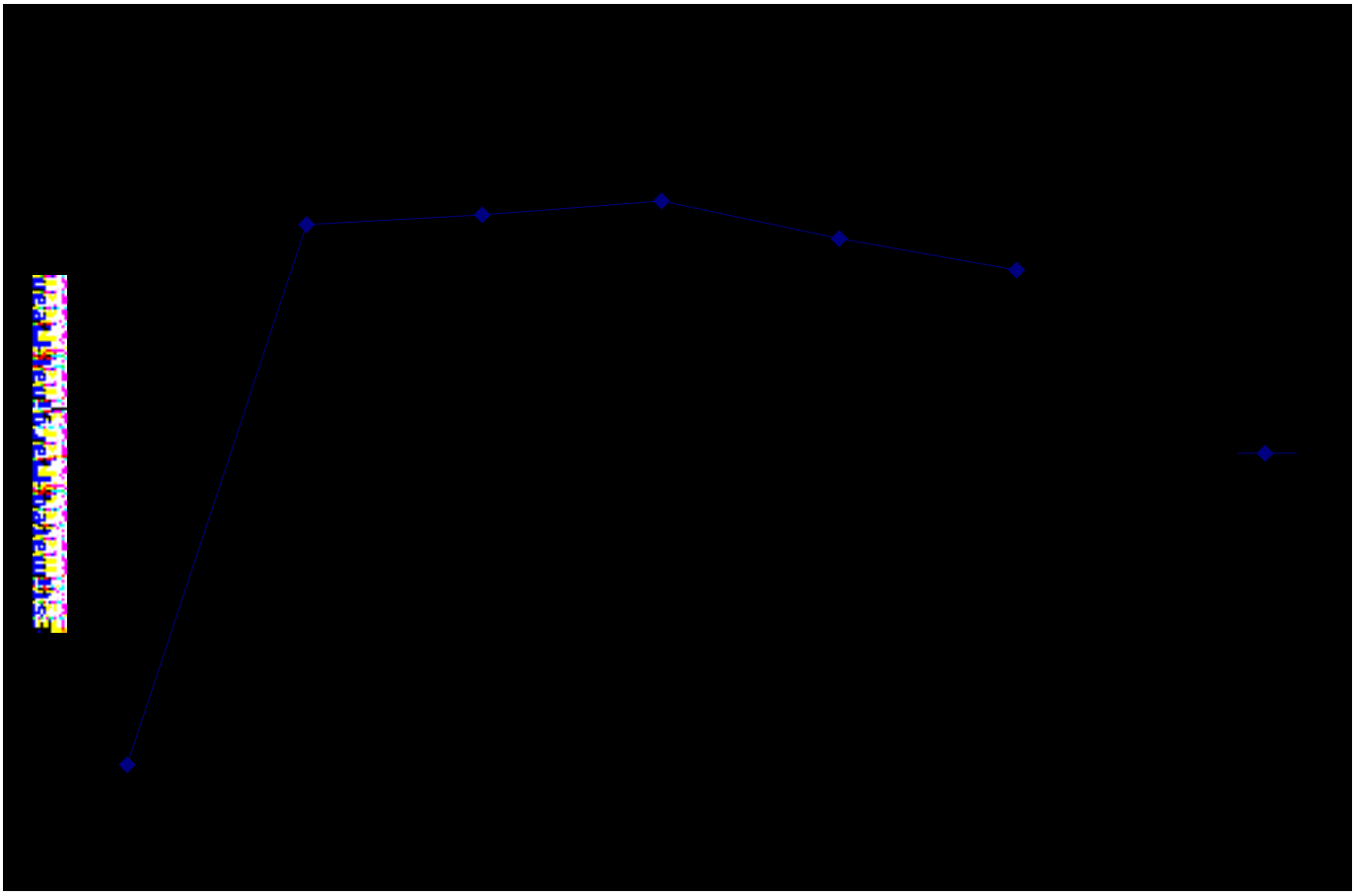

Figure 4. Hard to Concentrate (HC).

Referring to Figure Four, it was initially hard for subjects to concentrate, slowly increased in difficulty, and then began to become easier to concentrate after the one hour point. Rather than suggest the game sucks someone in after an hour of play, another explanation is that the player is making a concerted effort up until the focal interest point. After which, they began to repeat previous gameplay elements or became stuck at a certain point, whereby they found it marginally easier to concentrate.

