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The Structural Characteristics of Video Games: A Psycho-Structural Analysis

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ABSTRACT

There is little doubt that video game playing is a psychological and social phenomenon. This paper outlines the main structural characteristics of video game playing (i.e., those characteristics that either induce gaming in the first place or are inducements to continue gaming irrespective of the individual's psychological, physiological, or socio-economic status). This online study is the first ever to assess what structural characteristics (if any) are important to a group of self-selected video game players (*n* = 382). The main variables examined were sound, graphics, background and setting, duration of game, rate of play, advancement rate, use of humor, control options, game dynamics, winning and losing features, character development, brand assurance, and multi-player features. Although there were many major gender differences, one of the main overall findings was the importance of a high degree of realism (i.e., realistic sound, graphics, and setting). Other important characteristics included a rapid absorption rate, character development, the ability to customize the game, and multi-player features. Suggestions for future research are outlined.

INTRODUCTION

THE PSYCHOLOGY of video game playing is, in many ways, a very new area of research. The vast majority of past psychological research has tended to focus on two specific areas of investigation. These have been (i) the effects on children and adolescents of playing excessively[1–3] and (ii) whether or not playing video games makes children and adolescents more violent.[4–6] Essentially, most of the past research has tried to asses the question of whether or not games are inherently "good" or "bad".[3] However, when we look at the modern demographics of video game players, we see that a large number of those players are in fact adults. Furthermore, there is no conclusive evidence to suggest that the majority of these players are not leading perfectly "normal" lives in terms of their psychological and social functioning. Indeed, some of the more recent research has actually suggested that there may be positive benefits from playing video games such as enhanced problem solving skills, better communication skills, and team building skills.[7,8] Video game playing is no longer exclusively the domain of adolescents.[9] Video games are now available in a multitude of formats and places, including, but not limited to, the Internet, dedicated gaming consoles, and mo-

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bile phones. Mobile phones are undergoing something of a revolution due to the recent mass production of color screens, high-quality graphics, and enhanced processing power.

There is little doubt that video game playing is indeed a psychological and social phenomenon. This paper is in part constructed as a tentative framework to encourage psychological investigation of this growing area. It is constructed by psychologists (three of whom are gamers). This paper attempts to outline the main structural characteristics of video game playing (i.e., those characteristics that either induce gaming in the first place or are inducements to continue gaming irrespective of the individual's psychological, physiological, or socio-economic status). In many ways, it is the examination of what makes video games so enjoyable. However, such a framework also allows us to examine some related psychological features, such as the capacity for games to allow us to enter a fantasy world and to escape from our everyday lives. It may also allow us to examine such phenomenon as losing track of time whilst playing video games, or how they may affect our mood states and arousal levels. Some preliminary research[3] on adolescent computer game playing did show that reasons for playing their favorite games primarily revolved around the content and structure of the games. This included graphics, sound effects, and number of levels. It was argued that such responses suggested that structural characteristics of games were a topic worthy of future investigation.

Whilst research into the structural characteristics of video games is in its infancy, structural characteristics in gambling have been well documented. It is argued that several forms of gambling share a number of common structural characteristics with video games (particularly slot machines). Over the past three decades, a number of authors have examined the role of structural characteristics in the acquisition, development, and maintenance of gambling behavior.[10–17] Some of the analyses of structural characteristics have been in the form of general overviews.[10,12] However, others have been far more specific and have concentrated on the structural characteristics of individual gambling activities such as lotteries,[13,18,19] casino games,[11,13] scratch cards,[2] and slot machines.[14–17] Examination of these structural characteristics indicates that there are many similarities between gambling and video game playing. The only major difference is that most video games do not offer the chance to win money by playing. Despite these similarities, there has been very little written in relation to the structural characteristics of video games, athough several authors have written anecdotally about the similarities between gambling and video game playing and/or have examined the association between gambling and gaming by some excessive gamblers.[20–22] Some authors have written at length about the overlap between slot machines and video games.[22] Both video game machines and slot machines may be considered under the generic label of "amusement machines."[1] Furthermore, it has been suggested that arcade video games and slot machines share some important characteristics (some of which are structural).[20] These include the following:

