Time for play – An exploratory analysis of the changing consumption contexts of digital games

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Abstract

This study posits that Internet technologies are relaxing the coupling constraints required for the consumption of digital games, resulting in entirely different modes of consumption than has been the norm for the past thirty years. The data collection and analysis found that players of traditional console-based games tend to play for several hours at a time while at a home during evenings and on weekends, the traditional scenario associated with leisure activities. Players of the latest breed of online browser-based digital games, on the other hand, tend to play them for only a few minutes at a time, and at many times throughout the day as a diversionary filler activity between other daily activities. Because they utilize simple and readily available Internet technologies, online browser-based games have facilitated the penetration of digital games into new spaces, including the workplace and school, reflecting a growing trend in modern society.

1 Introduction

Interactive digital games have penetrated deeply into modern popular culture, becoming a prevalent form of entertainment among children and adults alike. Digital game producers put a great deal of effort into creating, marketing, and distributing these games, and players respond by investing large sums of time and money in consuming them. However, despite the growing significance of this medium in the lives of a large segment of the population, little effort has gone into the examination of the changing consumption contexts of different forms of digital games that are arising due to the growing ubiquity of game playing technologies.

Digital games[1] are not a new phenomenon, but the Internet is greatly expanding their reach beyond what was possible during the first thirty years of their existence. They have suddenly evolved from an activity that possessed stereotypical leisure-related time and space requirements into an activity that can be enjoyed in a wide variety of places and time periods. Anecdotal evidence suggests that they are now being played in schoolrooms and workspaces, rather than only in the living room after work. This blurring of the separation between the once dichotomous realms of work and home is part of a growing trend in modern society that needs to be more clearly illuminated so that we can better understand its impact on us as individuals, as well as on us as a society.

The purpose of this study is to determine if there are differences between the typical times and places in which traditional console-based digital games (e.g. games played using Microsoft's Xbox® or Sony's PlayStation®) and the more recent breed of online browser-based games are consumed (see Appendix A for a brief overview these technologies). Based on the conjecture that widespread availability of Internet-capable technology enables game playing anytime and anywhere that such technology is present, it is believed that online browser-based games are easing the coupling constraint[2] that once restricted consumption of digital games, thus allowing them to be played in many additional times and spaces as compared with earlier forms of digital games. This study also presents a new method of gathering time use data regarding the consumption of an Internet-based activity that is typically consumed sporadically throughout the day and for short periods of time, a task for which many pre-existing time use methodologies are inadequate. This study is relevant to researchers interested in the role of Internet technolo-

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[1] A digital game is a computer-controlled game that players interact with and that typically uses a video display of some type as the primary feedback device. This includes arcade games, computer games, console games, cellular phone games, PDA games, as well as games played on other proprietary handheld devices and set top boxes. The term "digital game" is being used in this paper because it is broader in scope and connotation than the colloquial "video game".

[2] A coupling constraint is a restriction on one's ability to engage in an activity consequent to the need for requisite objects (e.g. equipment, devices, etc.), space, and time. For example, one can only engage in the sport of ice skating if one has ice skates, ice to skate on, and the time to engage in the activity. If one does not have ice skates and cannot acquire them, or there is no readily available ice to skate on, or the individual is busy doing something else such as working or sleeping, then the coupling constraint has not been met – not all of the necessary "ingredients" are available, and so the activity cannot occur.

gies and the manner in which they alter the consumption contexts of activities that can be conducted both online and offline, and to anyone that seeks to conduct similar time use studies related to these media.

This study uses two different time use survey methods to gather data from a population of digital game players concerning the context in which traditional console style video games and Internet-accessible browser-based games are played. These data are then compared and analyzed to reveal the differences in the times and spaces in which these two different forms of digital games are consumed. The first hypothesis of this study is that online browser-based games are being consumed at many different times throughout the day and week, whereas traditional console-based games are played most heavily during typical leisure times (evenings and weekends). The second hypothesis is that browser-based games are being consumed in many different places than console-based games, which are believed to be restricted to typical leisure spaces.

2   Literature review

Digital games have grown significantly since their birth in the 1960's, becoming an important component of mainstream popular culture (Kerr, 2006; Malliet and de Meyer, 2005). The digital gaming medium has reached almost every demographic segment and become nearly as pervasive as television and radio. In fact, the Entertainment Software Association (2005, 2007) reports that 67% of the heads of America's households play digital games of one type or another, and the average player spends approximately seven hours per week engaging in this form of entertainment. The quantity of time being spent consuming these games becomes quite large when considered in the aggregate. For example, Microsoft reports that gamers logged a total of 1.5 billion hours of play time using the Xbox® gaming console's online gaming network during the first sixteen months after its introduction (TeamXbox, 2006). That equates to about 65 million days or 200000 years spent playing games online - and this is just the amount of time spent using Microsoft's network, which is one of many.

Evidence of the growing popularity of digital gaming can also be seen in the industry's sales figures - the software portion of the US gaming industry alone is bringing in over seven billion dollars per year in revenue (Entertainment Software Association, 2007; Interactive Digital Software Association, 2003; Research Alert, 2005). This has brought the industry to a level comparable to many of the older, more traditionally popular media such as newspapers ($11 billion in 2004), magazines ($13 billion), and recorded music ($12.7 billion) (Research Alert, 2005). These numbers are indicative of the inclusion of digital gaming into mainstream culture. However, despite their significant role in the lives of much of the population, there has been very little exploration of the times and spaces in which digital games are consumed, and how that is changing consequent to modern technologies.

The basic tenets of time geography, first introduced by Hägerstrand (1970), are that all human activities take place in a physical location, and that all activities take time to complete. This represents the simple truth that, in order to engage in a specified activity, an individual must be at a specified place where the necessary conditions for the activity are present for a specified period of time. Thus, not all activities can be engaged in at any given moment because of the "coupling constraints" wherein time, space, and the individual must all meet the necessary conditions for the intended activity. For example, console-based digital games generally require the player to be at home (or the home of another) where the console and television to which it is connected are housed, and to have several hours of free time to spend engaging in the activity. The influence these sorts of restrictions have on the activities of a population is one of the major concerns of time use research, as is the manner in which individuals cope with these constraints as they carry out their daily lives (Ellegård & Cooper, 2004; Huisman & Forer, 2005).

A major constraint on the activities of many individuals is their work schedule. Classical notions in time use research consider time spent at work to be time that cannot be spent on other activities such as household chores, personal care, and leisure pursuits (Arndt, 1981; Gronau, 1977; Hornik, 1982; Juster & Stafford, 1991). In the classic view, work and leisure are dichotomous, largely because the workplace and leisure spaces present constraints in terms of time, location, and accessibility of resources. We cannot be in both spaces at once, nor can we have all of the resources that we need in order to engage in both activities at the same time. As stated by Huisman and Forer (2005, p.3), "Essentially, these fixed activities [such as paid work] impose constraints upon an individual's activity pattern. Rather than focusing on observed behaviour, Time-Geography has sought to define the physical (spatial and temporal) constraints which restrict the choice of alternatives open to the individual. This describes what is physically possible or accessible within certain time constraints."