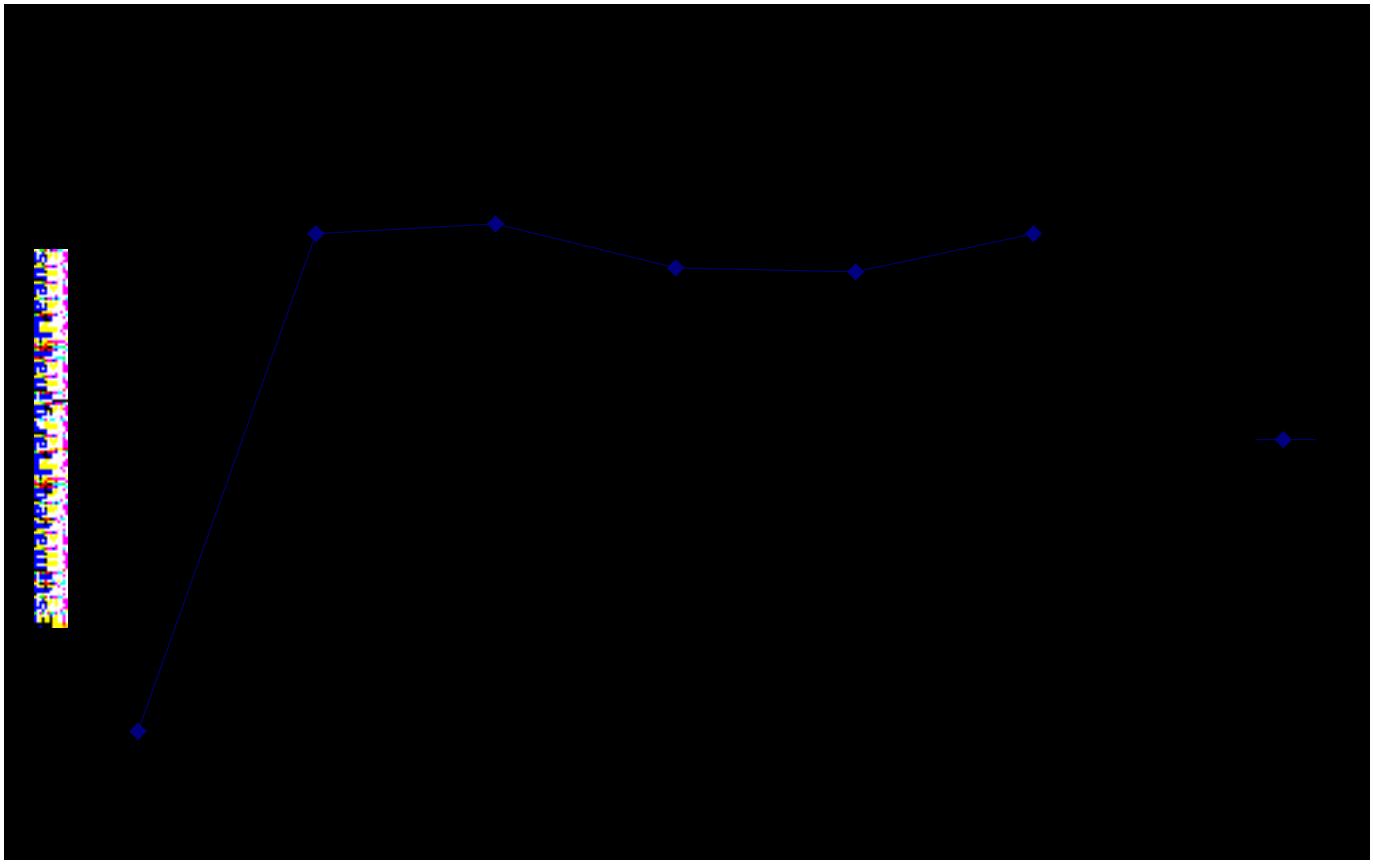

Figure 5. Self-Consciousness (SC).

The subjects maintained a very low level of self-awareness throughout the hour and a half, with an overall mean score of 3.4. Interestingly, it is at it's lowest an hour into the game and starts to increase afterwards.