- The requirement of response to stimuli that are predictable and governed by the software loop
- The requirement of total concentration and hand–eye coordination
- Rapid span of play negotiable to some extent by the skill of the player (more marked in videogames)
- The provision of aural and visual rewards for a winning move (e.g., flashing lights, electronic jingles)
- The provision of an incremental reward for a winning move (points or cash) that reinforces "correct" behavior
- Digitally displayed scores of "correct behavior" (in the form of points or cash accumulated)
- The opportunity for peer group attention and approval through competition

It has also been argued that, on both a psychological and behavioral level, slot machine gambling and video game playing share many similarities. These include similar demographic differences such as age and gender breakdown, similar reinforcement schedules, similar potential for "near miss" opportunities, similar structural characteristics involving the use of light and sound effects, and similarities in skill perception.[22] The main difference between video game machines and slot machines are that video games are usually played to accumulate as many points as possible, whereas slot machines are played (i.e., gambled upon) to accumulate money.

However, the new generation of slot machines, often referred to as video lottery terminals (VLT's) are starting to use video game graphics and technology. Furthermore, the use of such video game technology for gambling purposes is becoming highly prevalent on virtual gambling sites accessible on the Internet. These services offer such varied activities as simulated slot machines, card games, roulette wheels, or even entire virtual casinos.

Video games rely on multiple reinforcements (i.e., the "kitchen sink" approach) in that different features might be differently rewarding to different people. Success on video games comes from a variety of sources and the reinforcement might be intrinsic (e.g., improving your highest score, beating your friend's high score, getting your name on the "hall of fame," mastering the machine) or extrinsic (e.g., peer admiration). There is no evidence to suggest that the developers of video games have used psychological research to make their games more appealing. However, the success of video games suggests there is much to be learned about the psychology of gaming from an analysis of structural characteristics.

Despite the growing anecdotal literature on structural characteristics in video game playing, they have not actually been defined, and there has been little empirical research into the area. Therefore, a study was designed to assess what structural characteristics (if any) were important to video game players. As this was an exploratory study, there were no specific hypotheses.

MATERIALS AND METHODS

Respondents

A sample of 382 respondents took part in the online study aged between 14 and 50 years (mean age = 21.1 years; SD = 4.75). Respondents were initially contacted by an email request sent to university students on a variety of undergraduate and postgraduate courses. A snowball sample was also created by asking respondents to forward the link to anyone who they felt would like to take part. Email addresses were obtained to prevent multiple entries by the same person. Of the 382 respondents in the sample, 242 (63.4%) were male and 140 (36.6%) were female.

Design, materials, and procedure

The survey was an internet-based survey constructed using an "in house" Autoform system. The survey instrument was constructed by (i) playing a variety of video games and noting their structural features, (ii) examining and making comparisons with established gambling structural characteristics, (iii) informal discussion with video game players, and (iv) examining relevant research in the area of videogaming. The final questionnaire examined a number of areas. The main categories of characteristics are described below:

- *Sound:* This includes the use of realistic sound effects, speaking characters, background music, and narration.
- *Graphics:* This includes the use of high-quality realistic graphics, cartoon style graphics, and full motion video (FMV).
- *Background and setting:* This includes whether the game is based on a story, film, or television program, and the use of realistic settings and fantasy settings.
- *Duration of game:* This refers to whether the game is long (takes months or years to complete), medium (takes days or weeks), or short (can be completed within one session).
- *Rate of play:* This is the "absorption rate" and relates to how quickly the player gets into the game.
- *Advancement rate:* This relates to how quickly the game play advances.
- *Use of humor:* The refers to the use of humor in the game.
- *Control options:* This refers to whether a player can control the sound, graphics, and skill settings, choice of control methods, and physical feedback.
- *Game dynamics :* This covers a wide spectrum of game behaviors. It includes exploring new areas, elements of surprise, fulfilling a quest, skill development, AI interactions, finding things, collecting things, avoiding things, surviving against the odds, shooting, different ending options, different modes of transport, solving puzzles, beating times, cheats/Easter eggs, solving time limited problems, building environments, mapping, and linear/non-linear game format.
- *Winning and losing features:* This refers to the potential to lose points, points accumulation, finding bonuses, having to start level again, and ability to save regularly.
- *Character development:* This refers to character development over time and character customization options.
- *Brand assurance:* This refers to brand loyalty and celebrity endorsement, for example.
- *Multiplayer features:* This refers to multi-player option (online), multi-player option (LAN), multi-player communication, building alliances, and beating other players.

