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The Convergence of Structure and Design Between Video Games and Video Gambling

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THE CONVERGENCE OF STRUCTURE AND
DESIGN BETWEEN VIDEO GAMES
AND VIDEO GAMBLING

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Abstract

This study looks at the incorporation of video game design and structure into contemporary slot machines. The investigation was guided by theoretical and empirical works from a range of scholarly fields: gambling studies, video-game studies, digital communication, psychology, and sociology. Two methodological designs were employed. The first phase used a content analysis that identified the distribution of video-game styles and design in the most recent slot games on display at a major industry conference. The second phase employed semi-structured interviews with both experienced and inexperienced slot players to assess the impact of different design elements on their playing experience and motivation to play. Findings indicate that current slot machines share some similarities with video game mechanics through the introduction of more complex structure and multiple goals or games within games. Slot machines can resemble the immersive elements video games with the use of sophisticated graphics and sound design as well as the incorporation of complex themes and interactive animated characters. Eight gamblers with experience ranging from novice to highly experience participated in in-depth interviews. The interviews suggest that, like with video game players, some slot players might be more attracted to complex game mechanics in slot machines while other players are more interested in the immersive elements. The implications for the future of slot machine design, the study of slot machine design on problem gambling, and the use of digital space to introduce play into gambling are discussed.

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Chapter 1: Introduction

Slot machines are a ubiquitous presence in Nevada. They dominate not only the mega resorts on the famous strip, but also appear in dozens of local casinos, hundreds of gas stations, grocery stores, taverns, and laundromats. Rows of them prominently greet tourists at every gate when they disembark at McCarren airport, a spectacle that is no doubt disorienting to the newcomer while at the same time reinforcing the slot machine's established role in the city. Each one is akin to a small economic engine for the state of Nevada, generating casino profit, wages for employees, and tax revenue that supports public services with each spin.

Electronic gaming machines are efficiently distributed in populated centers throughout Nevada, and it is no wonder why. Not only do these machines occupy the bulk of most casino gaming space, they also generate the lion's share of gaming revenue. In 1991, slot machines earned 257 million for Nevada gaming establishments, this constituted 55% of gaming revenue ("Gaming Revenue Report," 1991). Ten years later, slot revenue would increase to 433 million and represent nearly 60% of the take. By 2011, Nevada gaming establishments offered 164,343 electronic gaming machines producing a total of 6.7 billion dollars in revenue, about 63% of all gambling earnings ("Gaming Revenue Report" 2001 and 2012).

The prominence of slot machines in Las Vegas today would have been difficult to foresee in the mid-twentieth century. When these machines were first introduced into Nevada casinos they were dismissed by many as novelty devices, primarily designed to appeal to women with limited gambling funds. Slot machines suffered from even greater stigma outside Nevada where they were heavily regulated and often prohibited. The early consensus was that slot machines did not represent true, serious gambling (Fey 2002). Indeed, it could be argued that the changes in the design and layout of slot machines in Vegas reflected the slot machine's ever-improving

status. Most early slot machines did not even offer chairs for gambling, whereas today virtually all slot machines offer ergonomic seating precisely designed to maximize both comfort and a wide variety of player styles (Scheri 2005). Other accommodating features introduced to the contemporary machine include the ability to accept cash instead of coins and the use of redeemable printed tickets for cashing out. The rise of "cashless" or credit machine gambling appealed to both casinos and players by eliminating the inefficient (and often grimy) practices associated with coins, and introducing flexible systems that encouraged more diverse wagering patterns and wagering denominations (leading to the rise of the so-called penny slots) (Schwartz 2010).

In his study on Las Vegas casinos, Erving Goffman notably dismissed the solitary slot machine as a lesser form of gambling that could not replicate the true social essence of gambling that could be found playing such games as blackjack or craps (1969). Goffman emphasized how traditional gambling offered a rare opportunity to acquire an increasingly diminished quality: action. Action involves skill, taking risks, and a willingness to eschew social convention, qualities Goffman admired in the craps shooter or blackjack player. In contrast, he defined machine gambling as low-risk, passive, and lacking the inherent qualities of true gambling he admired (Goffman 1969).

Almost fifty years after Goffman's initial dismissals, the nature of interaction between player and machine no longer reflects this simple definition. The design and game play of contemporary slot machines have evolved significantly from the original mechanical designs of the early 20th century. The staples of early slot machine play --actual physical mechanics like levers, reels, and coins-- have been replaced with entirely digital processes. Though many new machines still provide levers to pull, physical reels that spin, and speakers that play the sound of

coins raining into a metal collector; they are essentially simulations that allow an increasingly complex and diverse array of machines the ability to retain some base level of familiarity (Schüll 2012). The slot machines of today are a sophisticated blend of high-end graphics and sound that deliver a diverse range of complex game play and win-delivery methods. They reflect an impressive design feat: translating cold and robotic win/loss probabilities into a mysterious, whimsical, and entertaining experience. A winning spin offers players more than simple monetary gain but an opportunity to experience hidden secrets within the machine: bonus games, animation and movie clips, even the chance to play simultaneously with other players on linked machines.

Changes in slot machine design merit close examination. The growth in popularity and distribution of slot machines extends beyond Nevada. In the United States, over 800,000 electronic gaming machines of some form collect wagers in thirty nine states (American Gaming Association 2013) and make up a very substantial portion of the 38 billion dollars in casino gaming revenue (Schwartz 2014). Industry research estimates over 70 million U.S. residents gambled in casinos at least once in 2012 with 61 percent of them favoring slot games (American Gaming Association 2013). Each of Canada;s ten provinces offers machine gambling in some form (Marshall 2011). Globally, machine gaming has a significant presence and economic impact in Scandinavia, the United Kingdom, Central and Eastern Europe, Japan, Australia and New Zealand (Brooks, Ellis, and Lewis 2008; Meyer, Hayer, and Griffiths 2009; Office of Economic and Statistical Research 2010). Machine gambling's popularity does not transcend all cultures; however, as is evident in the surprisingly small share of revenue generated by slot machines in the emerging and important Asian markets of South Korea, Macau, and Singapore (Lam 2012; Loi and Kim 2010; "Macau Gaming Summary," 2013).

Slot machine evolution has not occurred in a design or entertainment vacuum. Indeed, the past twenty years have seen video games dramatically change in terms of complexity, scope, and realism. The early dismissal of slot machines in American gambling circles may have reflected a cultural bias against machine-driven play overall. In the mid-20th century, gaming machines (such as pinball or toys) were amusement devices for children and adolescents only. In today's entertainment market, human/machine play increasingly dominates our attention across a range of demographics.

Video games have also had a significant cultural and economic presence. The introduction of the Atari Video Computer System in 1977 marked the first significant commercial introduction of video gaming for household use. By the end of the 1980s, over 30 million North American households owned the Nintendo Entertainment System (Nintendo 2010). Today, in addition to traditional video game systems, a wide range of platforms from smart phones to laptops to even art projects and billboards offer the opportunity to play a video game. The number of software titles available to play is in the tens of thousands. For example, Apple computers, whose line of *i*-products dominates the casual gaming market, currently offers over 300,000 games for download to their devices (App Store Metrics 2015).

Within the last decade, video games have emerged as one of the largest leisure pursuits throughout the developed and developing word. Video game revenues and the number of hours devoted to playing them now exceed the economic and social impact of traditional mass media like television and movies. Sales data from the Entertainment Software Association (2012) indicate that American consumers alone spent 16.5 billion dollars on video game titles in 2012. *Activision Blizzard*, which owns popular video game franchises like *Call of Duty* and *World of Warcraft*, reported 4.75 billion dollars in global revenue in 2011 (Activision Blizzard 2011a). In

November 2011, the release of *Call of Duty: Black Ops 2* earned a worldwide total of 500 million in the first 24 hours of release, an opening-day figure that is comparable to the highest grossing movies of all time (Activision Blizzard 2011b; Internet Movie Database 2012). In 2013, Rockstar Games' highly anticipated title *Grand Theft Auto 5* made 800 million dollars in sales on the first day alone (Take-Two Interactive 2013). Total US sales of video game titles in 2011 was over 15 billion dollars, far exceeding the 10.6 billion movies earned at the domestic box office in the same year (Motion Picture Association of America Inc. 2011, NPD Group, 2012). Equally impressive is the fact that the 16.5 billion dollar North American market, though the largest national market, represents less than one fifth of the global economic impact of video games. Market assessments of global video gaming revenue (for all categories of games) project revenues exceeding 100 billion dollars by 2014 with robust growth through 2017 (Gartner Inc. 2013).

To a surprising degree, a popular video game can often bridge numerous cultural gaps: a good game design can appeal to very diverse populations of players. Games that originate from studios based in North America, Europe, Asia, and Australia find mass appeal that extends globally. For example, two of the more popular casual game titles of recent years, *Angry Birds* and *Candy Crush Saga*, emerged out of small studios in Finland, Great Britain, and Sweden and have generated hundreds of millions in revenue from over a billion players across all continents (Dredge 2013a; Dredge 2013b). *Starcraft*, a decades-old U.S. video game franchise became so popular in South Korea that televised professional competitions between players attracted tens of thousands of viewers and produced legitimate video game playing superstars (Bell, 2013). By the end of 2013, China (which only recently lifted a ban on home console systems) had nearly half a billion video gamers playing a mixture of both Chinese-developed and internationally-

produced mobile and PC titles (Pfanner 2014) generating 13 billion dollars in revenue (PricewaterhouseCoopers 2013).

In addition to robust sales, recent studies from a number of sources show that video games increasingly occupy a significant portion of our leisure time. Data on video game usage among first-year college students in the United States indicates that 92 percent of college men and 72 percent of college women play video games at least once a week. The average male student reported 14.3 hours of weekly play while women played an average of 9.5 hours per week (Cole, 2012). Although much of the discussion on video game usage focuses on a younger, male demographic (and not entirely without cause), the evidence suggests that video gaming of some fashion is increasingly gaining hold across genders, generations, and cultures. A survey of 2,054 American adults found that adult men are only slightly more inclined to play video games than women while 48 percent of all respondents reported playing some form of video game at least once a week. This same study also reported that 60 percent of Americans between the ages of 35 and 49, and 40 percent between 50 and 64, acknowledge regular or somewhat regular video game playing (Lenhart, Jones, and Ranking Macgill 2008).

Research on European video game players indicates similar demographic patterns as North America (Interactive Software Federation of Europe 2012). Chinese data points to a younger and more urban video game demographic that is active among both men and women (Brightman 2013). The rise of video game popularity can be attributed to a number of factors, many related to technological advancements over the last decade. The consistent and somewhat dramatic increase of the computational and graphical power of video game devices and computers (*Nintendo*'s latest console, the Wii U literally uses 1000 times more RAM than the pioneering Nintendo Entertainment System), coupled with the ability to link the gaming

experience of tens of thousands players simultaneously has resulted in an almost unlimited

creative canvas for game designers to utilize.

Perhaps an equally important development is the rapid growth of the smart phone market.

Even the most basic of these hand-held computers is capable of delivering a range of gaming

titles that offer different styles and objectives of play with impressive graphics and sounds.

Although portable electronic gaming devices have existed since the 1970's, the dominance of

smart phones is highly significant in that their primary purpose is communication, not play. As

mobile phones increased their computing power and popularity, millions of consumers who may

not have had much inclination towards video gaming suddenly own devices capable of

delivering thousands of titles instantly, cheaply, and with content geared towards their interest.

Consumer data reveals that almost 80 percent of American smart-phone users are devoting an

average of 10 hours a month playing games on these devices (Arbitron Inc., 2013).

Purpose of Study

The meteoric growth of video gaming across cultural and demographic boundaries is of

significant importance to electronic gambling machines. Slot machines and video games

increasingly share a range of important characteristics including game mechanics, the

presentation of graphics and sound, game play structure, and perhaps most importantly users.

This potential convergence of slot machines and video games offers both opportunities and

challenges to the gaming industry. On the one hand, evolving video game design and structure is

being adapted to conventional slot play. Slot machine elements like graphics, sound, theme,

story, and game structure have evolved significantly within the last decade. A typical slot

experience can include triggering multiple "bonus" or side games to play, the sensation of

dynamic and high quality video, animation, sound, and music, even the opportunity to play with

or against fellow slot players. The introduction of these changes merits a new set of analytical tools to complement current research on slot machines. Research into video games and video gamers offers a wealth of insights and new perspectives on player experience, motivation, and even potential addiction concerns and is a logical next step in the study of slot machines.