Early time use theory such as that by Becker (1965) and Voss (1967) brought attention to the importance of studying time spent engaging in non-work activities in addition to the more commonly studied work activities, and laid down the definitions and fundamental framework still in use in time use research today. The proliferation of the Internet offers a challenge to some of these fundamental conceptualizations of work versus leisure. Research has begun to focus on the role of Internet technology in the erosion of the clear divisions between work spaces and leisure spaces, such as in the manner that paid-work related activities are migrating into the home (Kaufman-Scarborough, 2006), and how they are changing when and where university students carry out the business of their education (Forer & Huisman, 2000). However, little research has addressed the growing movement of leisure activities into new spaces, such as the workplace. Many non-work activities (both leisure and nondiscretionary activities[3]) that previously could not be carried on at work are now quickly and easily dovetailed into a daily work routine because they can be carried out online, such as shopping, reading the news, play-

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[3]   Nondiscretionary activities are typically defined as activities that one feels obligated to engage in, but for which the individual is not paid (Voss, 1967). Examples include doing household chores (laundry, washing dishes), cooking, and sleeping.

ing digital games, paying bills, watching the highlight reel from a recent sporting event, and even online dating. While digital games are the specific interest of this study, they represent but one of a plethora of online activities that are available to anyone, anywhere that they have access to an Internet-capable computer. The increasing time being spent in such activities while at work has ramifications for the individual's utility function (e.g. more time for leisure activities in total, and receiving wages for the time spent engaging in them) as well as for the firm's productivity (e.g. paying workers for time spent in leisure pursuits, and potentially less productive workers). This study examines the impact of Internet gaming technologies that represent a potential relaxing of the "coupling constraint" that used to restrict the play of digital games to leisure spaces, and reveals that this technology is leading to them being played while at work. Online game playing is one of many online activities that are bringing into question our fundamental notions of how to draw the line between work and leisure activities, and how to measure these activities now that the line is much less clear.

2.1   Lack of contextual data on game consumption

Studies have been conducted that reveal some of the motivation behind the consumption of digital games and the demographics of the people that play them (cf. Lucas, Greenberg, and Lachlan, 2006; Nielsen//NetRatings, 2004). However, our knowledge of the times and spaces within which they are played is somewhat lacking. Where information on when people play does exist, it is typically either too vague to have relevance, or it is very specific and lacking generalizability. An example of the former comes from the American Time Use Survey, which collects data on how much time people spend playing games. However, the coding of this type of activity lumps digital game playing into the same category with such varied pursuits as "playing cards," "working jigsaw puzzles," and "spinning dreidels" (US Bureau of Labor Statistics, 2004). Examples of the latter come from Nick Yee's Daedalus Project (Yee, 2004) and the PlayOn research group (Yee, 2006). Yee's research has produced rich and detailed data on how much time people spend playing Massively Multiplayer Online Role Playing Games (a.k.a. MMORPGs), but this type of data is much too specific (a single genre of computer-based multiplayer gaming) to be generalizable to other genres or gaming platforms. Additionally, the studies that have been done generally do not focus on when that play is occurring or in what contexts. Specific data on where and when the consumption of various forms of digital gaming occurs would aid in an understanding of how technological innovation in the gaming industry is changing the time geography of this leisure activity.

2.2   Online browser-based games

The market for digital games can be segmented based on many different criteria, the focus of this study being the method by which the digital gaming experience is delivered to, and/or consumed, by the consumer. A relatively new and rapidly growing method of such delivery comes via the Internet. The Pew Internet & American Life Project estimates that 71% of American adults (approximately 165-210 million individuals) currently have access to the Internet (Fal-

lows, 2007), and that number is expected to continue to increase into the foreseeable future due to greater penetration of high bandwidth networks and wireless devices (Deloitte Research, 2004). This widespread availability of Internet-capable technology is providing ample opportunity for many individuals to participate in online game playing. According to a study by Nielsen//NetRatings (2004), one out of every three Americans that spent time online during May of 2004 played browser-based games at a gaming website.

The technology that facilitates online browser-based games is different from that which has facilitated digital gaming in the past, creating an entirely new degree of accessibility. The traditional digital game playing scenario involves dedicated hardware and/or software required to play the game (e.g. a Microsoft Xbox®, the game's software, and a television), which is generally designed to occupy a fixed location. Thus, consumption in this scenario occurs in the same fixed location over time, and at times when the location is accessible to the player (e.g. in a living room and during non-work hours when the individual is at home – a stereotypical leisure context).

In the case of the technology that facilitates online browser-based[4] games, the player occupies a fixed location housing a minimal amount of *non-dedicated* hardware (i.e. a computer) that grants accessibility through the Internet to a webserver at some remote location, which in turn houses and distributes the actual software that generates the digital experience. As an example, any person using a modern computer and an Internet connection may direct the computer's web browser to http://www.miniclip.com or http://www.pogo.com and click on their choice of a variety of free games. The game will then load into the player's browser and can be played for as short or long a time as desired. There is no downloading or installing of software needed. Once the Internet browser is closed, the game itself and all supporting files that may have been temporarily cached on the computer cease to exist (for all practical points and purposes).

In some respects, online browser-based games are a radical modification of previous forms of digital gaming. Games can be played from virtually any computer, any time, without any financial investment (i.e. many are supported by advertising and can be played for free), and without requiring the player to have any specialized technical proficiencies (i.e. they tend to be very simple to play). They can be sampled and played nearly at will, in the privacy and comfort of whatever environment the consumer chooses, and can be played from public computers. Anywhere that a person can find a computer with an Internet connection is now a potential location for consumption of a digital game. In addition to increased geographic availability, the browser-based games tend to be short and simple; they do not require a substantial time investment, which increases the temporal availability of digital games as well. Although a single, definitive reason for the popularity of online browser-based games is elusive, there is little

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[4] A browser is a software program that is used to view and interact with various Internet resources available via the World Wide Web. Essentially, it is the program that allows one to view webpages. Popular examples of browsers include Netscape, Internet Explorer, Safari, and Mozilla Firefox. A browser-based game is a digital game that is accessed and played entirely through the use of a browser, typically without the need to download or install any additional software.

doubt as to the popularity of the medium, as summed up by the International Game Developer's Association (2006): "Without a doubt, more people from around the world play [browser-based] games than any other kind of video game."

3 Data

3.1 Phase one – Interception at time of use survey

The first method of data collection used in this study gathered information on the context in which a particular online browser-based game was being used. Simply gathering data on when people are playing does not tell us how they are fitting the play time into their daily routine. This data collection methodology was intended to reveal whether games distributed in this way really are being played in places other than the traditional "at home after work" scenario, and to what extent. The digital game used in this phase of the study was an online browser-based digital game that was created by the researcher called "War of Nations". The game is basically an interactive massively multiplayer turn based strategy game similar to the classic Milton Bradley board game titled Risk®, and was available free of charge on the Internet. This game was entirely authored, sponsored, and maintained by the researcher. It is part of a rapidly growing genre of games called "persistent worlds," in which the player must log in to the game regularly (via any computer that has an Internet connection) in order to maintain their strategic and tactical position within the gameworld[5]. As such, it affords the opportunity to study a relatively static population of game players that have integrated the activity into their daily lives. Games of this genre allow a player to log in, make their "moves" within the game space, and log out with only a few minutes of time commitment. While they are offline, the game continues, with other players logging in and making their moves, some of which may impact the offline players, who will then log in later to counter-move. This is a feature of many browser-based games that differentiates them from the typical console-based game, in which game play entirely ceases when the player pauses the game or turns off the console. Consequent to this on-going interaction with other players, loyalty to the game used in this study is fairly high – the mean number of days current players had spent playing the game at the time of this study was 192 days. Any player that is inactive for 14 days is automatically removed from the game, thus, the definition of a "player" is anyone that has actively participated in the game space continuously without any 2-week breaks in their participation. At the time of this study, the game had been online for two and a half years and had an average player base of approximately 150 players. For games of this genre, this population is fairly small; most games of this type boast player populations in the thousands. The entire adult (18 years of age or older) population of the game was used as a sampling frame for both phases of this study.