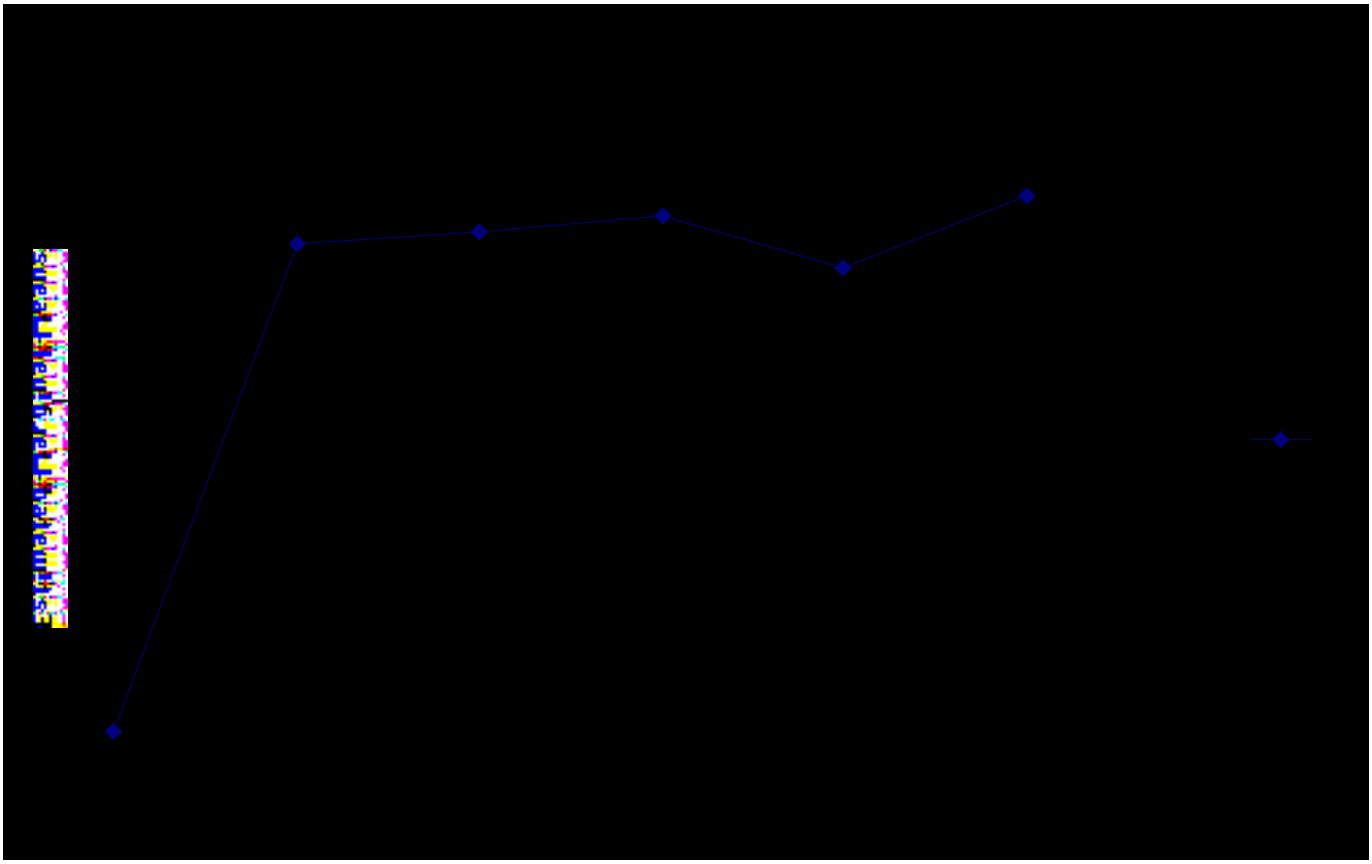

Figure 6. Control of their Actions (CA).

The subjects obviously felt quite empowered, as they all report a high degree of control over their actions. Control can be seen to steadily increase until the one hour point, as familiarity with the game and game language build. After the one hour point, the game gets substantially harder and the subject must try harder. Notice that in the final time period control is at its highest, suggesting a new level of mastery for the player.

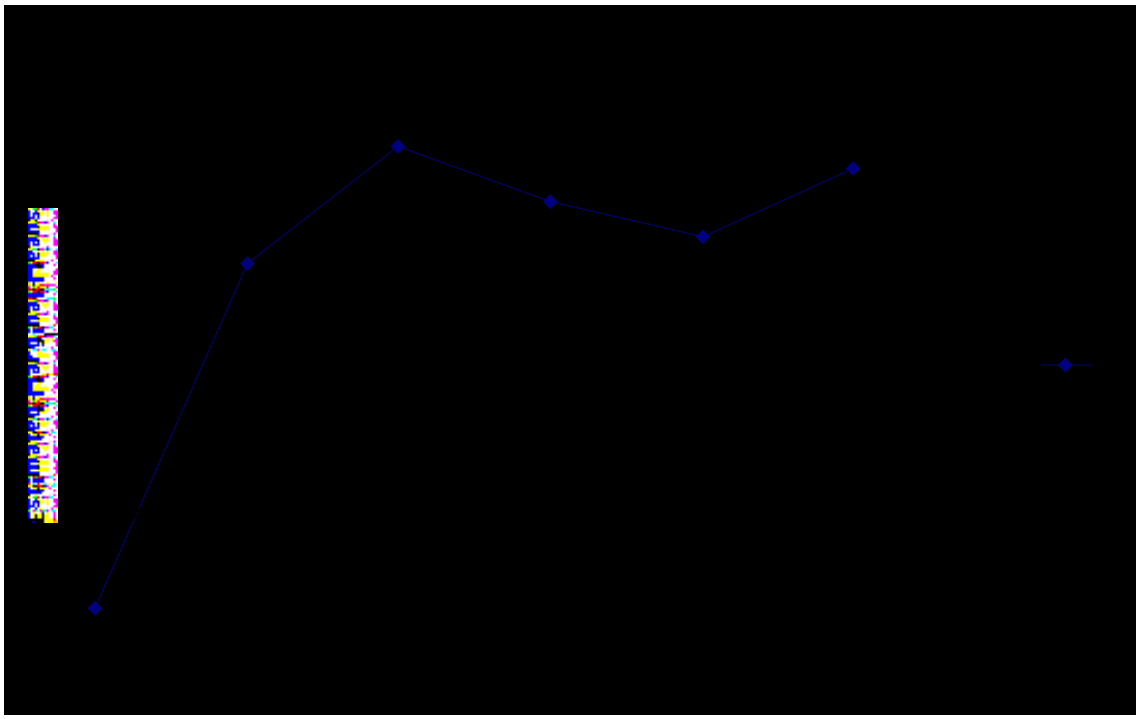

Figure 7. Challenge (CH).

In Figure 7, the challenge of the activity rose for twenty minutes before it declined for the next forty and then rose at the end of the gameplay period. From the flow perspective it would appear that there was a linear challenge which eventually became too great, after which time the game ceased to be as challenging, as it was either beyond or beneath the players skill. It should be noted that all of the challenge scores are relatively mid range, and as a result, perhaps the question was answered in a more global sense than solely the context of the game.