But beyond identifying design changes and the potential effects of those changes in machine gambling, this study also looks to better understand why machine gambling has shifted in this direction. Goffman's (1969) description of the unserious and action-free gambling that slot machines offer seems turned on its head when the biggest share of gambling in Las Vegas occurs on colorful, playful, and mysterious machines. Sociologists like Gottschalk (1995) and Reith (2002) argue that the over-the-top space and culture that is Las Vegas both disorients visitors and then reorients them towards a fun, playful, and consumerist perspective. As the newest slot machines introduce complex and fantastically illustrated and animated digital spaces, are they expanding this "Las Vegasness" to the virtual landscape where much of the gambling occurs?

Building primarily on Lombard and Ditton's (1997) concept of presence in electronic mediums, Salen and Zimmerman's theory of video game design, and Yee's (2006a) seminal study into the motivations of video gamers, this project examines the impact of video game design elements in newer slot machines primarily designed for the North American market. Using both a quantitative and qualitative approach, the study employed a quantitative, conceptual analysis to identify and catalogue a range of video game styles and structure present in new slot machine models as well as a second, qualitative, relational analysis to identify how these game play elements reinforce or supplant traditional slot machine design and objectives. The second phase of the study used semi-structured interviews with both experienced and inexperienced slot

players to further explore the potential impact of video game elements on their experience and understanding of machine gambling. The goal of this analysis is threefold: to bridge theories and research on video games with research into gambling and slot machines, to identify significant design changes in slot machine design and game play and, through synthesis, to develop a new framework from which to study and evaluate slot machine characteristics.

Chapter Two: Video Game Theory

Defining the number of different video game styles is almost as challenging as cataloguing the number of titles. Games can range from small-scale productions that are designed for intermittent, casual play (often on a portable device such as a tablet or smart phone) to programs that deliver vast and richly-detailed worlds that players can explore, shape, and experience simultaneously with other players. Themes vary dramatically from military combat to fantasy immersion; some games encourage cooperation among players to construct worlds and accomplish tasks through collaboration, while other games pit players in competition against each other, while other games simply encourage players to explore and discover the content of the game and interact with others in the digital space.

The economic model used by video game manufacturers to generate profit is also quite varied. The original arcade video games required players to pay a small amount for each play (the longer you stayed alive the more value you got from your quarter). The traditional model, introduced by companies like Atari and Nintendo depended on the sale of gaming consoles and a variety of individual software titles --a sales model that was boosted by the introduction of personal computers and home console systems. The source of gaming revenue for these traditional models came almost entirely from the sale of hardware and software (additionally, licensing for toys or products could also generate some revenue). Today, while many game developers rely on hardware and software sales for the bulk of their revenue, new revenue models that adapt to the realities of social and smart phone gaming are quickly emerging.

In addition to software sales, many popular games also require players to pay a monthly subscription fee to access their characters and the game world. In 2012, *World of Warcraft*, one of the most profitable and populated video games in history reported 10 million monthly

subscribers generating an annual revenue of more than five billion (Activision Blizzard, 2012). Other game franchises, rather than requiring players to outright pay to play, offer in-game benefits or perks (called micotransactions) such as quicker advancement through the game or competitive advantages for purchase to enhance the game experience. Though not all players will purchase these enhancements, enough do to make this model viable. Zynga, one of the largest gaming companies on Facebook reported 2.9 million unique players who paid for some form of virtual currency in the month of December 2011 (Zynga, 2011).

Society and Play

Dutch historian Johan Huizinga viewed games and play as an integral and ubiquitous aspect of human culture. His famous work, *Homo Ludens*, defined games and play as occupying a vital yet separate space in society, one in which the social conditions of play allows for a temporary suspension (or at least bending) of the normal rules of society (Huizinga 1950). Building on Huizinga's work, French scholar Roger Caillois argued that games are central to social organization while simultaneously a reflection of the cultural distinctions of the society that uses them (2001). Caillois categorized four characteristics of games: agon (competition), alea (chance), mimesis (taking the persona or characteristics of someone or something else), and ilinx (disorientation of the senses). Games employ agon, alea, mimesis, and ilinx in a manner that ultimately strengthens the society that develops them, maintaining a tenuous duality as reinforcements of society values or as harmless opportunities to taunt, ridicule, and flaunt the rigid restrictions imposed by culture in a social area where such rebellion can do no harm.

Certainly, when we consider both the historical design of video games and their current incarnations, one or more of Caillois' four characteristics of games are found in a variety of titles (Caillois identified these elements as well in the precursor to video games: pinball machines). Mimesis, the act of slipping on the skin of someone or something else through play, is a

consistent and fundamental element of almost all video game titles (online versions of games like chess and scrabble would be an obvious exception to the rule). From the early days of *Pac Man* and *Space Invaders,* video games have typically invited players to take on a number of roles in play: soldier, criminal, athlete, farmer, knight, superhero. Today, the opportunity to customize and develop a character is a significant game-play element of many video game franchises. Players do not merely take control of protagonists but actively design and shape their avatars as a way of introducing complexity and a sense of identity in their video game play. For example, the online, space-themed game EVE allows players to precisely manipulate their avatar's gender, skin tone, hair color, facial structure, facial hair, eye color, and clothing resulting in a nearly endless visual representation of player-generated characters. In his ethnography of the virtual world *Second Life,* Gottschalk (2010) notes that many members devote a large amount to time and effort into crafting their digital appearance, suggesting a significant social identification with their animated counterpart on screen. There is even evidence to suggest that the act of taking on a role or character in a video game that promotes a particular cause like social justice or environmental awareness can be more effective at motivating people to help compared to a more traditional use of text (Peng, Lee, and Heeter 2010)

Ilinx, the disorientation (and heightening) of the senses through physical motion is increasingly a component of many games. For over two decades, artists, designers, and programmers have rendered visually stunning and complex virtual worlds that dazzle and excite the user. Color, imagery, sound, even physical vibration are employed to stimulate the senses of the player. Studies on the physiological impact of video games suggest that the act of playing a video game affects our brain and body in significant ways. Video game play increases dopamine levels in the brain, they improve visual acuity, memory, and other cognitive functions (Green

and Bavelier, 2003; Nouchi et al., 2013; Winstanley, Cocker, and Rogers 2011). The pull of video games on our brain is so absorbing that virtual reality is evolving as a therapy to distract patients from pain during certain medical and dental procedures (Furman et al. 2009; Hoffman et al. 2011; Yohannan et al. 2012) as well as a therapeutic option for the treatment of Post-Traumatic Stress Disorder (Gerardi, Rothbaum, Ressler, Heekin, and Rizzo 2008). Video games with violence have been associated with negative effects including a potential rise in aggressive thoughts and behaviors (Gentile et al. 2004), while video game culture is often accused of representing women and minorities in a stereotypical fashion (Fox and Tang 2014; Burgess et al. 2011, Gottschalk 1995).

Competition (agon) in video games is as old as pong itself and is consistently found in titles ranging from one-on-one classics like chess and scrabble to dynamic, coordinated battles that can involve hundreds of simultaneous players. Video games provide a digital space, game play structure, and narrative goal that permits creative social interactions (Voida and Greenberg 2009). Online play compresses time and space into the screen: friends can collaborate or compete across time zones and it is not uncommon to engage players from a multitude of countries when logged in. Caillois (2001) argues that competition through games offers an opportunity to establish a meaningful sense of status and superiority within the relatively low-risk boundaries of play. Video games offer that opportunity to hone a skill and engage opponents. Though the setting exists only on the screen and through the controllers, the emotional benefits of victory and dominance can be quite strong (Burrill 2008).

Chance (alea) plays a central role in most video games and this may reflect the argument that a game is not truly pleasurable unless the outcome is uncertain (Caillois 2001). Video games are often designed to be played and replayed several times. The element of

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unpredictability allows familiar game zones to offer unexpected game-play challenges. In MMORPG's like *World of Warcraft*, chance is embedded into most game play elements and injects uncertainty, even tension within the fantasy, social, and competitive elements of the environment (Karlsen 2011). Many popular casual social games like *Farmville* or *Candy Crush Saga* also include a degree of uncertainty particularly with respect to in-game rewards.

Of course, the slot machine's appeal is primarily centered around chance (Walker and Phil 1992). Slot machines generate excitement specifically because they are unpredictable and their reward –money– holds recognized value and importance in industrial and post-industrial societies. Putting our fortunes into the hands of a random device we cannot control is the purpose of play, an opportunity to engage in a ritual that signifies the deeper uncertainties that lie out of our control in the real world (Caillois 2001). The resolution itself (win or lose) and the speed and certainty with which it arrives produces a moment of satisfying resolution in a world where uncertain outcomes are the norm (Reith, 2002; Schüll, 2012).

As the complexity of video games continues to grow, so too are the motivations that drive people to play. One recognized distinction in the gaming community is the difference in style between theme park and sandbox game play (Smed 2011). Theme park game play, much like a real theme park, offers highly structured environments where players are given little freedom to change or modify aspects of the game world and are encouraged to jump into the action and enjoy the ride. In contrast, sandbox games offer players a range of digital tools with which they are encouraged to build, modify, and customize the digital spaces they occupy. Rules, whether rigid and clearly defined or flexible and ambiguous, are fundamental to games and play, setting the boundaries, establishing goals, setting the pace, and empowering players with choice (Bjork and Holopainen 2006; Costikyan 2006).

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Presence in Video Games

Video game developers often talk of creating an experience that draws the player deeply into the worlds they create. Communication and media scholars often refer to this effect as presence in the game "an illusion that a mediated experience is not mediated" (Lombard and Ditton 1997). To the extent that it is possible we perceive ourselves as occupying the virtual space of the game with a limited awareness of the physical mediators (the screen, the controller, the speakers) between ourselves and our digital playground. One way that presence in digital worlds can be conceptualized is the degree to which it alters the experience of spatial awareness by stimulating the senses through vividness and interactivity, (Tamborini and Skalski 2006). Vividness is the extent to which the senses are simultaneously stimulated, while interactivity refers to our ability to engage and manipulate the digital medium.

The quality of the images on display is one obvious example of vividness in video games. Research suggests that as video games increase the quality of their graphics and level of visual detail, players show greater spatial presence within the game (Bracken and Skalski 2009). The introduction of 3-D graphics that allowed players to see more than one angle or perspective of the environment is another example of a significant visual element of vividness by giving players' increased interactive control over the thousands of rendered objects and characters in the game (McMahan 2003). Visual realism in virtual space may also enhance the capacity for social interaction. Gottschalk (2010) argues that improved avatar realism in Second Life improves the social interactions with other players which, in turn strengthens players' own ability to understand and identify with the virtual self they have created.

Other examples of sensual stimulation that are common in many current video games (and continue to be developed and enhanced) include both sound and physical stimulation (such as vibration). In current games, sounds (like speech, sound effects, background ambiance, and

soundtrack) can reflect a level of programming sophistication on par with the graphics. Sound is crucial to creating spatial presence in video games as it provides a second, complementary bridge along with the visual that translates the player's actions into meaningful outcomes in the video game space (Collins, 2008). Physical stimulation like vibrations in a controller again add to the vividness of the virtual simulation, such as when shooting a laser in a game creates a noticeable rumbling motion in the player's hand (Tamborini and Skalski 2006). With the introduction of the Nintendo Wii in 2006 (and followed by many home console manufacturers soon after) , many video games are now able to translate the motion of our body into direct action on the screen producing a more natural controller between the player and the virtual space (Skalski, Tamborini, Shelton, Buncher, and Lindmark 2011). No longer tethered by a hand controller, some games allow players to see the movement of their entire body reproduced by their avatar on the screen. This produces a stronger experience of self-presence, the extent to which your connection to your avatar (your digital representation on the screen) feels unmediated (Ratan, Santa Cruz, and Vordere 2007)

All three elements of vividness --imagery, responsive sound, and physical feedback-- link together harmoniously to the actions of players, heightening the level of spatial presence they experience. But presence is not merely the manipulation of the senses; it is also a psychological, emotional, and social state. The digital spaces of games must also have a *meaningful context* to produce presence (Lombard and Ditton 1997). For example, digital scenery like screen savers or living wallpapers often offer impressive graphics and sounds. But despite their visual and audio similarities with video games they do not produce presence as they do not offer a high level of interactivity nor do they provide context such as story, character development, or social interaction through which we can feel immersed in the digital space. Like with spatial presence,

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emotional, psychological, and social presence complement each other. Design elements like the

story behind the game, the personality of the characters, and the appearance and role of our

avatars together produce a framework of meaning that, when coupled with spatial presence, can

draw players deeply into the virtual space (Biocca, Harms, and Burgoon 2003).