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[5]   A census of the "Multiplayer Online Games Directory" (http://www.mpogd.com) on November 12, 2005 found 1,023 similar entirely browser-based multiplayer games available on the Internet, many of which are also of the persistent world genre.

To collect the data, a random number generator presented players with a survey following approximately 10% of their logins to the game. 10% was an arbitrarily chosen number aimed at reducing the potential for respondent fatigue and keeping the response rate high throughout the study. Participation in the survey was rewarded with a "virtual" object that has value within the game. A potential limitation of this technique that should be mentioned is the simple fact that participating in a survey can alter the behavior of those that participate, particularly when an incentive is involved. However, the exact nature of that influence in this research project was not studied, and is unknown. The survey instrument asked the respondent to indicate which of 32 different activities most accurately represented the dominant activity they were engaged in prior to logging in to the game, and that which they intended to engage in after they finished playing. The choices available were based on a "light diary" design developed by Gershuny and Smith (1995) that covers broad categories of activities, but without going into so much detail that it becomes confusing or over-burdening for respondents. The 32 activities were grouped into seven categories and presented via a simple menu system, as depicted in Figure 1. This survey was left active on the game website for the period from March 2, 2006 until April 12, 2006. A total of 76 of the currently active players participated in the surveys (86% response rate), most of them more than once, resulting in 235 total usable completions (the mean number of responses per player was 3). In addition to the "context" questions, the survey instrument also recorded the time at which the player logged in to the game, and the time at which they logged out (i.e. the duration of the play experience). This time was recorded by a Javascript function that captured the time according to the clock on the player's computer, eliminating any confusion about the time zone of the player versus the time zone of the webserver. Phase one's methodology was employed to overcome common limitations inherent in recall-based time use data collection (see Mulligan, Schneider, & Wolfe [2005] for an overview of the problems inherent in many different types of time use instruments).

Online browser-based games are typically quick, simple to play, and easy to embed in a variety of other simultaneous activities - they represent the type of activities that recall-based surveys are especially bad at capturing. Studies have found that respondents are much more likely to accurately recall activities that are done on a regular schedule (such as a regularly scheduled gaming session with friends) than those which occur sporadically or infrequently (Blair & Burton, 1987; Havens & Schervish, 2001; Hu, Toh, & Lee, 2000; Juster, 1985; Sullivan, 2007). Also, events in which the respondent participates for longer periods of time (such as a three or four hour long Nintendo® session) are more likely to be accurately recalled than those that only last for a short period of time (such as playing an online game for a few minutes during a lunch break) (Hu, Toh, & Lee, 2000; Jarvis, 2003; Juster & Stafford, 1991).

The ability of Internet technology to record the details of the consumption event at the exact moment it is occurring offers an excellent method of capturing highly reliable data. This method was highly successful in this study, and is readily applicable to studies of any manner of Internet-based activities.

Figure 1
Illustration of the context data collection instrument

3.2 Phase two – survey of past players

The second phase of the study was intended to gather data on the consumption contexts of the traditional console and (non-browser-based) computer games. This took the form of an online survey that asked respondents to provide information on any digital game that they may have played over the previous 24 hours. This recall-style methodology was used because these other non-online, non-browser-based games are not played in a location where the player is readily accessible for surveying at the point of the consumption. However, anecdotal evidence suggests that the purposeful effort required to play games via these other methods makes them suitable for a recall-based survey. Requesting data from only the previous 24 hours was an attempt to enhance the accuracy of the data because time use research has suggested that accurate recall of an event is dependent on the amount of time that has elapsed since that event occurred (Doherty & Miller, 2000; Havens & Schervish, 2001).

The survey asked all of the same questions as the survey in phase one, with two notable exceptions. First, the participant was asked to provide the time at which they had started and finished playing a game (rather than having that data automatically recorded, as in phase one). Second, the respondent was asked to provide the type of game they played (e.g. console, computer, online, mobile) and the title of the game. This data was then used to categorize the respondent's consumption event into the appropriate category (traditional versus browser-based).

The sampling frame was composed of the same basic type of gamers as the previous phase. The email addresses of 4502 currently-inactive players of War of Nations (the same game used in phase one) were used as a mailing list. Batches of invitations to participate in the survey were emailed to approximately 200 potential respondents at a time, twice per day from March 16,

2006 to April 12, 2006. A batch was sent each morning and each evening every day of the week to try and elicit responses covering all times of the day and days of the week.

Approximately 9000 emails were sent, yielding 375 total visits to the survey website (4% response rate), but only 121 responses were usable due to incomplete data and underage respondents[6]. The low response rate for this survey (compared to that in phase one) is likely due to the lack of incentive to participate.

In addition to gathering data on the time, duration, and surrounding activities, the survey instruments collected simple demographic information: age, gender, occupational status, education level, and zip code. The vast majority of participants were residents of the USA – those residing outside of the US were excluded due to an inadequate number of observations to allow for analysis of differences between US and non-US players. Zip codes were used to look up the median per-capita income of residents in the individual's census tract, which was then used as a proxy for the individual's income. The results of this data collection can be seen in Table 1, which contains information from both phases of the study. Many of the players that were willing to respond to the questions dealing with the games being played failed to complete this demographic part of the survey, presumably because of concerns over their privacy. The demographic figures presented in Table 1 are representative of the types of respondents that reported playing each style of game in this study. The subjects in this study are predominantly young and male, coinciding with stereotypical views of digital game players in general.

Those with higher incomes (or higher family incomes) are more likely to be able to afford post-secondary education, and also to afford the expenses inherent in traditional digital games (i.e. a console and game software).

Another potential factor leading to the decision to play a browser-based game is the increased role expectations of older individuals. The stereotypical 30 year-old (as compared to a 21 year-old) is likely to be in a stage of the family life cycle (Wells & Gubar, 1966) in which they face a decrease in available leisure time due to the increased demands of their roles in career and family life (McGrath & Kelly, 1986).

Research by Kaufman, Lane, and Lindquist (1991) suggests that individuals with greater role expectations (i.e. more demanding roles in life that lead to greater pressure on available resources such as time, money, and energy) are more likely to engage in polychronic time use (doing more than one thing at a time). While the data collected in the current study are not able to specifically address the issue, the demographic profiles support the notion that older, potentially more time-deprived individuals are more likely to be playing browser-based games because they are more easily played simultaneously with (or dovetailed into) other required daily activities.

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[6] The Institutional Review Board that oversees all US University-based research that uses human subjects requires a signature from the parent or guardian of an underage respondent before any survey data can be collected from those individuals. Within the framework of the current methodology, this requirement could not feasibly be met, so only adult respondents were used in the study.