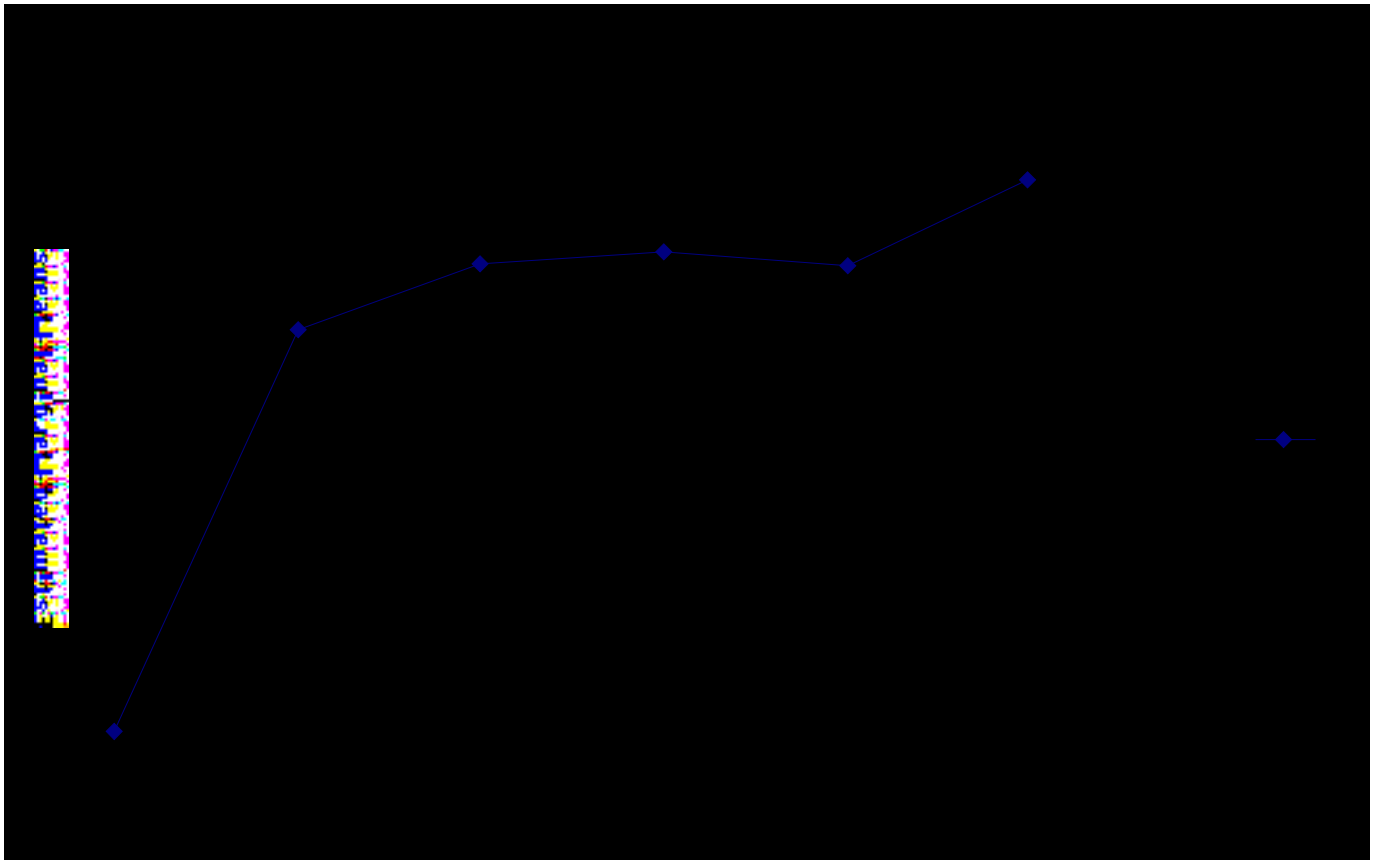

Figure 8. Skill (SK).

In Figure 8, the players skill in the activity shows a relatively linear progression, with a forty minute hump in the middle, where skill did not appear to increase. This should be noted in reference to a drop in challenge at this same time, suggesting that an increase in challenge is necessary for an increase in skill.