Game Structure and Motivation

The concept of presence helps explain the powerful draw of video games, but the

question of what specific types of environments, stories, and challenges appeal to different kinds

players requires a different theoretical framework. Yee (2006a) recognizing that vast game

spaces like World of Warcraft produced multiple appeals of play, conducted a study on 3000

Massively Multiplayer Online Role Playing Games (MMORPGS) players to identify what

motivated them to devote thousands of hours of sustained commitment to these worlds. Building

on theories of player motivation in MUD games like *Dungeons and Dragons* (the precursors in

terms of style and game structure to MMORPGS), Yee's analysis identified three specific areas

of player motivation: immersion, achievement, and social. Although Yee's study focused solely

on players of online social games like *World of Warcraft*, his analysis have been applied to many

different video game styles.

All video games have an immersive element of some form or another. Even the most

basic of games, a rudimentary online chess program for example, uses icons and imagery to

create an environment (or at least a board and pieces) that is recognizable by the player as chess.

Immersive elements are very much tied to the hardware that renders them. The current capacity

to dazzle the senses with colors, animation, sounds, even direct physical stimulation expand far

beyond what could have been imagined even just twenty years ago. Immersion exists at many

levels of game complexity and graphical intensity. Beyond simply providing a visual frame of

reference (as with chess), immersion provides meaning and context to the tasks at hand: a mathematical algorithm that replicates the laws of physics transforms into a comical battle between animated characters or a game that rewards players with quick reflexes and good accuracy becomes a military battle for control over territory.

For each area of player motivation, Yee (2006a) identified specific subsections. Immersion is further broken down into discovery, role-playing, customization, and escapism. His categorization of immersive elements clearly bears similarity to mimesis and ilinx. Caillois (2001) argued that mimicry is a part of play because we actively desire opportunities to escape the reality of our own existence through socially accepted ways. The immersive elements of video games at different levels of complexity and depth reflect this fundamental need of escape. Whether it's a princess to rescue, a crime syndicate to run, or a fighter plane to pilot, the immersive elements produce meaning to our digital actions and incentivize us to pursue our relationship with the mechanics of the machine. Salen and Zimmerman (2004) describe this as the relationship between the formal system and the context of a game. The formal system represents the rules and structure while the context represents the specific characteristics of those rules within the overall game structure. In video games, the process by which the formal system gains contextual meaning can only occur through play. In his study on arcade video games, Gottschalk (1995b) defines videology as the ideological components that organize the game experience. Like Salen and Zimmerman, Gottschalk recognizes that to fully experience the pleasurable aspects of a game, including the meaning embedded in the code, one must embark on a journey of learning the rules and then using them.

Discovery in video games can represent a range of activities or styles. There is the exploration of the virtual space itself and all that's contained within it: the designs, the

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characters, the sounds, the music. One simple reward of dogged commitment in video games is the opportunity to visit the locked and hidden secrets of the machine. Video games often interweave plot and character development into game play and offer these tidbits as incentive for players to progress through the game. Research into the impact of story and virtual environment of video games suggest that for certain players these elements strongly influence their desire to play (Westwood and Griffiths 2010). The act of taking control of a character in a video game and identifying with the outlined roles/lore of that character can further strengthen a player's enjoyment of the game (Hefner, Klimmt, and Vorderer 2007).

Discovery of the story often comes in the form of role-playing: many games encourage players to create and control a digital identity (Yee 2006a). Avatars are usually the conduit through which players take on the role of their character in the digital space of the game. The complexity of avatars again reflects the diversity of gaming today: they can vary from silly and cartoonish in appearance to surprisingly realistic and customizable. Hefner et al (2007) established a strong correlation between identification with an avatar's personality and enjoyment of the game. Many popular video game franchises are built on fans' enthusiasm for the avatar that they control (like *Nintendo's Mario* or *Halo's Master Chief*). In more advanced games, the choice of an avatar's designated role or purpose in the game environment, as well as the in-game choices you make, can significantly alter the gaming experience. Some games, like the popular *Fallout* series, encourage players to make moral decisions during game play, choices that can lead to different pathways and outcomes within the game world (Schulzke 2009). Some players choose to play the same game multiple times to experience the content and structure of the game from a range of character perspectives.

Games today offer a range of options for avatar customization and studies show that this

ability to craft both the appearance of their avatar as well as the role or personality of their avatar are major factors that drive player's interest and commitment. Some avatar customization can often produce nearly unlimited variety and precision while other games offer more generalized selections, but in nearly all virtual worlds/games that use avatars, their appearance is important to players. (Ducheneaut, Wen, Yee, and Wadley 2009). Suh, Kim, and Suh (2011), in an analysis of South Korean gamers, found that a degree of physical resemblance between players and their actual avatar correlated with a more positive attitude towards the game. A stronger resemblance (or at least perceived resemblance) between player and avatar also increases the sense of presence experienced when playing (Ratan et al., 2007). One study on video gamers in Singapore revealed that players who reported an increased identification with the characteristics and personality of their avatar reported greater immersion in the game (Li, Liau, and Khoo 2013). Another study on South Korean gamers determined that a strong feeling of identification towards an avatar increased the amount of virtual items (sometimes referred to as microtransactions) that players would purchase using real currency (Park and Lee 2011).

The availability of immersive elements like story and character development alone cannot produce a true video gaming experience. It is only through action within the game structure that immersive elements gain significance. Achievement in video games, along with immersion, is another motivation for play. Some examples of basic achievements that have long been a component of video game play include earning high scores, unlocking new levels, finishing the game, and challenging/beating an opponent. Yee (2006a) identified three subcomponents of achievement as motivation: advancement (getting through the game), mechanics (understanding the rules of the game), and competition (playing against other real players).

Game play is often structured around overcoming various obstacles in the game that relies on a combination of hand-eye coordination, strategy, memory, perseverance, and luck to succeed. Traditional video games like the classic *Super Mario Brothers* offered a relatively linear pathway of progress from levels 1 to 8, with each level demanding greater skill from the player in order to complete and a clear ending point to the journey (though some choose to replay the game to improve certain statistics like score or time). MMORPG's, on the other hand, deliver a vastly greater variety of achievements for players to complete. Completing quests are one of the primary objectives in many fantasy role-playing games. Quests are often used to introduce new players to other significant elements of game play including discovering the landscape, developing the skills of their characters, earning, collecting, and selling virtual items and virtual currency (B. Nardi, 2010; J. W. Rettberg 2008).

Another characteristic of goals in more complex video games is the tendency to design what Salen and Zimmerman (2004) call goals within goals. For example, a player may spend twenty minutes on a long quest, but in the process that player may accomplish several other shorter goals (and collect smaller rewards) at the same time. These short term goals (or rewards) sprinkled along a much longer journey give players "a kind of pleasure that is less than immediate than the instant gratification of the core mechanic, but more rapidly obtained than the long-delayed ultimate outcome of the game" (Salen and Zimmerman 2004:343). Goals are "artificial" and "invented" by designers and exist primarily as vehicles to guide players through the entire experience of being in the game. Short-term goals have a dual purpose: they break up monotony by providing much needed variety of game play, and they continually reinforce the player's desire to pursue the longer goal.

In a typical MMORPG like *World of Warcraft* or *Star Trek Online*, players will complete

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hundreds, even thousands, of quests over a period of months and possibly years (Nardi 2010). A committed player will rarely run out of tasks to accomplish as new content is frequently added to the game to give players incentives to stay in the game and pay their monthly subscription fees. Some scholars argue that the rise of the never-ending video game reflects players' desire to join a virtual world that offers a more lasting presence. Jill Walker Rettberg, a digital culture researcher at the University of Bergen, refers to this endless series of digital "to-do lists" as a deferral of an end (2008). Through the availability of endless tasks and goals, games like *Farmville* or *World of Warcraft* become conduits that offer endless play. Each quest offers up challenge, engagement, and a temporary sense of accomplishment when the task is accomplished, but our desire to play never ends as there is always another quest available waiting for our attention.

The principal mechanic of a never-ending video game (a characteristic present in both MMORPGS and *Facebook*-style casual games) is often a character-leveling system. As players complete a multitude of tasks in the game, they are rewarded with experience points. The accumulation of enough points (a process that is visually fed to players through some progress indicator) leads to their character advancing to the next level. This type of game structure, common in many MMORPGS as well as more casual social games actually originates from the game mechanics of earlier role-playing games like *Dungeons and Dragons* (Fine 2002). Leveling is important (though not exclusive) in games that depend on subscriptions and microtransactions for revenue as it provides motivation and guidance that encourages players to commit the time and money into sustained play. Leveling up rewards characters with more strength and abilities and new digital spaces and virtual items for the avatar to use, it is also key to maintaining status and relationships with other players (Nardi 2010). There is, however, a

catch: designers almost always increase the amount of effort required between rewards as the game progresses. The time it takes to move from level 1 to level 10 in *World of Warcraft* is considerably shorter than the time it takes to advance from level 41 to 50 (Ducheneaut, Yee, Nickell, and Moore 2006). Adding a layer of complexity to this process, many games require players to pursue multiple leveling paths that come to fruition at different times providing a fluid series of goals to chase (Rettberg 2008).

The option to engage the steady, reliable, and measureable progress of a leveling system appeals to many players. At first, this seems contradictory: the assumption is that we play video games to immerse ourselves into a stimulating, challenging and unpredictable world. And yet, in games like *Farmville* and *World of Warcraft*, the process of leveling can sometimes be repetitive, time consuming, and devoid of challenge. Gamers use terms like grinding and farming to reflect these relatively monotonous aspects of the game (Rettberg 2008). Yee (2006c) argues that these games, through the disbursement of well-timed rewards, train players to commit to what essentially becomes virtual second job --as much obligation as recreation. But it would be an oversimplification to suggest that these game mechanics trap players into a tedious and manipulative system. Some game scholars argue that the fact that you have to actually work at certain rewards and accomplishments increases its value to both the player and the community and confers status on the player as evidenced by the prestige other players will often bestow on those whose accomplishments reflect impressive efforts of time and energy (Castronova 2007; Nardi, 2010).

Not all games demand that players follow a highly regulated and formatted structure. Some video-game players seek more than following a passive script, they find pleasure in understanding the mechanics of the game and mapping out the best strategies for play (Yee

2006a). Gamers will go to surprising lengths to independently catalogue different elements of

the game and plot out efficient strategies for improved play up to and including collecting the

metadata of thousands of players. Almost any video game with a reasonable fan base will have a

significant amount of internet content like web pages and videos dedicated to distributing this

information (sometimes down to the most minute details). One such site, a *wiki* dedicated to

providing information about *World of Warcraft* boasts over 98,000 separate pages generated by

dedicated players (WoWWiki 2013). The last identified component of achievement in Yee's

(2006a) analysis is competition against other players, but for this analysis I will consider

competitive aspects of video games under the broader umbrella of social interaction in virtual

gaming space.

　　　The option to share a virtual gaming space with another person has been a feature of

video games from the early days when select arcade and most home-console games offered two-

player options connected through the device. It is arguable that the evolution of social

relationships in video games was as important a catalyst for change in gaming culture as many of

the other design and technical advancements seen in previous decades. Perhaps the most

noticeable development in social gaming is the sheer volume of players who interact with each

other in gaming spaces. *EVE Online,* a sandbox-oriented MMORPG that offers players the

opportunity to from large space-themed corporations that compete both militarily and

economically can have tens of thousands of simultaneous online users interacting in the vast

digital space (Caravelli 2009). Much of the research into the social component of video games

has focused on the diverse and complex array of social dynamics in MMORPG-styled games like

EVE due in large part to the complex relationships and identities gamers create in these worlds.

But the rise of casual, portable social games designed to be played intermittently throughout the

day on websites like *Facebook* or on smart phones and tablets also represent a new and rapidly-emerging approach to social interaction in video games.

There is a broad array of games that can be defined as having a social component. MMORPGS are an example of intensely social games that provide players with a digital environment where many avatars can interact in complex and sometimes unpredictable ways. One the other end of the spectrum are many casual social games where players can compete, collaborate, and socialize in a more limited and temporally-fragmented format. Yee's (2006 b) breakdown of how social elements of video games motivate players can be generally interpreted as consisting of two broader categories: the impact of a social presence on players' commitment and interest in the game and secondly, the use of the game's environment and structure to facilitate relatively normal (one could even argue mundane) social interactions.