Table 1
Demographic Profile of Respondents

	Traditional Games	Browser-based Games	US Population
Age			
Median	21	30	35
Gender			
Female	13%	6%	51%
Male	87%	94%	49%
Work Status			
Full-time Student	31%	19%	6%
Work Full-time	41%	56%	63%
Part-time work and/or Part-time student	16%	13%	
Homemaker	2%	3%	
Unemployed	10%	6%	34%
Retired	0%	3%	
Education			
Less than high school	8%	3%	9%
High School	31%	31%	32%
Some College	36%	41%	25%
Bachelor's degree	16%	22%	18%
More than Bachelor's	8%	3%	10%
Per-capita Income			
Median	$24,943	$18,773	$21,587
Sample Size (those reporting these data):	61	32	

US work status and education figures compiled from the US Bureau of Labor statistics (http://www.bls.gov/), the US census (http://www.census.gov/), and the National Center for Education Statistics (http://nces.ed.gov) are somewhat vague and include overlaps due to the data not being readily available in the same divisions used in this survey.

3.3 Limitations of the survey methodologies

The first major issue is the limited nature of the sample population. This study surveyed all present and past players of a particular online browser-based strategy game. As such, the results of this study are fairly conclusive as to the behavior of this specific population, but do not necessarily extend to the entire population of digital game players. Future studies may wish to use sampling plans that will include a wider range of player types. A related limitation is the genre of game employed for the data collection. There are many types of browser-based games available via the Internet, and the particular genre to which this game belongs is attractive to more serious gamers. There are a great many simpler games available that are played by less committed gamers, and the populations playing those games may behave differently than the population used in this study. A second issue involves the self-selected nature of the respondents. The respondents in phase one chose to respond (ostensibly) out of a desire for the incentive. Phase two respondents participated out of some sort of altruism. In both cases, the individuals that

responded do not necessarily represent all of the gamers in the population, or in other populations.

A final issue involves the large number of underage respondents in the sample population. Due to the extreme difficulty involved in obtaining written parental consent from these minors, slightly less than sixty percent of the sample population were excluded due to age issues. As a consequence, any conclusions made in this study are only reflective of the adult population of this community.

4   Results and analysis

4.1   Time of play

Figure 2 depicts the number of respondent players consuming "traditional" games and "browser-based" games at any given time (the data is based on 15 minute intervals and is the aggregate of all weekdays and weekend days). The x-axis of the figure provides reference times, but also indicates those time periods wherein the differences between the two forms of gaming are significant. Chi-squared tests (χ^2) of significance were used to examine whether or not the proportion of players reporting playing games of each type were the same during a given 15 minute time period. The time of day represents the local time of the player.

Figure 2
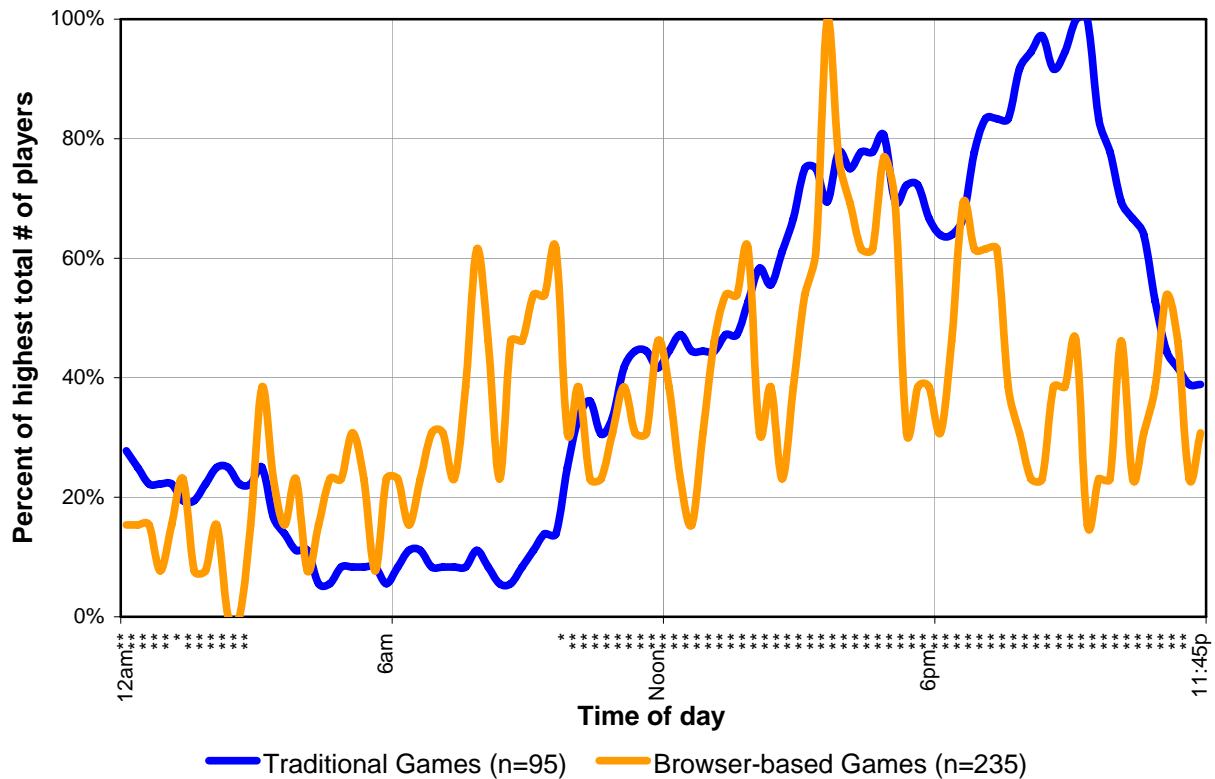**Time of play for traditional and browser-based games: Percent playing**
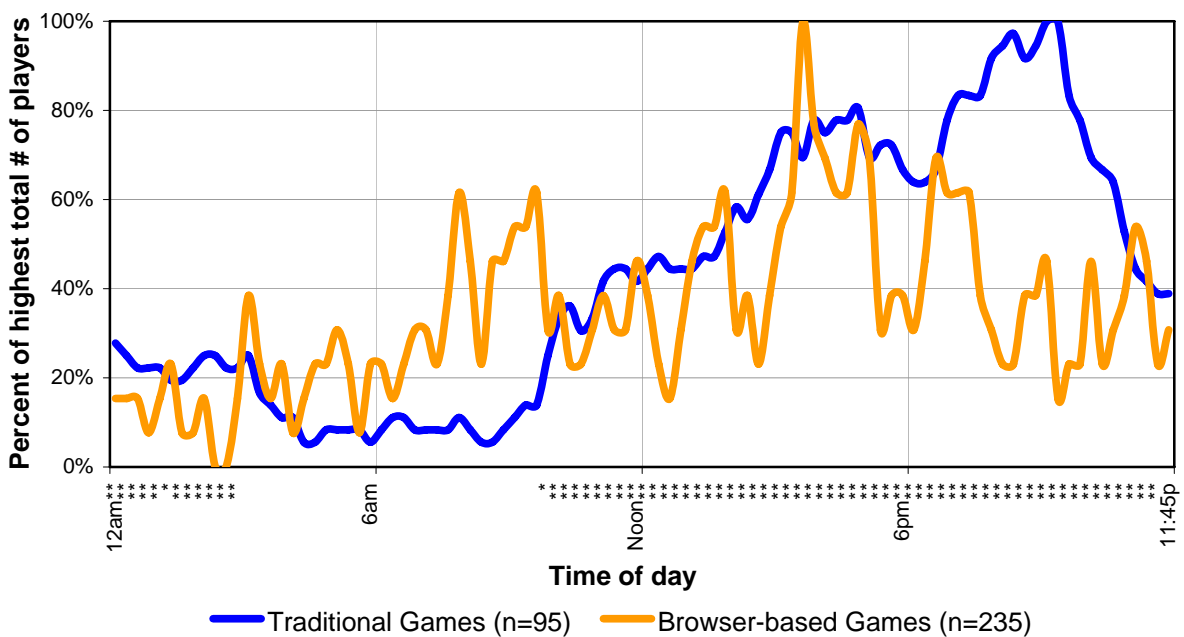
Statistical significance figures represent the significance between the
traditional games data and the browser-based games data.
*/** Statistically significant difference between the types at a 95%/ 99% confidence level.
Source: Calculations based on own data.