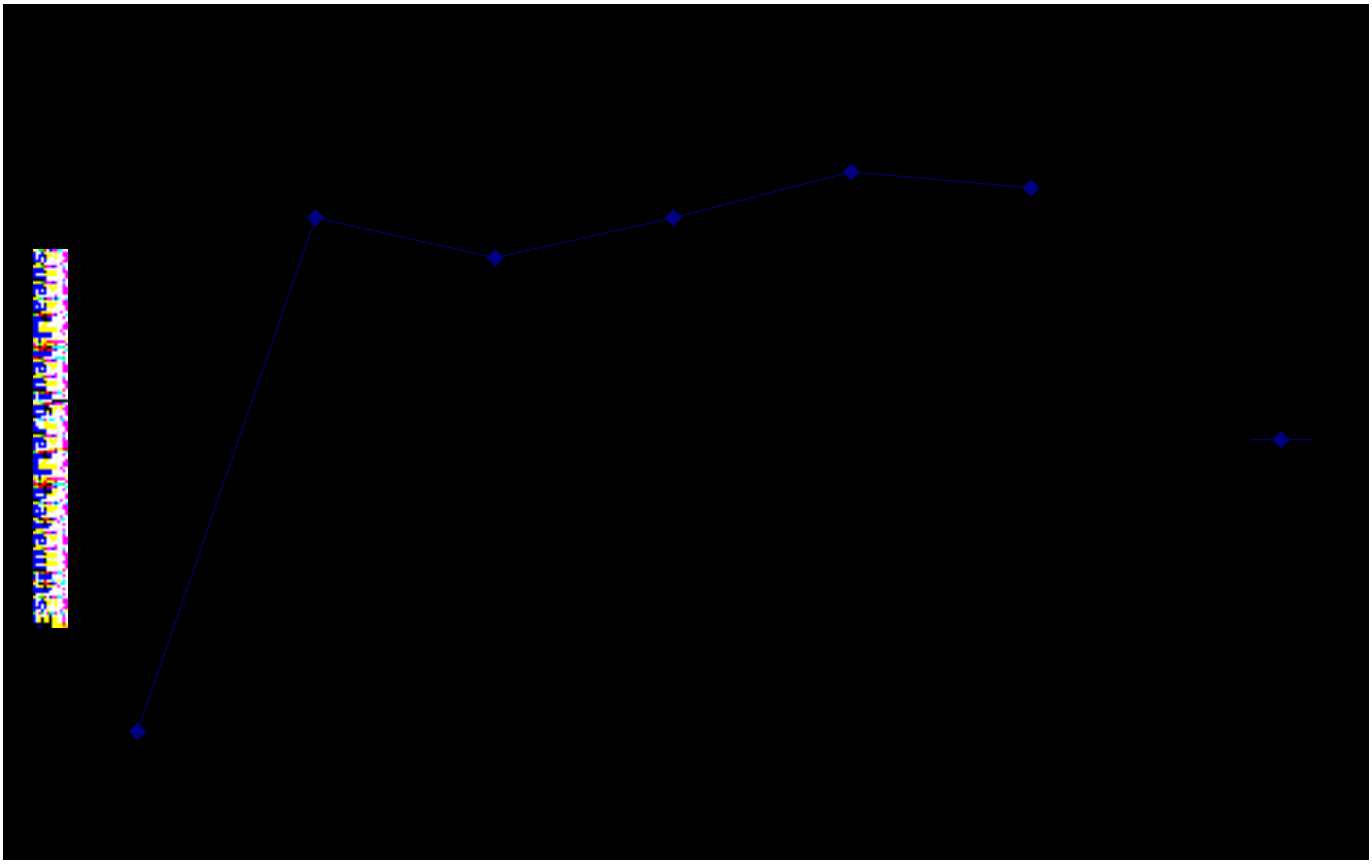

Figure 9. Wish Doing Something Else (WE).

Overall, subjects were very happy carrying out the experiment. None of the mean scores is greater than 4. Between time periods 2 and 4 an almost subconscious desire to change tasks is beginning to emerge, but the final time shows that they either began to enjoy the game again or became resigned and complacent to their fate.

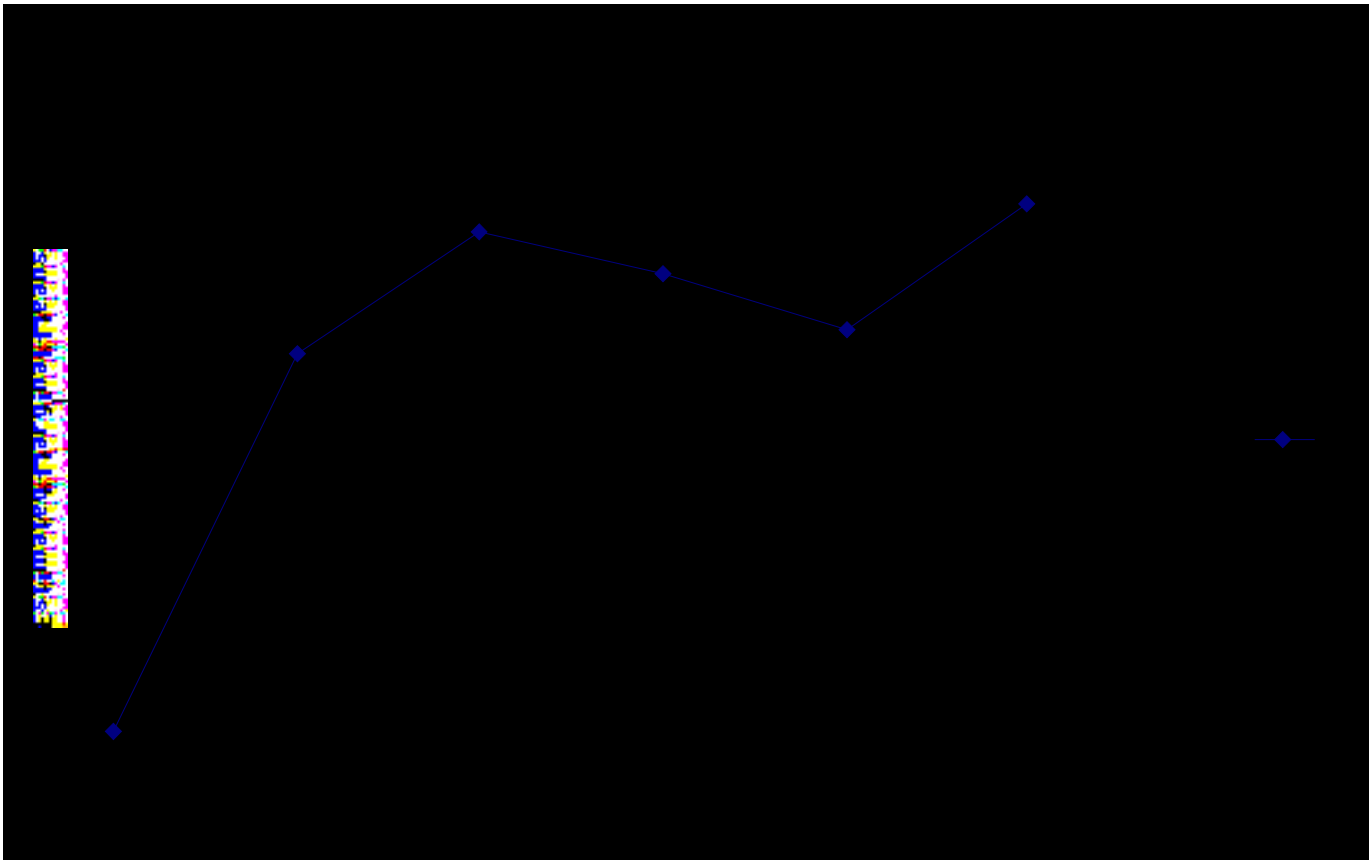

Figure 10. Something at Stake in the Activity (ST).

In Figure 10, whether an individual had anything at stake for their character, mirrored the challenge of the activity graph. This variable could also be interpreted as concern for the character they are playing, which after a certain waning if interest, increases in the last twenty minutes of play.