Playing a game with other people transforms the significance and importance of the structure and objectives of the game. At the same time as social interaction heightens the experience of game play, games produce a conduit for conversation, friendship, arguments, teasing, flirting and a range of other day-to-day social activities including scheduling meetings and tasks. The science of human behavior has long recognized that the social context of a situation has an impact on the actors present; the formation of groups both big and small create values and norms, statuses and corresponding roles, a social awareness that informs our perception. Social groups can generate both competitive and collaborative dynamics in video games that are shown to increase player's attachment to the game, motivation to play, and actual time spent in the game. Communication scholars Vorderer, Hartmann, and Klimmt (2003) surveyed over 700 games and identified four distinct player-preferences with respect to social interaction in video games: 23.6% preferred a competitive social dynamic, 38.2% preferred a

prosocial or collaborative environment, 22.4% preferred an individualistic (minimal social) experience, while 15.7% did not score strongly on any one profile. Among the group that favored competition, the presence of competitive elements increased the time spent playing as well as the player's commitment to finishing the game.

Immersion provides narration and context to a game while the structure of game play provides a logical and purposeful incentive to navigate the game mechanics. The social component of games appears to augment their immersive and achievement components. For example, research into video games designed to promote activity and a healthy lifestyle among children and adolescents found that the introduction of a competitive element against real players elicits greater enthusiasm and time commitment to the calorie-burning objectives of the game (Peng, Crouse, and Lin 2013). Surprisingly, the positive impact of a social presence on player enjoyment is contingent on sharing the same virtual space with the avatar: whether or not the other player is physically in the same room may not matter very much (Peng and Crouse 2013). This may be explained by the powerful impact of social gaming on players' experience of presence in the game. Experiments have shown that players who compete against a real opponent instead of a computer-controlled opponent experience greater levels of presence, as do players who play against friends compared to strangers (Ravaja et al. 2006; Weibel, Wissmath, Habegger, Steiner, and Groner 2008). We do not need our video game companions to be physically next to us to enhance the game; it is their representation in the shared digital space of the game that matters because that is where our attention is focused.

Cooperative elements of social game play are structured differently from competitive ones. Rather than challenging an opponent in a battle to achieve superiority in some way, collaborative game structures encourage players to work together and support each other in

pursuit of accomplishing tasks in the game (Salenand Zimmerman 2004). Research suggests that a collaborative game structure in certain circumstances can produce greater motivation and goal commitment in players than a competitive structure (Peng and Hsieh 2012). Games that rely on high level of cooperation reward players who collaborate with others with such benefits as faster advancement through tasks and levels, access to special content, or even extended time to play. The use of collaborative game play is a fundamental element of many online social games that are primarily played on portable devices like smart phones and tablets or though social networking websites like *Facebook.* In their analysis on the rise of social network gaming, Lautman and Curran (2012) established that collaborative game play is important to content providers because it encourages players to enlist friends and acquaintances (through their social network) to join them in playing the game. Because so many video game titles build a heavy social element into their game play, attracting a sizeable population of players over time is vital to success: the social elements of game play cannot be enjoyed if the game does not produce a sufficiently large player community.

Video game developer and writer Adam Liszkiewciz (2010) is highly critical of the nature of social play in games like *Farmville* and argues that the game play itself is dull, unimaginative, and rewards players not for developing skill or creativity but merely for showing up regularly and preforming the same monotonous tasks. Collaborative game play is fundamental to the success of *Farmville* as it strongly encourages players to invite others to play and then locks players in "a loop of reciprocity" where helping friends in their progress through the game creates an obligation for them to respond in kind. He contends that the fact that millions of people play the game does not make it a good game, rather it illustrates how the intersection of social networking, collaborative game play, and a sizeable population of players

can create surprising momentum for a title regardless of its true value as a game (Liszkiewciz, 2010).

Collaborative game play is not exclusive to social network games. More complex games like MMORPGS and console-based games build a number of collaborative activities into the player's routine. Many of the tasks that require cooperation from other players can be so complex they require surprising levels of planning and organization and can take weeks to achieve. In MMORPGS, players are encouraged to join guilds or corporations, formal groups that can range from half a dozen players to hundreds devoted to advancing through the game together (Nardi, 2010; Rettberg 2008). In order to be successful and achieve status, guilds require significant commitment from members to contribute in various ways including scheduling their real lives around the needs of the group: key guild members will often assume leadership roles to ensure discipline among other members (Levine 2008). Social video games encourage guild organization and success by including guild calendars, progress indicators, and a communication system that allows players to see who among their guild is online and available to help. In extreme circumstances, players who fail in their responsibilities to the group can find themselves facing significant social consequences up to and including being "booted" from the guild (Nardi, Ly, and Harris 2007), a punishment that can effectively cut players off from long-formed social relationships.

Social competition and collaboration do not simply provide motivation for players to engage in the game, the game itself can provide the structure and impetus for social interaction. A large number of studies into gaming culture have identified the importance of social relationships, friendships, and in-game status on players' attachment to their games (Ducheneautand Moore 2005; Ferguson and Olson 2013; Hussain and Griffiths 2009; Nardi et al.

2007; Nardi 2010; Salen and Zimmerman 2004; Williams et al., 2006; Yee, 2006a). The virtual environment of the game becomes a space to seek out conversation, support, friendships, rivalries, arguments, mentorship and a range of other normal social interactions. For many, a game can be a conduit through which friendships emerge and exist entirely while others see games as additional spaces to spend time and interact with family and friends.

Salen and Zimmerman's (2004) concept of meaningful play emphasizes the active position that games take. The elements of a video game: the rules, the graphics, the story, the game play mechanics should not be thought of as rigid conditions that define play, but rather as tools that enable play. The designer may create digital worlds, but it is the player who, through play, derives pleasure and purpose through the interaction.

Chapter 3: Gambling Theory

History of Machine Gambling

This study is an investigation of the adaptation of video game style and design into the latest generation of slot machines. Having addressed key theoretical perspectives in video game literature, the focus shifts to research and theories on gambling and slot machines. A comparison on theories and research of video game design (and motivation) and slot design and motivation poses some challenge. There is a large volume of research into video game design, culture, and player motivation and there is also a separate, significant literature available on problem video gaming and addiction. But unlike the study of video games, academic research into slot machine design and player motivation is often conducted with a limited focus on understanding and assessing risks associated with problem gambling. Naturally, understanding the relationship between slot design and problem gamblers is vitally important. One of the primary objectives of this project is to consider new theoretical perspectives on slot machine design and player motivation that addresses the entire range of gambling behaviors, including problematic ones, but also those behaviors associated with the vast majority of (non-problematic) players.

Video games and slot machines have a somewhat intertwined history. What we consider to be video games today: software that is playable on computers, smart phones, and home console systems traces its origins to the 1970's. The early mechanical machines of play (and their later incarnation pinball) found in arcades, carnivals, and taverns and dating as early as the late nineteenth century were the progenitors to these digital amusement devices. In this sense, slot machines and video games share a distant relative as the early development of mechanical games of chance evolved from the same entrepreneurs who developed mechanical games of amusement (Fey 2002; Scheri 2005; Schwartz 2006). Ultimately, no matter the design

similarities, the primary function of a slot machine is as a gambling device. Players make wagers, the machine determines the outcome, and winnings are dispensed to the lucky. The use of increasingly detailed movie clips, animation, complex win-delivery methods, and additional bonus games are inevitably tied to the gambling component of the machine.

Early slot machines used mechanical configurations to produce the wager's outcome. The pull of the level determined what outcome the spring loaded reels would present based on the physical distribution of the icons on the reels. The size of a machine's jackpot, then, was limited by the mathematical number of outcomes a machine could generate (topping out at roughly 1 in 10,000) (Schüll 2012). In the early 1980's the rise of computer-based slot machines revolutionized the industry. No longer driven by internal mechanics, the outcome of each spin reflected a digital calculation through a random number generator (RNG) chip. The physical reels, though still present, now served as mere icons for much longer and complex layouts in a process known as virtual reel mapping. Through virtual reel mapping, the range of payouts could be dramatically expanded, opening the door to machines that offered extremely rare but immense jackpots (Scheri 2005). Critics of virtual reel mapping argue that it purposefully misleads players into thinking their odds of hitting a huge jackpot is much greater than the actual, miniscule odds (Schüll 2012).

The 1980's also saw a more widespread acceptance for devices that replaced physical reels with animated displays on video screens leading to two game-changing developments: video poker and video slots. Invented by the prolific game designer and founder of International Game Technologies (ITG) Si Redd, video poker used digital chip-driven game mechanics and video monitors (followed later by touch screen monitors) to introduce strategy and choice to machine gambling. In Nevada, virtually all establishments that offer gambling opportunities,

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from mega resorts to convenience stores, offer video poker and many of its variations like Deuces Wild. Unlike slot machines, video poker presented fixed, knowable odds and a payout structure that could be improved with strategic play (Ethier 2010). Shortly after video poker's rise, casinos introduced a radically new design, multiline video slots, from Australian manufacturer Aristocrat (Fey 2002). This represents, in many ways, the development that opened the door to modern slot machines that merge the dynamics and structure of machine gambling with an almost limitless canvass of possibilities: increasing the number of possible winning combinations, increasing the number of wagers players could make, and unleashing the creative capacity to represent the wagering outcome visually.

This study looks at the confluence of video game and slot machine styles of play. However, despite the extent and variation to which slot machines employ stylistic and structural characteristics from video games, unlike video games slot games are inherently structured by the mechanics of chance. Although it may be tempting to argue that the rise of multiple, small microtransactions in video game purchasing mimics players "buy-in" of a slot spin, the fact remains that a video game purchase can only offer access to the wholly-contained imaginative world of the game itself. In contrast, players deposit money into slot machines in an exchange that offers a small but real probability of monetary gain, and the presence of video-game graphics, sound, and game play serve not to replace the slot experience but to transform it. The relationship between money and play between microtransactions in video games and traditional slot play also operate on different scales both in terms of the amount spent and the time-on-device received. A twenty dollar investment in a video game can realistically translate into 30 hours or more of play. In contrast, the duration of slot play provided by a twenty dollar buy in could vary from minutes to hours depending on a player's wagering amount, luck, and

commitment to play.

Any analysis of slot machine design must consider the social or cultural significance of gambling to the players who engage these devices. The stark contrast in slot machine popularity and revenue between Las Vegas and emerging Asian markets like Singapore and Macau are clear examples of the limitations of fantastical design when introduced to a culture that does not embrace machine gambling. Both historical and current cross-cultural analysis of gambling throughout the world indicates a diverse range of beliefs and practices with respect to gambling. In some cultures, gambling is an established and integrated social activity while other regions display little to no gambling of any kind (Binde 2005). In most Western nations, gambling of some form or another is generally an accepted and legal activity and can take many forms like lotteries, small parlors or clubs, casinos, or online gaming (Binde 2005).

Gambling in Las Vegas.

Although this study includes a global perspective in its analysis on the structure and design of slot machines, it undeniably relies heavily upon the 'laboratory' of Las Vegas. Although Las Vegas no longer retains its privileged status as one of the few legal gaming destinations in North America and the world, it arguably remains a major gambling destination and potent symbol of gambling itself. Bernhard and Ahlgren (2011) argue that Las Vegas is emerging as a natural "hub" for the development, study, and management of global commercial gaming. This is certainly true for the slot machine industry as thousands of Las Vegans are employed in the design, manufacturing, testing, and marketing of these devices (not to mention the presence of more than one hundred thousand machines available to play). Slot machines are the largest revenue-generator in Las Vegas casinos, and the amazing success of these devices should be considered in the context of the city itself.

Goffman's (1969) prioritization of action in his assessment of the social significant of gambling is arguably a reflection of the social place of gambling in mid-20th century Las Vegas and the United States. The social meaning of gambling in Las Vegas and other cultures remains an area of significant interest and debate in gambling studies. Certainly, traditionally recognized elements such as the opportunity for risk-taking, the pursuit of excitement, and the generation of adrenaline remain relevant. But in other ways --such as who is betting and the games they are betting on-- Las Vegas gambling culture has evolved. Perhaps one reason that Goffman's observations on action and gambling (and his dismissal of slot machines) seem less relevant in contemporary Las Vegas is the mere fact that gambling as a legitimate and socially acceptable activity has become an activity with greater mass appeal. Goffman conceptualized action as a distinguishing characteristic of the few, and yet the act of gambling is no longer marred by stigma and the social definition of a gambler no longer discriminates by gender, race, or social class (Reith 2002; Volberg and Wray 2007).