Figure 2 displays a pattern that is reflective of the length of time that players tend to spend playing games of the different types. The median amount of time spent continuously playing a game classified as a "traditional game" was three and a half hours, while "browser-based games" were played for a median time of fifteen minutes (the smallest interval possible via the survey instrument).

Consequently, a player of the older style of games was more likely to have their play episode overlap with that of other players, leading to the higher percentages in the graph. Another depiction of the exact same data can be seen in Figure 3. Figure 3 attempts to plot the data on a more directly comparable scale.

Each line is plotted based on the proportion of players of each type of game that were playing in a given time period relative to the maximum number that were ever playing at once. This makes it easier to see when a player is likely to consume each type of game relative to the other. In this depiction of the data, a steady increase in the playing of traditional games occurs throughout the day, reaching its highest point in the evening, just after a lull around 6:00pm (presumably representing the evening mealtime). Browser-based games, on the other hand, begin to be played earlier in the day (the first major spike in usage occurs at 8:00am) and continue sporadically, reaching their peak around 3:45pm. A notable diversion between browser-based games and traditional games occurs around 8:00pm, when browser-based games are being consumed less, while the older types of games are consumed more. This is posited to be because consumption of traditional console games is restricted to, and more suitable during, those post-work leisure hours (i.e. when the coupling constraints of that form of digital game consumption are met). If a gamer knows that they can play a browser-based game anytime, even while at work or school, but can only play their Xbox® in the evenings while at home, then that consumption makes more logical sense during that time frame. Additionally, a family or peer group that has a similar work-leisure time use pattern will have the opportunity to play together during leisure times (Fisher & Layte, 2004). It therefore makes sense to use those time periods to engage in multiplayer console games that are designed to be played in the same room with a group of friends, rather than to play single-player online games that can just as easily be played while alone and/or away from home. Console gamers are going to utilize those scarce "pure leisure" hours doing things that can only be done during that time due to coupling constraints. Leisure activities that have more relaxed coupling constraints and that can be easily integrated into the workday may be perceived as providing less utility if consumed during this "pure leisure" time as compared to a leisure activity that can only be consumed during this time. Through this logic, Internet accessible leisure activities are slowly migrating into the workday, as evidenced by these results. The time of day during which people play games was also considered from the perspective of weekdays versus weekend days. Large-scale time use studies have indicated a clear distinction between rates of participation in classically defined leisure activities on weekends versus during the workweek. Essentially, Americans tend to spend nearly 27% more time engaged in leisure activity on weekend days (with variations across different categories of leisure pursuits) (Juster & Stafford, 1991; Robinson & Godbey, 1997).

Figure 3
**Time of play for traditional and browser-based games: Proportion playing**

Statistical significance figures represent the significance the traditional games data and
the browser-based games data.
*/** Statistically significant difference between the types at a 95%/ 99% confidence level
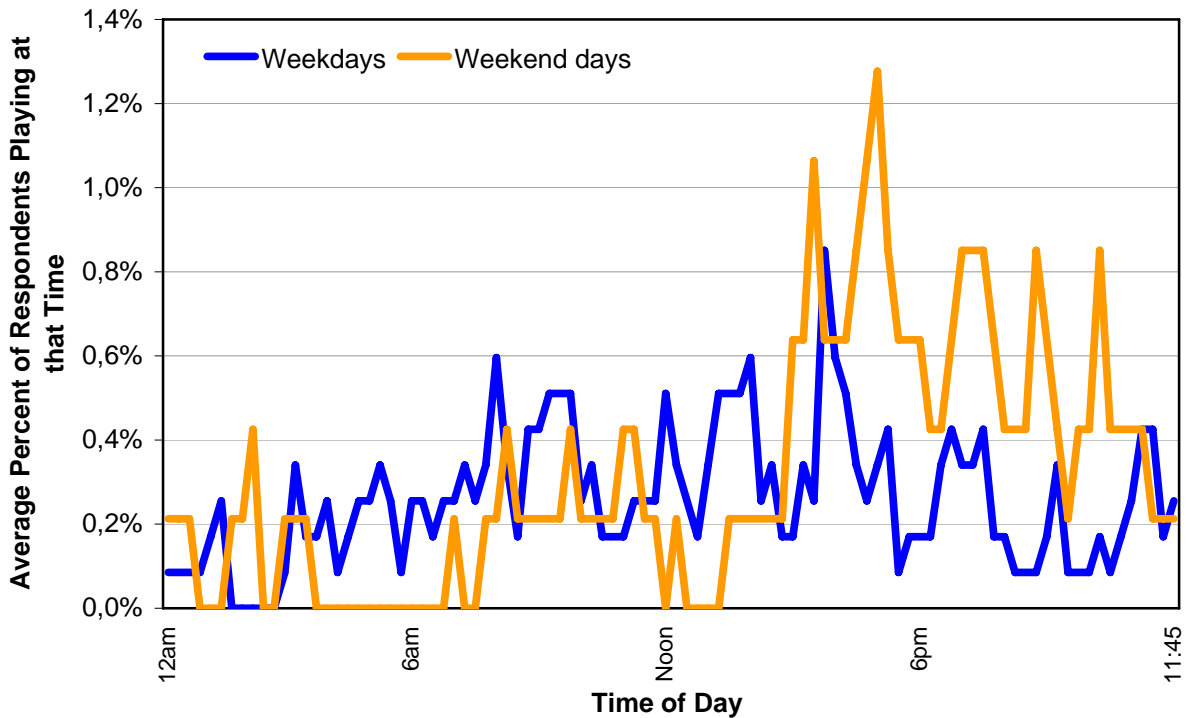Source: Calculations based on own data.

As such, we can expect digital games that are being consumed in the traditional manner in which leisure activities are consumed (i.e. during non-work hours and in non-work places) to exhibit a similar pattern. The data from this study clearly indicated just such a pattern of consumption for traditional games, but not for browser-based games (see Figures 4 and 5). While it is tempting to directly associate this weekday versus weekend pattern with the stereotypical work week (i.e. Monday-Friday are days spent working while Saturday and Sunday are days set aside for leisure), this study did not specifically inquire as to whether the participants adhered to such a schedule, and thus making that association is an assumption that cannot be strictly supported by the data presented in these graphs. A visual inspection of these graphs seems to hint that browser-based games are played almost equally across all days of the week, whereas traditional games exhibit the pattern expected of standard leisure activities – they are played most heavily in the evenings on weekdays but during both the day and evening on weekends. However, strong evidence was found *between* the different types of gaming. Analysis of the weekday data yielded results very similar to those displayed in the aggregated data (see Figure 6), indicating that traditional games are consumed much more actively in the afternoons and evenings than browser-based games. These graphs are suggestive of broad trends, but the small sample sizes of weekend play episodes are not able to provide conclusive statistical evidence.