Respondents were asked to rate how important they thought each of these features was for their enjoyment of video games on a five-point scale, ranging from *not important at all* to *extremely important.* Analysis of the results was done using SPSS and the final results were compiled by collapsing the vari-

ables down to three levels. *Not important* combined ratings of 1 and 2, *neutral* was defined as a rating of 3, and *important* combined ratings of 4 and 5.

RESULTS

Video games were played at least once a week by 96% of the respondents (mean = 11.13 times per week, mode = 4 times per week, SD = 10.69 times per week). The most frequently played game format (i.e., played at least once a week) was a stand alone PC/Mac (73.4%), followed by dedicated games consoles (69.6%), then mobile phones (54.2%), PC/Mac online/multiplayer (29.6%), portable games consoles (9.9%), and finally "other" (0.8%).

Sound

Realistic sound effects were deemed to be the most important feature by almost two-thirds of the sample, having characters that speak was not quite so popular, and background music and narration were seen as even less important (Table 1). There were no significant gender differences in relation to any of the sound characteristics.

Graphics

In relation to graphics two-thirds of the respondents preferred them realistic and of high quality (Table 1). Cartoon style graphics were generally not very popular at all. There were major gender differences in relation to cartoon style graphics. Significantly more females (35.7%) rated them as important compared to males (16.9%) ($X^2 = 17.93$, df = 2, $p < 0.001$). Full motion video was seen as important, by significantly more males (49.8%) than by females (37.9%) ($X^2 = 6.27$, df = 2, $p = 0.043$).

TABLE 1. PARTICIPANTS' RATINGS OF STRUCTURAL CHARACTERISTICS

	Not important	*Important*
Sound		
Realistic sound effects	9.9%	65%
Speaking characters	20.6%	43.9%
Background music	31.1	35.5%
Narration	35.2%	28.7%
Graphics		
High-quality realistic graphics	6%	80.7%
Cartoon style graphics	38.4%	23.8%
Full Motion Video (FMV)	26.4%	45.4%

Background/setting

Questions were asked in relation to how important the setting of the video game is, for example, when and where the game is set. In general, real-life settings such as being based on a story and having a realistic setting (as opposed to fantasy settings) were rated as important by a majority of respondents (Table 2), although being based on factual events was not so popular a characteristic, nor was being based on a film or television program. However, there were marked gender differences with some aspects of these features. Significantly more males (63.0%) than females (37.9%) reported that realistic settings were important ($X^2 = 23.53$, df = 2, $p < 0.001$). More females (40.7%) were in favor of fantasy settings than males (32.1%), although this was not significant. Significantly more males (32.9%) than females (12.9%) suggested that games based on factual events were important for enjoyment ($X^2 = 23.69$, df = 2, $p < 0.001$).

Use of humor

Humor was deemed to be an important feature by just over half the respondents, and only a small percentage of them suggested that it was not important. Significantly more females (60.7%) than males (47.3%) reported that humor was an important characteristic ($X^2 = 7.13$, df = 2, $p = 0.028$) (Table 2).

Brand assurance

It was important to just under half the respondents that they purchase their games from a familiar and trusted software company (Table 2). However, far less respondents thought that having a celebrity endorsement (e.g., Colin McRae Rally, Tony Hawkes Pro Skateboarding) was a particularly important feature. There were no significant gender differences on these characteristics.