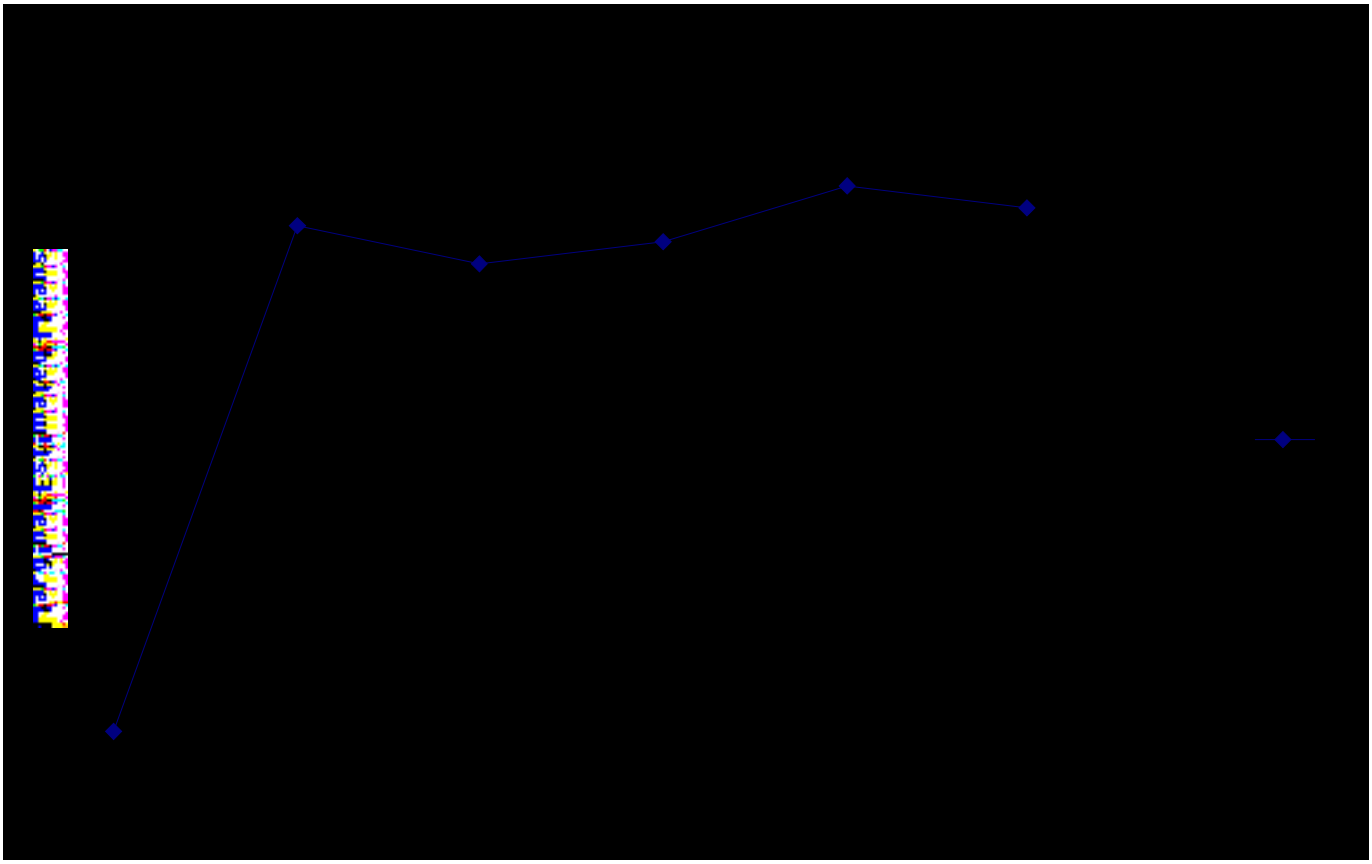

Figure 11. Success (SU).

Generally, the subjects felt they were doing well, with high success scores, that slowly increase as they gain more confidence with the game.