Figure 4
Play of traditional games on weekdays and weekend days
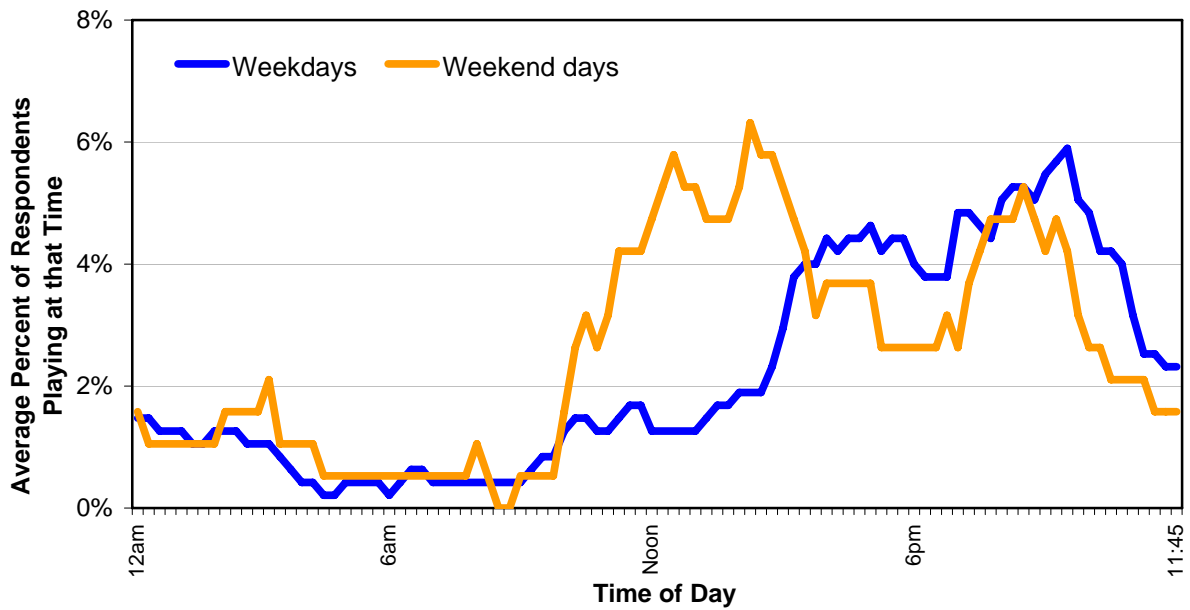
Percentages represent the average of all weekdays and all weekend days.
Chi-squared tests did not find any statistically significant differences between the data sets.
Source: Calculations based on own data.

Figure 5
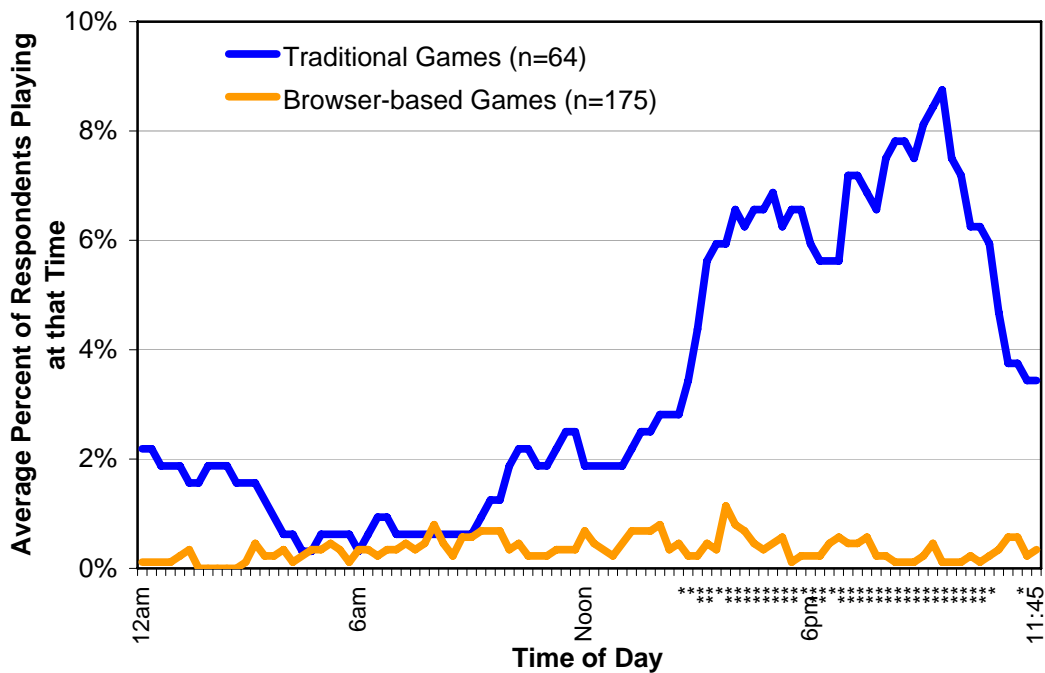**Play of browser-based games on weekdays and weekend days**

Percentages represent the average of all weekdays and all weekend days.
Chi-squared tests did not find any statistically significant differences between the data sets.
Source: Calculations based on own data.

Figure 6
Weekday play of traditional and browser-based games

Percentages represent the average of all weekdays (Monday through Friday).
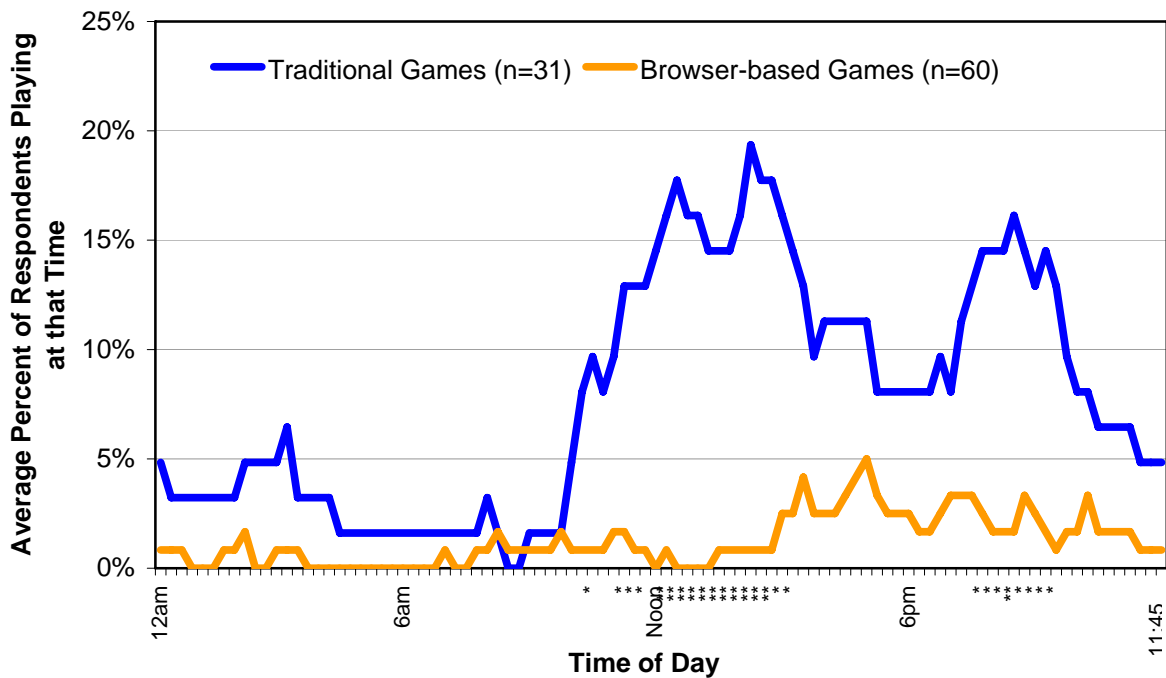Source: Calculations based on own data.