Character development

Two-thirds of the respondents indicated that it was important for the characters to be able to develop over time in terms of features such as dexterity, strength, and intelligence (Table 2). It was also seen as important that the player be able to customize the actual physical properties of the character

TABLE 2. PARTICIPANTS' RATINGS OF STRUCTURAL CHARACTERISTICS

	Not important	*Important*
Background/setting		
Based on a story	19.6%	56.1%
Realistic settings	20.4%	53.8%
Fantasy settings	30.3%	35.2%
Based on film or TV	36.3%	30.8%
Use of humor	15.4%	52.2%
Brand assurance		
Brand loyalty	25.6%	48.3%
Celebrity endorsement	53.3%	21.7%
Character development		
Character development over time	9.4%	65.8%
Customize character	17.5%	58.5%

before the game began, in terms of clothing, name of character etc. Males (69.3%) appeared to be more interested in character development over time than females (59.3%), although this was not significant.

Duration of the game

Medium duration games (i.e., those games that took days or weeks to complete) were rated as most enjoyable. This was followed by long duration games (i.e., those that took months or years) with short duration games the least popular (i.e., those games that were over within a session) (Table 3). Although medium duration games were most popular overall there were significant gender differences. Significantly more males (52.3%) preferred the long duration games compared to females (24.3%) ($X^2 = 34.07$, df = 2, $p < 0.001$). Males (51.4%) also preferred medium duration games more so than females (40.7%). Finally, although short duration games were not very popular overall, significantly more females (26.4%) preferred these games than males (18.9%) ($X^2 = 8.11$, df = 2, $p = 0.017$).

Rate of play

Rate of play related to two main features. Absorption rate was defined as how quickly a person could get into the game, and rapid absorption was deemed as important by over three-quarters of all the respondents (Table 3). Similarly, rapid advancement of play was also rated as important by a majority of respondents, but rated as important by more females (63.6%) than males (53.5%). However, this finding was not significant.

TABLE 3. PARTICIPANTS' RATINGS OF STRUCTURAL CHARACTERISTICS

	Not important	*Important*
Duration of game		
Long (months or years)	27.4%	42.0%
Medium (days or weeks)	11.5%	47.5%
Short (e.g., one session)	50.4%	21.7%
Rate of play		
Rapid absorption rate	7.0%	76.5%
Rapid advancement	12.0%	57.2%

Control options

Having the option to customize the game was seen as an important feature of the game by most of the respondents in terms of actual settings (e.g., level settings, sound, and graphic settings) (Table 4). Significantly more males (71.2%) than females (60.0%) rated this as important ($X^2 = 6.28$, df = 2, $p = 0.043$). Choice of control method (e.g., joystick, keyboard) was also rated as an important feature by both males and females. However, overall, physical feedback was not deemed to be an important feature. Significantly more females (38.6%) rated this features as important compared to males (23.9%) ($X^2 = 11.44$, df = 2, $p = 0.003$). In fact, almost half of all the males (49.8%) said that this feature was not important, compared to females (34.3%).

Multi-player features

Overall, multi-player features were rated as important by a majority of respondents both in terms of online gaming and LAN's. Beating other respondents or non player characters, and building alliances and multi-player communication were also seen as important (Table 4). Multi-player games were preferred more by males (57.2%) than females (46.4%), and this was significant for LAN's (males 57.6%, females 39.3%) ($X^2 = 12.44$, df = 2, $p = 0.002$). Similarly, significantly more males (45.3%) than females (31.4%) rated multi-player communication as important ($X^2 = 13.50$, df = 2, $p = 0.001$). Also, significantly more males (56.0%) than females (27.1%) were interested in building alliances ($X^2 = 29.66$, df = 2, $p < 0.001$). Furthemore, significantly more males than females were interested in beating other

TABLE 4. PARTICIPANTS' RATINGS OF STRUCTURAL CHARACTERISTICS

	Not important	*Important*
Control options		
Sound and graphic settings and skill levels	9.9%	67.1%
Choice of control methods	18.0%	57.4%
Physical feedback	44.1%	29.2%
Multiplayer features		
Multiplayer option (online)	19.3%	53.3%
Multiplayer (LAN)	17.8%	50.9%
Multiplayer communication	19.8%	40.2%
Building alliances	14.6%	45.4%
Beating other players or NPC	11.5%	58.0%

players (males 68.7%, females 39.3%) ($X^2 = 32.28$, df = 2, $p < 0.001$).