Much has been written about how the space of Las Vegas itself --the ideological as well as the physical-- produces an aura, a vibe, an altered sense of reality that normalizes, induces, celebrates, rewards and encourages the somewhat irrational act of gambling. A range of theories and studies have attempted to demystify the so-called power of Las Vegas on the individual through the analysis of such aspects as casino architecture (Finlay, Kanetkar, Londerville, and Marmurek 2006; Mayer and Johnson, 2012; Rothman 2002), gaming servicescape (Kim and Moon 2009; Lucas 2012) , and marketing (Gottdiener, Collins, and Dickens 1999).

The famous Las Vegas strip is frequently described by new visitors in terms of its overwhelming stimulation of the senses. The scale and scope of our casino resorts and the fantastical display of themes, lighting, and décor transform this space into an almost other-

worldly experience treading a surreal line between what Ritzer calls "reality and unreality" (2010). The logic behind placing a casino within a medieval castle, a pyramid, or an elegant and lavish reproduction of an Italian promenade may be more than merely attracting new visitors through ostentatious novelty. Gottschalk's (1995) postmodern analysis on Las Vegas (conducted at the dawn of the casino-resort) describes the hyper-excesses of the strip as a means to quickly and unequivocally convey to tourists a new set of social expectations that emphasize a form of unrestrained and fun consumption unhinged from a tangible and consequential reality. In his sharp critique of the Las Vegas experience, media and marketing scholar Richard Belk (2000) analogizes resort-casinos as the adult version of the classic American theme park, where: "This triumph of fun and magical belief over purposive cognition and rationality is precisely the spirit associated with gambling" (pg. 116).

Sociologist Gerda Reith views the emergence of Las Vegas's brash, surreal, and pleasure-focused environment as indicative of a larger change in how and why we gamble, a change that is in itself reflective of broader cultural shifts overall. The playground persona of the strip also reflects gambler's re-orientations towards the games themselves: not simply as purveyors of good fortune and riches but opportunities to engage in stimulating acts of play itself (Reith 2002). The opulence and fantasy spectacle of the casino-resorts on the strip encourage gamblers to make a transition and shift their perception of gambling as an opportunity for play rather than something perhaps more serious and consequential. The more players engage the structure or framework of the game, she argues, the more the game motivates us to repeat that process whether it is wagering on blackjack or activating another slot spin. The presence of risk and the win/loss dynamic inherent in all gambling remains an important, but not central, component to the individual gambling experience as gamblers are not pursuing any tangible end through their

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wagers but simply entering a state of arousal and excitement that must be continually repeated in order to be maintained (Reith, 2002). Reith's analysis of gambling as extended play parallels Salen and Zimmerman's (2004) assessment of *games within games* and Rettberg's (2008) concept of *deferral of end* in video games where we desire the delay (not necessarily the removal) of the finish line.

The idea that the introduction of spectacle to gambling space transforms the gambling exercise itself into a strange hybridization of risk-taking and effervescent play is an interesting one that has some empirical support. In their study on fantasy baseball leagues, Bernhard and Eade (2005) describe a fusing of immersion and gambling: where the monetary wins and losses of fantasy sport competitions act as arbiters of reality in the immersive act of creating and managing an imaginary team. The implications of the notion that play transforms gambling are significant as it suggests gamblers are not entirely pursuing an objective and measurable end but rather an experience and sensation that can only be maintained through repeated engagement (Natasha Schull (2013) makes an argument somewhat similar to Reith on this point). The idea that play, not winning or losing, may be the primary motivator for gamblers in Las Vegas has particularly interesting implications for slot machines. If a physical gambling space, such as the opulent and excessive presentations of Las Vegas casinos, can help to transform gambling into an action of play more than an action of wagering and risk, is it possible that the digital space of slots can also generate feelings of play in machine gambling?

It is well established that the digital space of games creates spatial presence: the illusion of physically and socially occupying the digital landscape displayed on the screen (Lombard and Ditton 1997; Tamborini and Skalski 2006). It may be possible that by producing digital experiences that resemble many of the play elements of video games (immersive, achievement,

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and social elements) contemporary slot machines are further reinforcing the idea of gambling for play. If the use of creative and fantastical architecture can disorient our perception of gambling, the even broader and more varied canvas of slot machines may also produce a similar result. The consequences of significant monetary loss through slot play may be mitigated by exposure to visual stimuli, game play structure, and a narrative structure that continually reproduces and reinforces the play elements of video games.

The Science of Slots

Slot machines and gambling are heavily regulated in the vast majority of markets where they are present. One constant characteristic for all slot machines in regulated markets is that they present a negative expected outcome for players. Though short bouts of slot play may deliver thrilling wins, long-term slot play is certainly a losing proposition due to the mathematical disadvantage against players (Cabot and Hannum 2001). Studies on slot machine design are usually focused on identifying how the structure of slot game play can produce a distorted player perception about the win/loss dynamics of machine gambling and contribute to irrational thinking and decision making among problem gamblers (Delfabbro and Winefeld 2000; Griffiths 1991; Ladouceur, Gaboury, Dumont, and Rochette 1988; Toneatto et al. 1997). These analyses are often guided by neurological and psychological theories about human behavior, conditioning, and addiction. Much research into the effect of slot machine design focuses on the extent to which the combination of symbols, sounds, game mechanics, and the distribution of wins and losses conditions players to desire engaging the machine.

Arousal

Research into the structure of slot machines looks at how the design, layout, and style of the game produce a psychologically and physiologically stimulating effect that reinforces

player's attraction to the machine. Griffiths (1999) outlines several structural elements that can reinforce player's positive association with slot machines including sounds, colors, frequency between spins, prize structures, win frequency. Of particular significance is the extent to which machines combine various stimuli at key moments to heighten the impact of winning, a concept referred to as arousal (Fisher and Griffiths 1995).

Intermittent Reinforcement

Slot machines deliver wins in an unpredictable fashion. Though machines are programmed to payback a certain percentage of the money they take in, their inherent design delivers those wins through very random patterns. Behavioral psychologists have long identified the power of an uncertain or random reward structure in modifying behavior. When presented with a task/reward structure, our persistence towards the task elevates when the rewards are distributed in an unpredictable variable ratio rather than a fixed schedule. From their very origins, slot machines have distributed winnings in this fashion (Knapp 1997; Skinner 1965).

Near-Miss effect

Research further shows that the impact of a variable ratio-rewards structure is amplified when a player experiences a near-miss of a big win (Skinner 1965). In the original, mechanical slot machines a near miss would randomly occur when a player would only collect two of three symbols needed to complete a paying spin or possibly a jackpot. In a sense, a near miss on the old mechanical machines somewhat accurately represented the true likelihood of hitting a jackpot. The arrival of digitally programmed slot machine outcomes and the virtual reel mapper enabled slot designers to introduce an artificially greater number of jackpot near misses that can

produce a distorted perception of the likelihood of winning among players (Harrigan 2007, 2008).   Studies confirm that presenting players with an over-inflated number of near misses during slot play does increase player commitment to the machine (Kassinove and Schare 2001; Reid 1986) and that players may demonstrate a preference to play machines that produce a larger number of near misses (MacLin, Dixon, Daugherty, and Small 2007).

Losses disguised as wins

Another element of slot machine design often scrutinized is the common practice in machines that occasionally offer a "winning" spin that pays out less than what the bettor initially wagered but is accompanied by other visual and audio stimuli associated by the machine with winning.   In a study conducted by Dixon et al (2010), subjects demonstrated similar physiological symptoms of arousal when presented with wins that were less than their original wager as they did when receiving larger wins that exceeded their initial wager.   Losses disguised as wins may further distorted players awareness of the true financial outcome of their wager by including vibrant sounds and animations (for example: music, the sound of coins accumulating, a flashing console) that players generally associate with successful wins.

Social Slots

Perhaps the most unexpected development in the merging of video games and slot machines is the rise of social slots. Despite looking and feeling like conventional slot games (and sometimes even directly copied from casino slot game software) social slots are not wagering devices, they are slot-machine simulations available to play through social networking websites like Facebook on computers and smart phones. Though players can purchase credits to

play the machines these credits can never be converted back into currency and are purchased solely to allow continued interaction with the game(s). The largest social slot app on Facebook is Double Down Casino. In 2012, the free-to-play Double Down Casino was purchased by IGT (a major manufacturer of real-gambling brick and mortar slot machines) for 500 million dollars. IGT immediately took steps to introduce free-to-play versions of their popular slot machines to their virtual social casino. Currently, IGT's half-a-billion dollar foray into free-to-play social slots appears to be a success. In addition to dozens of slot games, Double Down Casino offers players the option to play Blackjack, Poker (against other players), and Roulette. IGT (a publicly traded company) reported total revenue in 2013 from Double Down Casino at $219 million dollars. Each month an average of 6.7 million unique visitors played slots (and other free gambling games) at Double Down spending on average 40 cents per visit ("DoubleDown Casino revenue growing 'at an incredible pace' for IGT" 2013).

The success of Double Down Casino (and other free-to-play social slots) entirely reflects players' eagerness to play the games rather than their desire to win (as any winnings cannot be redeemed for actual currency). The sheer number of monthly players raises important questions in important questions in the field of problem gambling and youth problem gambling studies (Gainsbury and Derevensky 2013; Griffiths 2013; Schneider 2012). Beyond the important concerns of whether paying money to play slot-machine simulations can produce similar problem gambling conditions among vulnerable players, the growth and popularity of social slot games raises as yet unanswered questions about how slot machines actually motivate players. Much research into the motivations of slot players focus on the win/loss dynamic and the assumption that the other elements of the machine (sound, music, theme, story, animation) work to heighten the experience of winning. And yet winning in social slots takes on an entirely

different meaning when the coins awarded may only be used to perpetuate play. (One possible explanation is that, in social slots, players are more engaged in the intrinsic auto-telic elements of slot play (as described by Schull, 2012) and are less effected or motivated by the winning and losing fake-money chips.

Research on the impact of slot design on player commitment and problem gambling is centered around players' pursuit of monetary gain and their willingness to embrace irrational thought to justify or minimize damaging behavior. Social slot machines are both popular and profitable and yet they lack this fundamental attribute: monetary gain. Though some players may choose to purchase in-game credits to extend game play in social slot casinos that money (and any potential winnings) can never be converted back into currency. In fact, there is some concern in the industry that problem gambling may extend to a small portion of social slot players may show signs of problem gambling similar to real-money gambling (M. D. Griffiths, 2013).

What is the attraction of playing a slot machine that cannot pay out winnings? The only logical explanation is to assume that players derive satisfaction merely in engaging the pseudo-wagering structure of the game. Social slots are not slot machines; they are essentially video games that utilize the design and structure of slot machines to deliver entertainment to players. The introduction of video game theory and research tools provides new avenues to evaluate this emerging entertainment activity.

Chapter 4: Research Methods

In this study, I employed both a quantitative and qualitative content analysis of modern slot machines to examine the game mechanic and design similarities between slot machines and video games. I collected the data primarily from observations I conducted at the 2011 Global Gaming Expo (G2E), an annual industry showcase of hundreds of the latest models of slot mchines held in Las Vegas. Using Yee's (2006a) theory on motivations for video game play, Salen and Zimmerman's (2004) concept of structural design in video games, and Lombard and Ditton's (1997) concept of presence in digital space, I performed a quantitative content analysis the game characteristics that enable (or at least simulate) achievement, immersive, and social game play in slot machines. Using qualitative analysis, I also approached the more subjective question of how the inclusion of video game structural and design elements transforms the act of machine gambling into a dynamic mixture of risk-taking and amusing play.

In addition to the content analysis, I also conducted eight semi-structured interviews with both novice and experienced slot machine players. Yee's (2006a) analysis of motivation among video game players indicates that different game components appeal to some players more than others. The interviews are a first step at determining whether Yee's player typology of achievement, immersive, and social motivators also applies to slot players. The interviews consisted of asking pre-determined questions with relevant follow-ups as well an interactive component where participants engaged actual slot games and gave feedback about how different elements in each game impacted their experience.