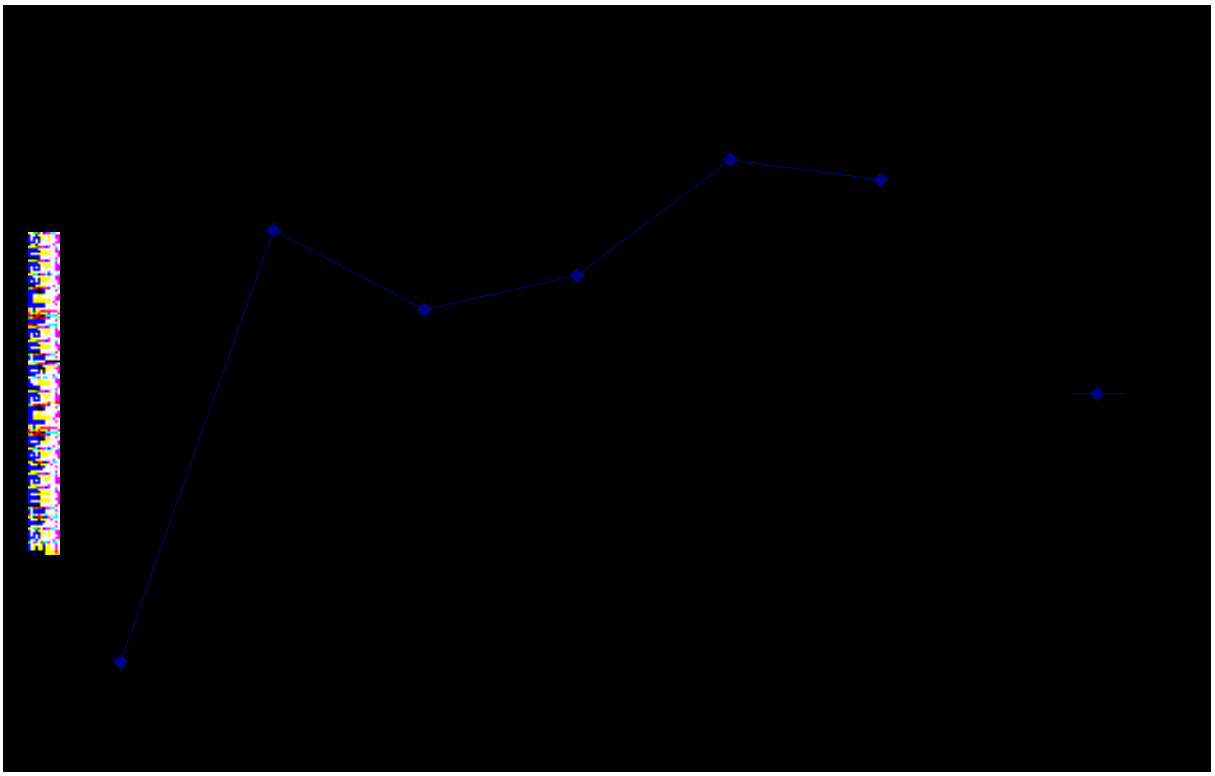

Figure 12. Challenge/Skill Ratio

The flow ratio shows that initially the game was too hard for most subjects, but as they practised more, their skills and involvement in the game increased(?), as flow would predict. The perfect result in this case would have been a straight horizontal line at the one on the y-axis, as this would indicate that skill was always equally matched with challenge.

From the results, it appears that the flow measure (VESM) seems less sensitive to small time intervals (compared to it's normal usage over the span of a few days). Significant change was found over time in variables HC, SK, CH and ST. Interestingly, the computed variable Ratio, a composite of two significant ratio's (challenge & skill) proved non-significant in the post hoc tests.

Performance seemed to be grouped into the first two time blocks, the middle two and the final twenty minutes. The vigilance literature supports this the most common period is a 40 minute time interval of sustained attention (Ditchburn, 1943;Wyatt and Langdon 1932). Contrary to popular belief, in this context attention span hasn't been shortened significantly.

Appendix E has a listing of the questions which were asked the participants after their gameplay period was completed, Table 2 presents the numerical responses. Contrary to expectation, 72 % of the subjects did not identify with their on-screen alter-ego. Also somewhat contrary to expectation that 54 % of the participants would not play the sample game indefinitely given the chance. Whether this aversion was a function of the testing procedure now associated with the game remains to be seen. Sixty-three percent of participants were able to forget about themselves during gameplay (often a 'side effect' of flow). Thankfully, the 90% of subjects were able to concentrate, despite the constant interruptions to their game experience. Sixty-eight percent of the subjects found the game goals ambiguous. This may be semantically misleading however, if the subjects interpreted the question to mean whether the game "had any point" rather than in the performance competence sense which the question was asked - "goals to be accomplished are clear". Finally, 68 % of subjects described the experience as enjoyable.

Table 2.
Interview

Yes	5	8	14	20	15	15
No	16	12	6	1	2	2
Maybe	1	2	2	1	5	5
	Character Identification	**Play Forever**	**Forget About Self**	**Able to Concentrate**	**Goals Ambigious**	**Enjoy Experience**

To truly examine the nature of emotional interaction, it would be advantageous to know which points in the game maximize or hinder flow. There are only a finite amount of different modalities of gameplay which video games usually adopt. Based on the theory that personal involvement will be dictated by the difficulty of interaction required by the player, a gradient of game behaviour modes is proposed in Table three.

Table 3
Game behaviour relative to personal involvement

Most Involved	(external world excluded)
Twitch	• 'firefight' or other learned reflex based sequences
Character navigation	
Modal Selection Screens	(Maps, Equipment selection)
Movie Scenes	• traditionally where people are used to becoming receptive and forgetting about themselves (not necessarily flow)
Text boxes	• Story related, then informative
Least Involved	
(Awareness of Room playing game in or other unrelated mental task)	

This would allow further research to pinpoint the specific forms of interactions or modalities which optimize the cultivation of this state. Based on the amount of challenge each mode would provide, it would be expected that flow will decrease across modalities (Twitch -> Text). Unfortunately, the major block to recording this data, is that the mode must be measured in consistent matching amounts. Gameplay is seldom that predictable and is heavily skewed towards the top of the spectrum. An additional confounding factor is that there is no real way to ensure that any given mode is encountered at an equal time as another player. For this reason, the ideal set-up would be a game which was instrumented to 'know' what it was doing and balance out the sample data accordingly.

Further research needs to examine the neurological aspects of flow state and the mind during gameplay. Down that path of research lies a more powerful biofeedback apparatus, and ultimately a 'mental state generator' (through self-mediating your own perception).

The best video games are microworlds, which present the learner with the simplest case scenarios, yet offer increasingly complex situations based on these rules. Regardless of the comparative perceptual caveats of other media, the video game provides many opportunities simply via it's interactive nature for future growth in the depth of experiences we can explore (with fault tolerance). Ideally, a self-aware game, which counters the players actions through a flow type mechanism, could facilitate a game world with more valuable experiences than Faster Pussycat, Kill, Kill. The video game has the capability to take our present one way television absorption, and replace it with a conversation with whomever (or whatever) we choose. On the hypothetical grounds that there is a correlation between absorption (enjoyment) of a story and personal involvement, the video game stands to break new ground in human fictional experience.