The weekend differences depicted in Figure 7 indicate that traditional games are played more heavily both during the day and during the evening. Both of these observations support the notion that traditional leisure times (weekday evenings and all day on weekends) will preferentially be filled with consumption of activities that can only be consumed during those times. One of the objectives of this study is to determine whether browser-based games are played in different times than traditional digital games. The collected data support the conjecture that they are by revealing a trend toward playing browser-based games equally across all days of the week, whereas traditional games are consumed in a fashion similar to other stereotypical leisure activities.

4.2 Context of Play

The second major factor being considered in this study is the place, or context, in which the consumption of these games is occurring. Table 2 displays summary results. For the statistical analysis in Table 2, each activity category was considered independently of the others, as was the distinction between activities engaged in before versus after playing (Chi-squared tests of significance were used to examine the differences). In all cases, the null hypothesis was that an equal proportion of players of each style of game would be engaged in the activity in question. Those cases where this hypothesis could be rejected are indicated by asterisks.

Figure 7
Weekend play of traditional and browser-based games

Percentages represent the average of all weekend days (Saturday and Sunday).
Source: Own calculations based on own collected data.

Table 2 provides an indication of those activities where the play context of browser-based games is significantly different from traditional games. The first point is that browser-based games are less likely to be associated with meals at home. This is likely due to the fact that many players of these games play them in short, sporadic bursts throughout the day, while traditional digital games are played more often in the evening after supper until bedtime (traditional game players are significantly more likely to sleep after playing versus before). The amount of time spent in a single play episode (typically over 3 hours) tends to make these consumption experiences a major event, couched between other major daily events such as meals, work, and sleep. Browser-based games, on the other hand, seem to be filler activities that can be easily squeezed in between many other routine daily behaviors.

The second major point is that browser-based games are much more likely than traditional games to be played while at work. Many of the players of the more traditional games mentioned having been at work before playing, but none mentioned then going back to work. The same is true of education and classes outside the home. This fits with the notion that these players are going home at the end of the workday/schoolday and starting to play. While just as many of the browser-based play episodes followed work, a full 9% of the responses indicated that the respondent was then going to resume working. Work was significantly more likely to follow a browser-based play episode (χ^2=12.71, p<0.000), partially because of these "at work" players, and partly because of a large number of players playing before starting work (5% indicated sleep or commuting, presumably to the workplace, as the activity that preceded the play

episode that was followed by work). This leads to the inductive inference that nearly 10% of online browser-based gameplay episodes are occurring while the player is at work.

Players of browser-based games are accessing them via the Internet. Therefore, it was expected that they would be associated with web browsing. However, they were no more likely to be preceded (χ^2=1.64, p=0.200) or followed (χ^2=0.68, p=0.407) by web browsing than traditional games. This suggests that the Internet was used at that point in time solely as a way to access the game. Respondents were not surfing around, then playing the game for a while before going back to other online activities. This supports the notion that the game was what the individual was seeking, and the Internet was simply the delivery vehicle, rather than the Internet being the destination and the game just one of many diversions consumed.

The finding that almost 10% of the participants are embedding browser-based game play into their workday strongly supports one of the ramifications of this study – these games are being played in places where traditional games are not, the workplace in particular. The accessibility of these games via the Internet has relaxed the coupling constraint previously inhibiting consumption of digital games in the workplace to the degree that playing during work hours and at the work place is common, at least among this population of gamers. In light of these results, it is important to recognize that digital games are just one of many activities that are benefiting from this relaxed coupling constraint.

The Internet has altered the consumption possibilities for a great many digital activities, both leisure (games, dating, chatting with friends) as well as nondiscretionary uses of time (paying bills, shopping, looking for a new job), allowing them to be engaged in during the workday. Generalizing further, it is clear that many activities that were previously bound to specific times and spaces can now be engaged in at many different times during the day, in many additional places, and can be broken up and spread out throughout the day to serve as filler activities between those traditional activities that have not benefited from such an abstraction (e.g. washing dishes, playing soccer).

A final observation from Table 2 is that browser-based games are significantly more likely to be followed by participation in sports or exercise (χ^2=7.16, p=0.007), but all of the models are equally likely to be preceded by such activities (χ^2=0.04, p=0.843). This would appear to be a consequence of the fact that browser-based gameplay occurs throughout the day, while the older models tend to be played later in the day, leading up to bedtime. This finding does *not* suggest that browser-based gamers are more physically active, but that consumption of these types of games is more likely to occur earlier in the day, for shorter spans of time, and to serve as a time-filler between other activities (such as while waiting to meet with friends for a sporting event).

Table 2
Activities before and after the play episode

Distribution Model:	Activity Prior to Play in %		Activity Following Play in %	
	Traditional	Browser-based	Traditional	Browser-based
In-home activities				
Sleep, rest	15	20	30	23
Washing, dressing, personal care	2	2	1	2
Food prep & clean up	7	1**	2	0
Eating at home	7	5	10	3*
Care of own children & play	3	2	1	3
Helping other household members	0	0	1	2
Out-of-home activities				
Travel, commuting	0	6*	1	2
Paid work	11	12	2	16**
Attending classes and ed. outside of home	7	7	2	4
Breaks and meals at work or study	0	2	2	0
Shopping	0	0	0	0
Professional appointments (doctor, dentist)	1	1	1	1
Helping people outside home, charities	0	0	0	0
Housework				
Cleaning house, tidying	7	1**	2	1
Clothes washing, ironing, sewing, etc.	1	0	0	1
Maintenance, odd jobs, DIY	1	0	0	0
Gardening, pet care	0	0	0	0
Study and Labor at home				
Studying at home	8	5	3	7
Paid work at home	0	1	0	1
In-home entertainment				
TV, radio	3	9	12	6
Talking, telephone calls, email, online IM	3	0*	2	2
Reading	0	2	2	3
Web browsing	2	5	3	5
Other hobbies	3	1	3	1
Out-of-home entertainment				
Eating, drinking out (bars, restaurants)	0	3	3	2
Visiting friends (may include eating)	4	3	0	2
Sports participation, exercising	4	4	0	7**
Walks, outings, etc.	0	0	1	0
Concerts, theatre, cinema, sport spectacles	0	0	2	1
Religious, political, other meetings	0	1	0	0
Other				
Doing nothing	3	0*	0	1
Other, not elsewhere specified	8	3	11	3**
Sample Size	92	258	92	258

* Statistically significant difference between the types of games at a 95% confidence level.
** Statistically significant difference between the types of games at a 99% confidence level or above.
Source: Calculations based on own data.