Game dynamic characteristics

Game dynamic characteristics relate to the actual format of the game, that is, the type of action that occurs whilst playing and the nature of the tasks undertaken. Depending on the type of game, some features would be more prominent than other features. However, most games will contain several, if not all, of these features in varying degrees. Overall, features like exploration, elements of surprise, fulfilling a quest, skill development, sophisticated AI interactions, finding things, surviving against the odds, collecting things, shooting, solving puzzles (timed and untimed), using cheats/Easter eggs, and avoiding things were all popular features (Table 5). Additionally, respondents reported that they did not like games that

TABLE 5. PARTICIPANTS' RATINGS OF STRUCTURAL CHARACTERISTICS

	Not important	*Important*
Game dynamics		
Exploring new areas	4.7%	76.0%
Elements of surprise	4.2%	75.2%
Fulfilling a quest	5.0%	74.4%
Skill development	5.7%	68.1%
Sophisticated AI interactions	8.4%	67.1%
Finding things (e.g., secret doors, levers, passages, hidden levels, characters)	9.7%	65.3%
Surviving against the odds	8.6%	62.7%
Shooting (enemies, targets, etc.)	14.6%	61.9%
Different ending options	14.4%	59.5%
Different modes of transport	14.6%	58.7%
Collecting things (e.g., objects, keys, chalices, components)	15.1%	56.7%
Solving puzzles	17.5%	56.1%
Beating times	15.1%	52.0%
Cheats/Easter eggs	23.0%	50.1%
Avoiding things	15.4%	49.6%
Solving time limited problems	17.8%	45.4%
Building environments	32.6%	33.4%
Mapping	35.5%	29.0%
Linear game format	44.6%	18.0%

were in a linear format, and they preferred games where there could be several different ending options. Less popular were building environments (e.g., simulation game features) and mapping areas. There were several noticeable gender differences in relation to some of the game dynamics. Significantly more males (79.0%) rated sophisticated AI as important compared to females (46.4%) (X^2 = 45.19, df = 2, p < 0.001). Significantly more males (74.1%) rated skill development as important compared to females (57.9%) (X^2 = 11.92, df = 2, p = 0.003). Significantly more males (71.2%) preferred shooting things than females (45.7%) (X^2 = 28.43, df = 2, p < 0.001). Significantly more males (66.3%) preferred a variety of different forms of transport within a game compared to females (45.7%) (X^2 = 17.19, df = 2, p < 0.001). Also, significantly more males (67.1%) liked surviving against the odds compared to females (55.0%) (X^2 = 7.43, df = 2, p = 0.024). Significantly more females (65.0%) preferred solving puzzles than males (51.0%) (X^2 = 7.459, df = 2, p = 0.024). Significantly more females (57.1%) preferred avoiding things (e.g., dangerous places, spells) than males (45.3%) (X^2 = 6.92, df = 2, p = 0.031). Significantly more females (73.6%) also rated finding things as important compared to males (60.5%) (X^2 = 6.87, df = 2, p = 0.032), and significantly more females (67.9%) rated collecting things as important compared to males (50.2%) (X^2 = 11.52, df = 2, p = 0.003).

Winning and losing features

Just over a third of all the respondents rated points accumulation as important, although a majority saw the potential for losing points as a necessity (Table 6). Similarly, most respondents also rated finding bonuses as an important feature. One thing that was definitely not seen as important for the enjoyment of the games was having to start the level again from the start. The vast majority of the respondents expressed that it was important to be able to save the game at regular intervals. Again, there were some marked gender differences in relation to these characteristics. Significantly more females (47.9%) were in favor of points accumulation than males (32.9%) (X^2 = 11.37, df = 2, p = 0.003), and significantly more females (64.3%) were in favor of finding bonuses than males (45.3%) (X^2 = 12.67, df = 2, p = 0.002).