Content Analysis of Games

The use of content analysis to study slot machines is employed periodically in gaming research. Several notable attempts to identify and classify common game-play characteristics have been published over the last two decades (Griffiths 1991; Griffiths 1993; Griffiths 1999; Dowling, Smith, and Thomas 2005; Parke and Griffiths 2006; Harrigan and Dixon 2009). The use of content analysis is essential to understand how the structural characteristics of gambling machines contribute to problem gambling behavior. However, it is arguable that conducting research from only behavioral and psychological perspectives restricts our overall understanding of slot machine design, impact, and cultural significance. Certainly, the use of such a restricted lens in the analysis of more conventional texts like movies, books, and advertisements would never occur as we recognize that these media are both shaped-by and shapers-of their broader social and cultural habitat. Books do not command us to submit, they invite us, as active individuals, to participate. This analysis is guided by the perspective that player engagement with slot machines extends beyond base psychological response and includes a conscious interpretation of the experience that informs their interaction with the games.

Though content analysis is a method frequently used in the study of slot machines, its deployment often lacks depth, breadth, or clear methodological justification. Parke and Griffiths' (2006) review of structural features in slot machines is one of the more comprehensive and important publications in this area within the last ten years. And while their identification of key structural changes in British slot machines has provided important insight into the evolving nature of slot play, their methodological approach was not clearly specified and their observations were drawn from an unspecified but small number of machines. Harrigan and Dixon (2009), used data from PAR sheets for machines operating in Ontario (Canada) casinos as well as observations of the machines themselves to identify how structural characteristics of

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machines (including a precise understanding of the mathematics driving wins/losses) contributed to problem gaming. Although they presented a more rigorous methodology than is often used, their analysis was again limited to the PAR sheets of 23 machines that ultimately only represented four unique machine brands.

Though the risks of problem gambling associated with slot machine play are valid and merit investigation, it should not be the sole focus of research into these devices. Gambling's presence and social acceptance both in North America and globally has grown at an incredibly fast pace (Bernhard, Futrell, and Harper, 2009). With that geographic spread has come an almost banal normalization of the act of gambling itself (Reith, 2002). Huizinga (1950) and Caillois (2001) argue that leisure and play in society reflect deeper social significance underneath the superficial appearance of frivolity. On a similar note, Salen and Zimmerman (2004) describe video-game players as active participants who seek to engage in meaningful play through interaction with the world of the game itself.

Though public health discourse may drive research on slot machines, it is important to recognize that most slot players are not problem gamblers and likely choose to engage these devices for similar reasons they pursue other recreational activities. Any research on slot machines should include the normal, recreational perspective in the overall study, and perhaps also consider slot design from the perspective of an active and engaged player rather than the stereotypical passive, irrational, and self-destructive player.

In building a strong methodological approach, I relied primarily on the more comprehensive and rigorous research conducted in the content analysis of video games. As video games have grown as a popular leisure activity among a wide demographic, so too has research into their composition. Like movies, T.V., print, and music, the content of video games

speaks to broader social trends. But more traditional mediums, video games do not convey their meaning in the same way. Video game play incorporates two fundamental elements: the structure of the game (the rules, the controls, the abilities and limitations, the virtual space you occupy, the winning/losing conditions) and the story of the game (Who are you controlling? What is the purpose of play? Where are you?). For example, the popular *Portal* video game series places the player in a first-person perspective in a 3 dimensional environment and structures game play around puzzle solving through the creative manipulation of the laws of physics. The story of the *Portal* video games situates the player as a female protagonist trapped in a research facility that must solve puzzles and use technology to survive a series of experiments conducted by a mendacious artificial intelligence. The *Portal* series is an excellent example of a game whose massive success and popularity is arguably equally reliant on the fluid interplay between both elements.

The immersive and interactive nature of game play necessitates new theories and methods for measuring and understanding their underlying messages. The experience of a video game is mediated by the actions a player takes within it and shapes the individuals ultimate interpretation of the text. In order to extract the meaning and context of the experience, it is necessary to actively engage and play the game. Aarseth (2003) refers to this as ergodic literature, text that requires "nontrivial" effort on the part of the reader to be exposed.

The emergence of video games as an important medium for study has also produced robust debate among scholars about the ideal epistemological approach to interpreting these digital landscapes. The narratology perspective argues that video games have not fundamentally changed the nature of storytelling and can be interpreted using traditional narrative analysis (Atkins, 2003). Ludologists, on the other hand, emphasize the need to relate the structure of the

game (player orientation, controls and movements, rules) with the progressing story when evaluating the text as the experience of engaging the structure is inextricable from other narrative elements (Aarseth, 2003; Juul, 2005). For example, in a video game that introduces heroes and villains who commit righteous and immoral acts, ludology places significant importance on the situation of the player in these texts and how the player's choices, actions, and interactions affect how they interpret and experience the text. Quantitative content analysis of video games, much like with other textual analysis, identify and record key elements of a game such as avatar composition, game rules, or story as they are revealed through play (Consalvo and Dutton, 2006). Qualitative studies rely heavily on the researcher's engagement and immersion in the game and their own interpretations and reflections of his or her experiences while doing so, an approach Consalvo and Dutton (2006) criticize as frequently lacking clear methodological accounting.

In this content analysis, I examine the inclusion of video game design elements in contemporary slot machines and assess how they are blended with the traditional win/loss dynamics of machine gambling. This paper will make two significant contributions to our understanding of slot machine design. It will deploy new theoretical perspectives from video game scholarship to understand and interpret of slot machine design. My use of a much broader and more diverse sample and design as well as my focus on the interplay between characteristics will produce a more rigorous methodological approach to the content analysis of slot machines.

The analysis will be guided by theories from both video game and slot machine scholarship. In particular, Yee's (2006) three identified motivators for play (immersion, achievement, and social) forms the base of the analysis. A quantitative analysis will seek to identify and catalogue video-game features embedded in the slot game itself. Video-game

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features are categorized into three areas: achievement, immersion, and social. Achievement in game structure are activities in the game that diverge from the standard game play (such as triggering a bonus round game). Immersive elements include features such as avatars, animation quality (and animated characters), sound quality, and the use of established popular culture trademarks. Social aspects of slot machines include any design that incorporates some form of multi-player interaction among linked players. This includes collaborative or competitive social play as well synchronous or asynchronous interaction.

Held annually in Las Vegas, G2E, is the largest industry conventions in gambling. A major showcase of services and technology offered by hundreds of companies, the week-long convention attracts thousands of visitors representing both North American and international casinos and other gambling providers. One of the largest attractions of the convention is the vast array of new slot machine models on display. Dozens of slot manufacturers, ranging from international giants like IGT to much smaller, independent companies that service a more limited niche market offer their products for examination over a three-day period.

The convention floor of G2E offers an excellent opportunity to collect data on the design and game play structure of the latest models of slot machines. Eager to generate new sales, manufacturers purchase thousands of square feet of convention space to display a wide range of their latest machines (as well as some of their older, but popular, models). All machines are set up on a demo mode which enables potential buyers and the curious alike to play the machines as they would appear on a casino floor.

This section identifies and catalogues key game elements in slot machines that reflect video game design. This is not as clear and straight-forward a process as it may first sound. Schmierbach (2009) notes that one of the challenges of data collection in the content analysis of

video games is the variation of experience that arises through interaction with the game. Different coders may experience the game from different perspectives, and even the same coder may experience the same game differently depending on how uncertain elements of the game's structure unfold (Schmeirbach refers to these as paths through the game). Though video games may offer more variability compared to traditional media, these pathways, once identified with multiple runs through of the game, can provide a reasonable coverage of the data (Schmierbach, 2009).

Modern slot machines offer a similar challenge to content analysis. Many machines offer a wide range of features, animations, sounds, and bonus games that cannot always be purposefully triggered but occur randomly as game play progresses. Five or ten minutes of interaction with a machine can provide significant detail about certain game-play elements, but more complex game designs would require hours of play to reveal every pathway in the machine. Fortunately, there is abundant data on slot machine game play and structure available to be collected from a range of sources. In addition to observations collected through direct interaction with or observation of the machines at G2E, I also relied on several other sources of data. These included the rules or instructions for each machine (most manufacturers will include a brief outline of the game features, rules, and payouts that players can access on the machine itself). Many manufacturers also provide a high degree of detail about the design and features of their machines on their company websites and these sites were used to supplement details about the structural characteristics of the machines observed.

Other new and exciting opportunities to observe not only the function of slot machines but also the player experience itself has recently become available on popular video sharing sites like You Tube. Surprisingly, there is a very active community of slot players who capture video

of their slot play and share it on popular websites like You Tube. Many of these videos capture

bonus rounds (randomly-triggered side games within normal slot play) and a cursory

investigation reveals that the majority of the machines sampled at G2E have numerous videos of

key gaming moments that are uploaded by players. Like with manufacturer websites, the

YouTube videos were used to supplement the data collected on G2E floor to ensure a more

accurate categorization of slot design components. Although player comments both in the videos

and in other areas of the webpage were not collected or analyzed for this analysis, the video

records of the machines provided a more precise level of data on key game-play characteristics

and revealed, to some extent, elements of machine design that capture the attention of slot

machine enthusiasts. Finally, if after consulting all other sources of information the key

elements of a particular model remained unclear, I sought an active version of the machine in

Las Vegas to play (or observe others play) to help fill any remaining gaps. These various

sources allowed for a robust map of the different pathways and other important features for each

model.

Quantitative Analysis

For the quantitative analysis, I collected data on all machines displayed during the 2011

G2E by five large distributors that occupy a substantial presence in the market: IGT, WMS,

Bally's, Aristorcrat, and Konami. Currently, two of these companies, WMS and Bally have

merged and become part of a new company, Scientific Games. Two hundred and twenty-five

machines on display at the 2011 G2E were catalogued. For each manufacturer, I attempted to

evaluate every unique slot-title on display (video poker machines were excluded from the

analysis). A table containing the title, genre, and manufacturer of every machine studied can be

found in Appendix A.

The qualitative analysis was broader in scope. It consisted of my observations and experiences playing machines on display at G2E from 2010-2015. Although the focus of the analysis was primarily on these five manufacturers, I also collected some observations through interaction with other manufacturer's machines on display at G2E and played on actual slot machines in Las Vegas casinos (using my own personal funds).

Each machine was evaluated for three criteria: theme, game play features, and immersion features. The primary mechanism for collecting data was through my individual interactions with each machine on display at G2E, which were available to play in a non-monetary demonstration mode. Most slot machines on display at G2E also offered an instruction screen that detailed all of the pays, special features, and bonus games. These information screens were also used to help identify the various features of the machine. In addition to the data collected directly on G2E floor, I accessed videos, images, and descriptive text available on the internet about each individual title during the coding process to fill in any gaps or confirm notes from the field. Virtually every machine identified in the initial data-collection phase had additional information about the game structure, theme, and design through promotional materials uploaded by the manufacturers as well as fan videos taken by real players and posted on *YouTube*.

The data collected to measure theme and structure included the machine's title, a basic description of the theme, whether or not the machine used a specific music, television, movie, or video game pop-culture brand, whether the machine used mechanical reels, video reels, or a hybrid of both, and an overall assessment of the slot's make up (like screen size, game complexity, brand presence, and cabinet design) to identify the machine as premium or core. The game-play features that were identified for specific categorization included the total number of bonus events and in-reel bonus events the machine offered as well as the presence of specific

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classes of bonus events (free spins/wheel spins, interactive games, accumulation bonuses, and group bonuses). In addition to tracking the machines' various bonus game offerings, the presence of special reel configurations (like stacked wilds, oversized symbols, and two-way pay lines was noted).

The analysis of slot game mechanics consisted of an extensive descriptive summary of the presence of various achievement, immersive, and social game play elements in slot machines. Common features across machines were classified according to both their video game characteristics and their role in the slot machine mechanics. Important features were coded for each machine according to the extent to which each characteristic is present. In addition to presenting descriptive figures and tables of each of the identified features, a correlation matrix is used to establish the extent to which certain design characteristics are associated positively or negatively with other characteristics.

The analysis of immersive elements identified both technological aspects such as graphic detail and sound quality as well as the use narrative aspects present in each game that correspond with video game design. The presence of 3D display and surround speakers embedded in the slot chair was noted, as well as the extent to which animation detail and animation interaction was part of the playing experience. Animation detail and animation interaction were divided into three classifications: high, medium, and low. High animation would involve complex, visual bonus rounds and intricately detailed and animated symbols and reels. Medium animation would involve a lesser degree of movement and detail on the screen but remain visually appealing and reflect a reasonable standard of quality. In low animation detail, the symbols and reels would show very little graphics or movement and the artistic quality would be very plain.