5   Conclusions and Implications

The results of the data analysis supported the hypotheses and primary conjecture of this study. Online browser-based games are consumed at many different times throughout the day and days of the week, while the more traditional console-based games are played much more heavily in the afternoons and evenings. These older forms of digital gaming are still restricted by the classical coupling constraints, and tend to be associated with classically defined leisure times and spaces. Online browser-based games, on the other hand, are consumed in some places where the other forms of games are not, most notably while at work and at school, and the consumption episodes tend to be much shorter (fifteen minutes or less versus more than three hours for the other types of games). Aside from being an illustration of the impact of the Internet on traditional notions of time geography, this relaxing of the coupling constraints on digital game playing also represents a phenomenon that feeds into the lifestyle of the growing class of time-constrained consumers that are actively pursuing a large variety of short-duration activities with which to fill their scarce free time (Sullivan, 2007). Any activity that can be performed via the Internet, whether it be leisure, work, or chores, can now be broken up and engaged in at many different points during the day and week. This reality complicates any traditional time use study; future time use studies will require detailed analysis of all Internet activities engaged in during the day, no matter how short the duration, and separating work from leisure activities will require greater attention to exactly what is being done, rather than when or where.

An additional important purpose of this study was to test the "interception at time of consumption" survey methodology. Online behaviors are difficult to categorize and track. An individual can check their email, find information on a product they are interested in, make reservations for a hotel, and play a game all while carrying on instant messenger conversations with several people entirely within a time span of less than fifteen minutes. A typical quantitative time use survey that asks the individual what they did on the Internet during those fifteen minutes is going to have a hard time coming up with an accurate portrayal of the activities. Internet activities can be shorter in duration and more fluid than most popular research methodologies can accommodate. Setting up a survey that intercepted an individual at that exact moment when they engaged in the activity worked well for this study. The response rate was very high (significantly higher than the standard survey used in phase two), and the instrument was able to capture data about the context of the behavior that is probably much more accurate than would have been possible through a recall based survey or a diary. All in all, this methodology proved itself to be a very valuable tool for time use research related to online gaming behavior, and it is likely to be useful in all time use research that involves studying Internet use, or populations that use the Internet.

The results of this study are reflective of a general trend in modern American society. Consumers are spending more and more of their time interacting with, and through, Internet based technologies. This represents a cultural shift with far reaching consequences. A central tenet of time use research is that individuals have 1440 minutes per day to budget to the activities in which

they wish to engage. How masses of individuals collectively choose to spend those minutes dictates the structure of our society and the marketplace. The fact that there are a limited number of minutes available means that time spent on a new activity is time not being spent on an old activity.

The manner in which players of online browser-based games fit the consumption into their day provides hints as to what activities those play episodes might be displacing. Traditional digital games that are played in traditional leisure times are most likely to be replacing time spent with other leisure activities, such as outdoor sports and hobbies. They are also likely to be replacing other entertainment media and may be contributing to the recent decline in television viewership (Broadcast Engineering, 2004; Hughes, 2005). Browser-based games played periodically throughout the day (and at work) for purposes of diversion, on the other hand, may possibly be replacing economically productive activities, or household chores. This brings up obvious questions of lost productivity in the workplace, something that becomes even more significant when we take into account the wide variety of other Internet-accessible activities that are equally likely to be consumed in a similar fashion.

The results of this study support the conjecture that the technology that distributes digital games is related to their method of consumption, but the nature of the present study does not support a causal link between that technology and the consumption tendencies. This was an exploratory study, and as such, it was limited in its scope and the conclusiveness of its findings should only be considered as suggestive. Given the results, however, more research into the online browser-based gaming phenomenon is certainly warranted. Topics might include:

- What is the role of gaming in the workplace? How, when, and why do workers fit these short play episodes into their day? What impact does it have on their productivity? What impact does it have on how they spend their leisure time?

- Are the people that play these games while at work different from other game players? Do they play at work because they are spending more time there?

- Are digital games just substitutes for alternative leisure activities, or are they displacing other, non-leisure activities as well?

- The data collected in this study came from a free online game - does paying for a browser-based game alter how it is consumed? Does that monetary expenditure lead to longer or more frequent consumption episodes (i.e. a motivated attempt to maximize utility)?

This paper collected some introductory statistics on the relationship between the technology involved in digital games and the consumption itself, suggesting a penetration of digital games into new times and spaces in our lives and daily routines. As Internet use continues to grow, and new technologies emerge to absorb our time, time use researchers are going to increasingly be called to examine this fluid and dynamic realm of human experience. This study has presented a methodology and case study of how such examinations might possibly be conducted.

Appendix

Overview of console- and browser-based games

The term "digital game" has come to refer to any type of computer-controlled game that players interact with and that (typically) uses a video display of some type as the primary feedback device. The term is being used by the burgeoning field of digital games studies as an umbrella term that encompasses many diverse types of games: arcade games, computer games, console games, mobile games, online games, etc. These varying forms of games have many differences which essentially distinguish them as individual mediums, rather than as one cohesive media. However, they all share a fundamental commonality: they are created, distributed, and consumed using digital technologies – hence the use of the catch-all term "digital games".

This study focuses on two different types of digital games that are easily distinguishable based on the differences in equipment needed to play a game: console-based games and browser-based games. Console gaming systems first emerged in the 1970's (Malliet & de Meyer, 2005), and typically consist of a small computer system designed specifically to play games that is connected to the user's television set and into which interchangeable game cartridge or compact discs are inserted. Popular examples include the Atari 2600, Nintendo® Entertainment System, Sony Playstation®, and Microsoft Xbox®. The base system (the computer hardware) typically costs in excess of US$100, and is required to play any games. Individual games are sold separately and are usually only playable on the console system for which they were designed (e.g. Xbox games can only be played using an Xbox console). Console-based games tend to have relatively advanced graphics and sophisticated game play. Traditionally, games for these systems are for one player or for two players only, and popular genres of games include racing, fighting, action, and sports.

Browser-based games, on the other hand, are played on a computer that has Internet access. There is no specific hardware required; any modern computer can be used to play these games. However, in order to play browser-based games, the computer must have access to the Internet and have the software necessary for browsing (e.g. Microsoft's Internet Explorer, which is generally included in every installation of the Windows operating system). Browser-based games are called "browser-based" because all of the software needed to play them is included in the browser. These games tend to use an advertising-based revenue model, wherein a game is provided free of charge to all players, with the understanding that they will have to endure occasional advertisements during the gameplay, typicallly in the form of a banner ad or an ad that appears while the player waits for the game to load. A player of such a game does not need to download or install any additional software in order to play. Games of this type tend to be very simple, easy to play, and have rather basic graphics. Many games are single player, but there are also multiplayer games in which anywhere from several players to hundreds of players are all interacting within the same gamespace. These multiplayer games are very different from the

typical console-based game, in that a player can easily "pause" their participation in the game (by simply taking a break from their computer, or by actively leaving the game space by logging out) while the other players in the game space continue to play. The player can then return to the game later and find that the game space has changed due to the actions of the other players; console games typically do not have this feature – once the game is paused or turned off, all game play ceases until the player returns, or begins a new play episode. Puzzle and strategy games are popular single player genres, while roleplaying and card games are popular mutliplayer genres.

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