TABLE 6. PARTICIPANTS' RATINGS OF STRUCTURAL CHARACTERISTICS

	Not important	*Important*
Winning and losing features		
Potential to lose points	14.6%	53.8%
Points accumulation	28.5%	38.4%
Finding bonuses	15.9%	52.2%
Having to start level again	39.7%	24.0%
Ability to save regularly	4.4%	81.2%

DISCUSSION

This is the first ever study to explicitly examine the psycho-structural characteristics of video games and was designed to serve as a preliminary framework from which these characteristics can be identified, and used for further psychosocial investigations of video game playing. We have defined what we feel are the main characteristics at present. However, other characteristics may become more or less important, over time, due to advances in the design and development of video games and the technologies that they utilize. It should also be noted that the importance of such characteristics may vary between individuals, and may vary according to the frequency with which people play video games. This is in itself another area worthy of further investigation. Similarly, there were some major reported differences between males and females in their ratings of the characteristics. Again, these differences are another area that warrant further investigation, and current observations are limited. However, overall, it can be argued that the respondents showed a great deal of recognition of the characteristics presented, and the study received (spontaneous) favorable comments about the nature of the study.

One of the main overall findings was the importance of realistic (good quality) sound, graphics, and setting. It is perhaps not surprising that realistic sound effects and speaking characters were identified as important to the respondents. Sound effects are one of the main interfaces of video games and a part of the basic overall structure of virtually all games. However, it was interesting to note that background music was only deemed as important by approximately one third of the respondents. It could well be that, for many gamers, background music could be seen as irrelevant or distracting. However, this also highlights one of the limitations of non-experimental survey studies. That is, background music is by definition "in the background" and, whilst not consciously processed, may in fact be an important feature of the overall gaming experience.

Further experimental studies need to be done to measure the effect of such features before we can clearly say if this is indeed an important psychostructural characteristic. An unpublished study by Griffiths[23] examined arousal levels while gamers played *Tetris* with either the sound on or off. Although almost all the sample described the background sounds and music as annoying and irritating, arousal levels (as measured by heart rate) were significantly higher when the sound was on. This suggests that the importance of sound may be unconscious. Interestingly, in the current study, sound effects were one of the few characteristics examined that were gender-neutral (i.e., they were expressed as equally important by both males and females).

The study demonstrates that, to a large extent, the success of a video game depends on a fairly high degree of realism both in terms of sounds and vision. High-quality realistic graphics were rated as important by four-fifths of the respondents. There were major gender differences in relation to the style of graphics, and this may relate to the type of games that males and females seem to prefer. It was evident that, although most respondents like realism, overall, males (more than females) preferred the explicit realism of games that involved FMV, skill development, violent actions, survival, and controlling vehicles. Similarly, males preferred games that were based on factual events. Such games are usually based upon battles or sports events for which males have traditionally had a preference in "real life." Therefore, such video games are essentially replicating gender stereotypical behavior, that is, action based, fast moving, competitive, and visual spatial activities. This may also relate to findings from previous studies that suggesting that males show a better average performance on visual and spatial tasks.[24,25]

The study also found that females were more likely to prefer the non-violent, less competitive, gentler paced cartoon style games, and the types of games that involved a higher degree of fantasy and make-believe. This is further demonstrated by the type of game dynamics that females preferred, such as solving puzzles, avoiding dangerous places, characters, and finding and collecting things. This supports previous research in this area that females tend to prefer non-violent problem solving games like *Tetris* and *Sonic the Hedgehog*, whereas boys preferred more violent games like *Streetfighter 2*.[3] However, it should be noted that this particular study used an adolescent sample. The fact that females seemed to prefer humor in games may also relate to their preference for non-violent, cartoon style games. Cartoons are after all primarily humorous. Similarly, it has been noted that males reported playing games to master them and for the competition, whereas females preferred the less aggressive and less demanding games.[26]

The competitiveness of males could also explain why more of them rated the multi-player options as important than did females, as multi-player characteristics offer greater opportunities for beating other players. However, more males than females also reported that they thought building alliances and multi-player communication were important game characteristics. One reason for this may be that males feel more at ease with online communication.[27] There are several possible tentative explanations if this is actually the case. Males may feel that they can communicate better from the relative anonymity that such technological communication offers, and such features may actually help them to develop socialization and communication skills, particularly if they feel isolated in other areas of their social lives. Other explanations may relate to females' relative alienation of online communication technologies and may be something that is redressed over time as such technologies become more common place. Clearly, this is an area that warrants further investigation.