The use of interactive animation was also measured using the same criteria. Games that did not offer any level of interactive animation or animated character or object as part of the game player were classified as low. Games that would occasionally introduce animated sequences or animated characters that would interact with the reels and bonus games were classified as medium. And games that offered highly interactive animation and animated characters that would interact with both the player and the game play frequently were coded as high.

The coding of both animation detail and animation interaction proved challenging as both concepts are produced though multiple indicators of depth, detail, and quality. For example, a game could have very plainly-drawn symbols, but those symbols might occasionally move or come to life in a slightly noticeable way. The combination of low-art quality and moderate animation would result in a classification of medium animation detail. If the game offered no animation at all and very plain symbols, it would be categorized as low detail. In order to qualify for high detail, both the artistic quality of the symbols and background as well as the presence and quality of other animated events had to be both of high quality and had to appear frequently during play. The same standard was used for animation immersion. A game that did not include the presence of an animated character or object (outside of any animation present in the slot symbols themselves) would be categorized as low. A game that offered some limited interaction with an animated character or some animated object that was not solely contained within the reels was classified as medium. In order to be categorized as having high animation immersion, the presence and use of animated characters interacting with both the player and the game had to be frequent and reflect high-quality in terms of art, graphics, and sound. For both animation

detail and animation immersion, a slot game would have to rise to the graphic and production values of contemporary and popular video game titles in order to be identified as high.

Qualitative Analysis.

In her guidebook to content analysis, Nuendorf (2002) argues that qualitative content analysis can offer depth to the interpretation of the text by providing rich detail into the intersection between reader and content that quantitative cannot. This approach is very important in the study of video game content as content can *only* be experienced through participation as the act of participating as a player transforms the content (Consalvo and Dutton 2006; Malliet 2007; Schmierbach 2009). Ultimately, a qualitative approach was also needed to understand the interplay between the video game logic and the traditional wagering dynamics of newer slot machines.

I employed qualitative methods to reach two objectives. The first was to provide a richer level of detail about the design of the machines by including a detailed account of the motivations, decisions, emotions and sensations that the player experiences. The second was to provide a clearer understanding of the nuanced interplay between the video-game elements of the machines and the traditional wagering outcomes. The theoretical framework of the qualitative analysis was shaped by Lombard and Ditton's (1997) theory on presence, Salen and Zimmerman's (2003) conceptualization of meaningful play in video games, and Yee's (2006a) findings on motivations on play as well as theories on slot play motivation. These three theories provide the necessary video-game reference point necessary to properly examine the video-gamization of slot play. Theories of presence explain the power of digital spaces to fully occupy our mental awareness. Salen and Zimmerman help explain how the rules and mechanics of a game work with the immersive elements to create powerful emotional experiences. Yee's work on player motivation in video games identifies achievement, immersion, and social engagement

as three different aspects of video games that appeal to different players in different ways. It is

one of the most widely-recognized theoretical frameworks on player engagement and is the

natural starting point for a comprehensive examination of how more complex slot design impacts

slot players.

Consalvo and Dutton's (2006) approach to a systematic qualitative content analysis of

video games emphasize cataloguing the experience of play through a recordkeeping of objects

(the virtual items used during play) and interface (the display of information to players). This

guideline was particularly useful to the analysis's goal to identify both objects and interface that

reflect the video game design and/or traditional slot wagering design. The purpose of the

qualitative analysis was to go beyond categorizing and listing game mechanics and produce

some understanding what kinds of effects and experiences are induced by the inclusion of video

game elements in machine gambling. The use of game play logs (Consalvo and Dutton, 2006) in

qualitative video game content analysis encourages the researcher to test the boundaries of the

game and identify the player's capacity to bend and shape the programming of the game in ways

that may not reflect the original intent of the creators. Game-play logging was used on select,

premium machines to help identify the vast range of visual, aural, gameplay, and gambling

elements that were released during important moments of game play.

Unlike with the quantitative analysis, sampling for the qualitative portion of the study

was not be limited to the machines on display at G2E. Because I approach this investigation as

long-time player of both video games and slot machines, I will include my experiences with real-

money play in Las Vegas casinos. Though unorthodox, but not without precedent as a method, I

believe that a true appreciation of the integration of video-game styles with wagering requires, at

some level, that I experience not just the structure of the games, but how they affect my

orientation, emotion, during genuine and consequential wins and losses. Perhaps the greatest

challenge for the qualitative component of this paper was the risk of selection bias that reflects

my preferences as a researcher, video-game player, and gambler. With tens of thousands of

machines available for study, a skewed sample of a few machines could reflect either the my

personal playing preference or a tendency to focus on machines that have structural

characteristics that complement the theoretical assumptions of the paper. To minimize this risk,

throughout the qualitative analysis the I continually questioned the extent to which personal

preferences as a gamer, gambler, and researcher shaped my perceptions and experiences of the

slot play.

Semi-structured Interviews

While the quantitative and qualitative content analysis helped establish the use and nature

of video game design in slot machines, they cannot provide sufficient data regarding the impact

of these elements on the player's experiences, decisions, emotions, and motivations. To better

understand the extent to which video game design affects playing slot machines, eight

participants were interviewed in the Konami Gaming Lab located at UNLV. The Konami

Gaming Lab simulates a real casino gaming space complete with several gaming tables, craps,

roulette, cash-out systems, and ten unique slot machines of various styles.

The use of semi-structured interviews in gaming research is common. Many studies into

the experiences and motivations of both video game players and gamblers have used data from

interviews or focus groups (eg: Griffiths 1990; Parke and Griffiths 2005; Klimmt, Schmid,

Nosper, Hartmann, and Vorderer 2006; Binde 2009; Watson, Mong, and Harris 2010).

No study has ever looked at how video game design influences the slot-play experience,

and as such the structure of the interviews was principally guided by the exploratory nature of

the study as a whole. The interview portion of this study consisted of eight semi-structured

interviews with gamblers of many different intensities and preferences. Out of the eight individuals who participated, six were women and two were men. Each interview lasted anywhere from sixty to ninety minutes. Participants were compensated with a $25 gift card to a retail chain at the completion of each interview. The interviews were audio-recorded and I transcribed each recording.

Participants were recruited using flyers that were posted on the UNLV campus as well as on message boards in public spaces in Las Vegas like libraries. Participants were also recruited from an advanced level sociology class focused on the topic of gambling in society. Five of the participants were full-time or part-time UNLV students and the remaining two had no affiliation with the university. Despite the fact that most participants were students, there was actually a surprising diversity in terms of age, observable social class, race, and gambling affinity. The following is a brief description of each participant.

Colleen is a student in her mid-twenties who moved to Las Vegas a few years ago. Intelligent and articulate, Colleen's rare experiences with gambling were more an exercise of curiosity than a passion for gambling. Despite her infrequent gambling experiences, Colleen is a blackjack dealer in an off-strip casino.

Nicole is a Latin-American UNLV student in her late twenties. A friendly and open individual, she is an occasional gambler, primarily on video slot machines.

Jasmine drives a taxi in Las Vegas and has a very outgoing personality. In her early twenties, her experience with gambling began after her 21st birthday and is strongly tied to social events with colleagues. A moderate gambler, Jasmine estimates that she plays slots roughly once or twice a month, often with her fellow taxi drivers.

David is a student in his early thirties who has a broad appreciation for gaming, both table and slot. David is a social gambler in that he only gambles with friends from out of town or with his girlfriend. David acknowledges that he may have lost too much money in recent gambling sessions and has tried to significantly cut down on his gambling.

Malaya is a young Filipino woman who gambles with her family once or twice a month. Although all of her gambling is machine gambling, Malaya admits that she avoids that flashy and more complicated slot machines and prefers the simplest, quicker, and direct games like video blackjack or video poker.

Sheila and her husband have been retired for a few years and actually moved to Las Vegas specifically for the opportunity to regularly gamble. The couple gambles almost daily, for multiple hours a day, and they play on a wide range of games from video poker to live table poker to slot machines.

Omar is a quiet, polite young man in his late twenties. Omar's gambling frequency and preference could best be described as hit and run. Omar seeks out simple three-reel, one-pay line machines, puts in a relatively small amount of money, makes a handful of big wagers, and either exhausts his funds or takes his money and moves on.

Jessica, a shy and very soft-spoken student in her early-twenties, is a frequent gambler and often goes out with her family to the casino. Jessica enjoys playing the more complicated, premium slot machines and in particular is attracted to games that are of specific pop-culture themes that she is fond of.

The interview consisted of three components. In the first component, participants were asked to fill out a very brief questionnaire measuring demographic characteristics and gambling history (appendix A). After that, we conducted a semi-structured interview using a list of

questions to guide the discussion (appendix B). The interviews covered in more detail their

gambling history, gambling preferences, and their experiences and preferences specifically with

slot machines. Lastly, participants were invited to play on a number of different slot games and

give their feedback about the experience. One of the strengths of the inductive approach to

research is the flexibility it affords the researcher to observe unexpected trends or events that

illuminate the concepts under investigation. It soon became apparent that though the prepared

questions used in the interview was valuable, they could not always provide the necessary

insights that was needed to better understand how various components of slot-machine design

influenced player experience and player motivation and the extent to which players' experiences

align with the theories of Lombard and Ditton, Salen and Zimmerman, and Yee.

The lab contained several functioning slot machines that could be played and explored

with play-money credits (credits with no monetary value that participants were given in

advance). In addition to these machines, a number of YouTube clips that actual slot players had

filmed of personal significant slot experiences were available to be shown to the participants.

Lastly, online social casinos offer a wide array of slot games that can be played with free credits

that are nearly identical (and sometimes actual clones) of the machines offered in Las Vegas

casinos. These sites were also used to provide participants with examples of slot desings.

During the interactive portion of the interview, each participant spent time playing four

machines that offered different game play structure, different levels of immersion, and different

themes. The first game that each player was asked to play was IGT's *T-Rex*. *T-Rex* is a basic

5X3 video reel machine with simple game play and animation and ustacked reels and offers one

free-spin bonus that can be triggered. The symbols used in the reels are dinosaurs, and the only

instance of vibrant animation occurs when players hit two or more stacks of t-rex symbols at

which point all individual icons merge into a giant, animated *T-Rex* that ferociously roars at the player.

The second machine played was *Swinging Sixties*. This game had a more complicated structure than *T-Rex*. Players played three separate sets of video reels at the same time, with the third set of reels having three times as many rows as the two smaller reels. There was one in-reel bonus and one free spins bonus. Although this machine had no significant moving animation at all (beyond the spinning video reels), the colors and art of the symbols and the overall theme of them machine were highly detailed and very vibrant. Music was also a very important part of the machine. During normal reel play, a generic tune somewhat reminiscent of the psychedelic sixties style plays continuously in the background, and when a free spins bonus is triggered, recognizable sixties songs like "*Wild Thing*" play along with the spinning reels.

The third machine was Konami's *Rock Around the Clock*. *Rock Around the Clock* is a hybrid video/reel machine. Players spin physical reels that offer fairly basic symbols, but sitting above the main physical reels is a video display that has an animated clock slowly counting up to the twelve o clock position. *Rock Around the Clock* offers accumulation bonuses. When the clock hits twelve, players are given the opportunity to play a progressive bonus, a free spins bonus, or both. An animated mascot, a giant smiling clock superimposed over a woman's body, will intermittently reward the player with a random boost that gets the clock closer to the guaranteed bonus. When the bonus is triggered, the entire physical reel component of the machine unexpectedly pivots to reveal a hidden side of the machine and players get to play a game that blends physical characteristics like a spinning needle with video animation.
In addition to the physical machines in the lab, players had the opportunity to select any particular social slot game that interested them.

A laptop with external speakers was made available to participants in the lab. Three *Facebook* social casinos were viewed: The benefit of playing on these free social casinos was that it offered the participants over one hundred slot titles that they could choose to play based on what drew their attention. It also gave players an opportunity to again play games and engage with themes that they might not normally play because they don't want to risk real money on it. Like with the real slot machines, participants provided much more description and insight when actually interacting with the game itself. One disadvantage of use online social slots was the limited capacity of a 15.6 inch laptop screen to display the rich visual detail of the games.