Appendix A

BROCK UNIVERSITY DEPARTMENT OF PSYCHOLOGY
Informed Consent Form

Examining video game immersion as a Flow state: Determining the exact nature of (positive) experience while playing a video game, coupled with video game motivation and what kinds of experiences are more gratifying/edifying to gameplay behaviour.

Researchers: Robertson B. Holt (thesis student), and supervising professor John O. Mitterer. Ph.D.

Name of Participant (Please Print): _____

I understand that this study in which I have agreed to participate will involve meeting with the researcher to play a video game for an hour and a half while filling out periodic questionnaires detailing the nature of my experience for which I will receive two hours of PSYC 1F90 credit towards my research requirement. As far as I am aware, I do not have epilepsy, nor does watching quickly moving objects cause me physical discomfort (although the study eliciting this kind of response is an extremely remote possibility).

I understand that my participation in this study is voluntary and that I may withdraw from the study at any time and for any reason without penalty.

I understand that there is no obligation to answer any question/participate in any aspect of this project that I consider invasive, offensive or inappropriate.

I understand that all personal data will be kept strictly confidential and that all information will be coded so that my name is not associated with my answers. I understand that only the researchers named above will have access to the data.

Participant signature _____ Date

This study has been reviewed and approved by the Brock Research Ethics Board. (File#99194). Date of approval (February 12,2000).

If you have any questions or concerns about your participation in the study you may contact (Robertson Holt at 341-8217) or Professor Mitterer at (905) 688-5550 x3459. If you have any emotional concerns arise following your participation in this study you may contact Student Services located on the fourth floor of the Brock University Tower (room 407) by phone (905)688-5550x4750 and arrange for an appointment to speak with a councilor.

Feedback about the use of data collected will be available during the month of June, 2000, posted outside of B302. Furthermore, a written explanation will be provided for you upon request.

Thank you for your help ! Please take one copy of this form with you for further assistance.

I have fully explained the procedures of this study to the above volunteer.

Researcher Signature_____Date_____

APPENDIX B

Examining video game immersion as a Flow state—Letter of Information

The research study which I am invited to participate in deals with the relationship between video game experience and a state of mind called flow. Flow (auto-telic or self-rewarding behaviour) is defined as a state where the extent of an individuals skills (or competence) are perfectly matched with the difficulty of the task, creating an optimal level of task challenge. Applying the criteria which contribute to Flow to video game experience, the study hopes to pinpoint specifically what roles or activities in games that create enjoyable experiences.

The method of the study will involve playing the video game Crash Bandicoot 2 while filling out computerized questionnaires for a period of two hours. As with all video games there is the slight risk of aggravating an epileptic seizure, but this is not a foreseeable outcome of participating in this study. This study is focused at mapping the experience of novice gamers living in the southern Ontario region, who are also first year psychology students. The questionnaires which are to be answered consist of ranking such questions as “How well were you concentrating ?” and “I felt ecstatic and joyful” on ranked scales. Any questions which the participant does not feel comfortable answering may be left blank. A two hour research credit for PSYC 1F90 will be given in exchange for participating in the study.

The results from this study will provide new understanding behind the motivational factors behind prolonged video game play, and human/machine interaction, with a focus on creating an optimal video game experience through pinpointing the most enjoyable and engrossing segments of the game. The results will hopefully lead to better video game design, improved computer interface mediation, and human factors and engineering psychology understanding in general.

APPENDIX C

Debriefing Form

"Examining Video Game Immersion As a Flow State"

Thank you for your help and participation. The study in which you have completed, was concerned with the domain of human interface and emotion in psychological research. Your participation was mainly to discern whether flow is a valid representation of some states of video game play. It will assist further research as it was a *foundational* study crossing two domains (motivation & immersion) never before examined in this context. Your results will be scored and tallied to gain a better understanding of the phenomena the study concerned. You may obtain copies of the results of the study (including your particular data) by contacting the researcher via the contact information on their informed consent letter. The results will be posted outside room B304 towards the end of May.

Thanks again for your co-operation,
Rob Holt

APPENDIX D

Video Experience Sampling Method Questionaire

>> adapted version of Czikszentmihalyi & Czikszentmihalyi (1988)<<

Time Interrupted > 0:00 (recorded by researcher)
Time Finished scale > 0:00 (recorded by researcher)

When you were interrupted
(for all questions circle the one which is most applicable)

What were you thinking about ?
- what I was doing
- something else related (i.e. what to do next)
- something completely unrelated (laundry)

	not	a bit	mostly	completely
How well were you **concentrat**ing?	+ + + + + + + + + +			
Was it **hard** to concentrate ?	+ + + + + + + + + +			
How **self-conscious** were you ?	+ + + + + + + + + +			
Were you in **control** of your actions ?	+ + + + + + + + + +			

Circle the mark which best describes how you felt about what you were doing.

Challenge of activity	+	+	+	+	+	+	+	+	+	+
			low							high
Your **skills** in the activity	+	+	+	+	+	+	+	+	+	+
			low							high
Do you **wish** you had	+	+	+	+	+	+	+	+	+	+
Been doing something **else** ?	not really								very much	
Was there anything at	+	+	+	+	+	+	+	+	+	+
stake for your character	not really								very much	
in the activity ?										
Were you **succeed**ing	+	+	+	+	+	+	+	+	+	+
In what you were doing ?	not really								very much	

***** UNPAUSE AND RETURN TO GAME*****

APPENDIX E

INTERVIEW QUESTIONS

- Did you identify with the character ?
- Given the choice would you play this game indefinately ?
- Did you forget about yourself, when playing the game ?
- Were you able to concentrate ?
- Were the goals in the game ambiguous ?
- Would you describe the experience as enjoyable ?
- What about the game could have made the experience more enjoyable or immersive ?

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