The rate of play of video games was also deemed an important feature by the majority of the respondents. In particular, a rapid absorption rate was rated as important by over three-quarters of the sample with no gender differences evident. Similarly, rapid advancement through the game was also considered to be important by most respondents, with slightly more females preferring rapid advancement to males. These characteristics may, to some extent, relate to preferences regarding the duration of the game. Overall, medium duration games were preferred by the respondents, followed by long duration and then short duration games. However, males preferred long duration games the most, and females preferred medium duration games the most. Although short duration games were rated as important by only a small proportion of the sample, more females preferred these games to males. If females prefer rapid game advancement, it makes sense that they would also prefer shorter duration games, where advancement is likely to be relatively quick.

Winning and losing features were seen by most respondents as an essential characteristic of video games. The ability to save the game at regular intervals to avoid having to start the level again was rated as important by the vast majority of respondents. However, there were some marked gender

differences in that more females than males preferred accumulating points and finding bonuses. It could be that, as females seemed to prefer to be in competition with themselves, rather than others, that such features enabled them to achieve this goal.

Most respondents reported that a variety of control options were important to them and overall more males than females rated this as important. One characteristic of game controls that was not popular overall was the use of physical feedback. Why this may be so is not clear. Conversations with gamers and personal experiences with these devices suggest that they may be a distraction from the game and function as a kind of "reality check." For instance, if a player is absorbed in the virtual reality of the game, they may be less aware of their actual real world surroundings. Physical feedback (from a joystick say) may in fact serve to remind them that they are not actually in the game, but instead sitting in front of a screen holding a control. Why more females rated this feature as important is less clear, unless females are less positive than males about the dissociative experience of being absorbed into a game, and hence prefer to have such reality checks. This might explain why more females than males rated fantasy settings as important. Such settings may be clearer to distinguish from actual reality and perhaps less absorbing. Again, this is an area that needs further investigation.

Overall, celebrity endorsement was not rated as important by over half the respondents, and it could be that such endorsements could reduce the realism of the play. For example, if the player thinks that the skateboarder on the screen is Tony Hawkes, then it may be harder for them to imagine themselves in the game instead. This may explain why character development and character customization options were rated as important by most respondents.

The success of a video game's structural characteristics (where success is defined as an increase in video game play due to the structural characteristic) depends upon the psycho-structural interaction. The importance of a structural characteristic approach is the possibility to pinpoint more accurately where an individual's psychosocial processes influence their behavior. Such an approach also allows for psychologically context specific explanations of behavior rather than trait-based global explanations (such as "addictive personality").

It is clear that structural characteristics of video games are prevalent and appear to have come a long way over the last decade. Further work is still needed to pinpoint which structural characteristics are more likely to affect an increase in actual video game playing behavior. For instance, it may be that light, color, and sound effects are integral to increasing baseline levels of video game play.

It has been widely accepted that structural characteristics of slot machines influence the acquisition, development, and maintenance of gambling behavior. However, there has been little written on their role in video game play. It would appear that the role of structural characteristics in video game play has become more significant within the past decade as video games now have better graphics and sound, and are far more "realistic." Arguably, these more developed structural characteristics have an even greater potential to increase levels of video game playing both within society and within some individuals. Interactive feature plays, increased skill orientations and player involvement, and the manipulation of familiarity and sound effects are now combined to produce sophisticated and psychologically immersive video games.

This paper has made observations about the psycho-structural characteristics of video games based, in part, from previous research on certain forms of gambling, in particular slot machine gambling. The structural similarities between these two activities are, on many levels, very similar. Furthermore, as many forms of gambling are now utilizing video game technology, it is frequently becoming difficult, in the gambling sphere at least, to make a clear distinction between what is simply a video game and what is also a form of gambling. However, there are also major differences between these two activities in that video games are (usually) simply a form of entertainment, whereas gambling is also about winning and losing money. Consequently, the social costs of high-frequency video game playing behavior are not likely to compare with those of high-frequency gambling behavior.

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