The *YouTube* clips that were shown generally focused on a different type of bonus game or game play structure. The two YouTube clips that were shown the most frequently was a clip from a Wizard of Oz game that demonstrated an interactive bonus and a clip from Aladdin and the Magic Lamp that demonstrated a very complex, interactive, video-game style of bonus round. The *YouTube* videos were not used as extensively as the interactive game play due to the fact that watching a clip of a specific slot machine did not seem to generate as much conversation, interest, or excitement from the participants as playing actual games.

The interviews were guided by Yee's (2006a) model for player motivation in video games which identifies achievement, immersion, and social interaction in digital spaces as three categories that appeal to players in different ways. I coded each of the interviews myself. Each interview was transcribed and statements by participants were identified by their reference to three themes that emerged from the text: winning and losing, game structure, and immersive elements. In addition, statements on each theme were coded as either positive or negative. I paid particular attention to spontaneous statements that were make, unprompted, by participants as they engaged the machines, as I felt that these statement reflected a genuine emotional

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response to the moment. Among the less-experienced slot players who were interviewed, these spontaneous comments often reflected their unfiltered response to various games and features as they were experiencing them for the first time. Players with mire experience found that playing those games triggered memories of past slot play which they wanted to share.

Chapter 5: Content Analysis of Slot Machine Design

Underlying Mathematics of Slot Machines

The fundamental structure of any slot machine (or any casino game at all), is the mathematical model that determines how often a wager will pay out, and how much it will pay out (Mazur 2010). In the end, all slot machines in Nevada are built with one inevitable mathematical fact: over millions of spins the amount of money wagered will exceed the amount of money paid out in winnings (Epstein 2012). Although Nevada has recently taken concrete legislative steps to introduce some skill in future slot machine gaming (Ryan 2015), currently every wager made on a slot machine is resolved by a mathematically-computed random outcome.

The reliance on probability in machine gambling creates an interesting dynamic between the bettor and the casino. A casual gambler, whether playing slot machines or table games, will make from a few dozen to maybe a few hundred wagers during a gaming session. Though the most likely financial outcome for a player that makes fifty wagers is a loss of some amount, there is at least a viable probability that after fifty reel spins, a player may find herself breaking even, or with slightly more than she started with (and very rarely much more than she started with). Given a relatively small number of trials, even when playing against a mathematical disadvantage, it is possible to come out ahead. This, of course, is a psychological necessity for gambling, for who would play if the outcome of every session was always a guaranteed loss (Jacobson, 2010)? But unlike the player, the casino has the advantage of time and a far larger bankroll. While a slot machine has a reasonable probability to award more credits than it takes in after a small number of spins, as the number of wagers increases from dozens to hundreds to

thousands to millions, the mathematical probability of the casino losing money is essentially zero (assuming the machine is operationally sound).

Any consideration of the video-gamization of slot machines must reflect on this unavoidable restriction: no matter the diversity in graphics or style, the underlying mathematical reality of every slot game restricts much of the game play options of slot machines. With the exception of video-poker-styled games (which are not included in the focus of this study), the player's actual ability to manipulate the game outcome is limited to choosing a machine, inserting money, choosing an amount to wager, and activating the wager by pressing a button. From that point on, the outcome is effectively determined by the probability parameters of the machine's random number generating chip. Another important difference is the difference in pacing between slots and video games. Normal slot play is broken into multple, five-second experiences, a rappid pacing that video games rarely employ.

While the underlying mathematical programming may be the ultimate foundation of any slot machine, the configuration of that math can lead to noticeable variations in playing experience. There are two mathematical elements of the random distribution of wins and losses that impact a slot machine's game play: payback percentage and volatility (Epstein 2012). Payback percentage (also known as the hold or the PAR) is the percentage of the money wagered that is returned back to the player. A machine with a very high payout percentage might return 97% of the money wagered (giving the casino an expected profit of 3 cents for every dollar wagered). A more typical payout percentage in Las Vegas would likely fall between 85% and 90%. It might seem that the payback percentage is the most important determinant of the win/loss dynamic and thus the playing experience and that a better payback percentage would make for a more desirable experience. But studies are mixed on whether or not players can

identify or are significantly affected by a slot's payback percentage (Lucas and Brandmeir 2005; Lucas and Singh 2012; Dixon, Fugelsang, MacLaren, and Harrigan 2013). This may partly be explained by the range of volatility in slot machines. A machine's volatility is the relationship between the frequency of hits (wins) and the amount won. A low volatility machine might hit very frequently but for very small amounts (including amounts less than the initial wager). In contrast, a high volatility machine might hit more infrequently, but the payouts for wins would generally be larger. Two machines can have identical payout percentages but provide vastly different playing experiences due to differences in volatility (Turner and Horbay, 2004).

Structure: The Fundamentals

Although this analysis focuses on identifying recent changes and diversity in slot machine design, it must be acknowledged that the basic visual structure of almost all new slot designs shares fundamental characteristics that can be traced all the way back to the early *Liberty Bell* machines. Though modern machines rarely use physical spinning reels and now rely on computer chips to determine the random outcome of a wager, the game mechanics of almost every slot machine at G2E and on Las Vegas casino floors contain three traditional elements: the use of symbols arranged on a set of reels, the spinning and stopping motion of the reels, and the requirement that several matching symbols fall on an identified pay line in order to win. The most basic and traditional slot design (one that is still manufactured and played today), is a single center pay line with three spinning reels (see Fig 1). If the right three symbols stop on the pay line, the player is awarded credits determined by which specific symbols land.
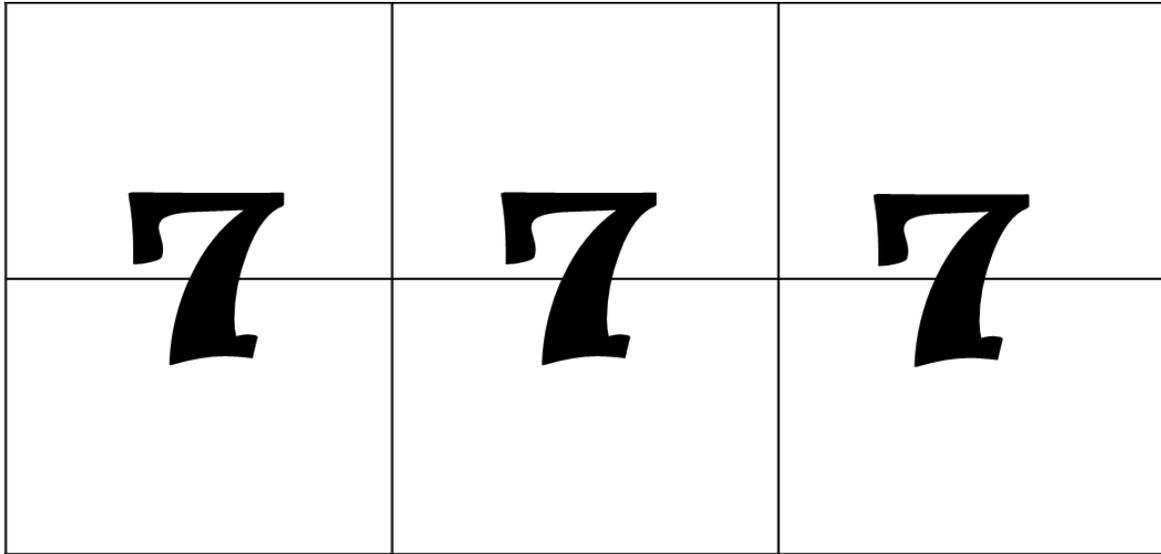
Figure 1: A traditional, three-reel, one-pay line layout

In the late 1980s, with the development of video screen terminals in slot machines, both the number of lines and number of columns grew (Scheri 2005). These multi-line slots drastically increased the number of pay lines players could wager on. Although the wager for each line only costs a few pennies --with ten, fifteen, twenty, or even more than 50 pay lines to play-- the total wager can range from 40 cents to several dollars. Traditional multiline games allow players to select the number of lines and then select an amount to wager per line (ranging from 1 penny to greater than 20 pennies). Other multi-line machines offer a more streamlined betting structure, making players play all lines and offering different denomination amounts per line (this reduces the number of buttons players need to push and makes it much simpler to understand how much is being wagered). The clear, plastic wagering buttons are illuminated with white light and occasionally may contain inexpensive LED screens that can display basic animations. One manufacturer, Bally Technologies, does not use physical buttons at all and instead offers touchscreen buttons on a flat, interactive LED surface.

1 Line	10 Lines	20 Lines	30 Lines	50 Lines	Max Bet
Play 1 Per Line	Play 2 Per Line	Play 3 Per Line	Play 4 Per Line	Play 5 Per Line	

60 Credits	120 Credits	180 Credits	300 Credits	600 Credits
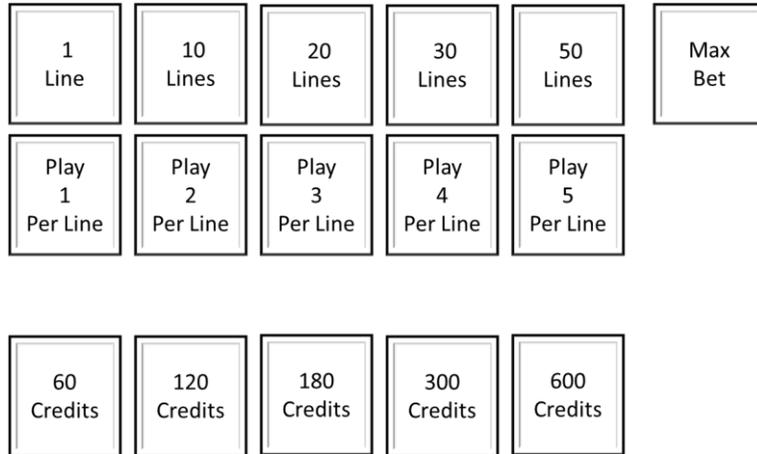
Figure 2: Common wager layouts

The top layout allows player to select both the number of lines to play and the amount to play. The bottom layout simplifies betting by playing all lines and giving players a range of total credits to choose from for the wager.

With an increase in both the number of lines to be played and symbols used, the number of different ways a player can make a winning combination grows. In the vast majority of machines, it is not necessary to match five symbols a single pay line; matching as little as two consecutive symbols (staring from the left reel) may produce a small pay. With this structure, it is possible for more than one line to have a winning combination. In addition to the number of symbols matched, the value of the symbol also matters in determining the payout, with some symbols worth more than others (generally the more the symbol is worth, the less likely to make a match). The value of each symbol (along with other win conditions in the game) will either be displayed on a paytable positioned above or below the reels or may be only viewed when the player chooses to access a game-rules menu that pops up over the reels.

Multi-line video slots come in a range of different sizes. The more common and traditional layout is five columns by three rows (5x3); however, other larger combinations or

rows and columns like 4x3, 5x4, 6x4, and 6x5 were frequently observed at G2E. It is not just the size of the reels that has grown but also the number of sets of reels that can be played at once. Some machines use a multi-reel display where two or more separate and independent sets of 4x3 or 5x3 reels are spun simultaneously with one total wager. Other designs increase hits by paying matching symbols starting from both directions (right to left and left to right) essentially doubling the number of lines played. Perhaps the ultimate example of this growth in possible winning combinations is WMS's *Lady Godiva*, a 6x4 multi-reel game that pays left to right and right to left and boasts 4096 ways to win.

By increasing the number of rows, columns, pay lines, and even reels contained within a single spin, slot machines offer more opportunities to make a paying spin. In a low-volatility machine more columns and rows will hit frequently but often for an amount less than initially wagered. In higher volatility games, the array of symbols and patterns will payout less frequently, but in rare instances key symbols line up in just the right way to produce a large win.

Beyond the win/loss aspect of the game, the addition of more symbols and lines on the screen creates a new dynamic for near misses by presenting a large number of uncompleted patterns with each spin. For example, a common situation would present four high paying symbols on reels 2-5 without the providing necessary symbol on reel 1. Or wild symbols (which can match with any other symbol in the game) cluster in reels 4 and 5 while reels 1-3 do not produce any connecting matches. The distribution of the symbols on each reel is essential to producing the large number of adrenalin-boosting near misses. Because most multi-reel machines pay left to right and only require 3 matching symbols on a line to produce a win, the symbols on later reels like the 4th and 5th come into play less frequently. As a result, some designs will add more desirable symbols (like wild symbols) to these less-impactful reels

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creating a greater number of seemingly missed opportunities and obscuring the mathematical

reality of the game.
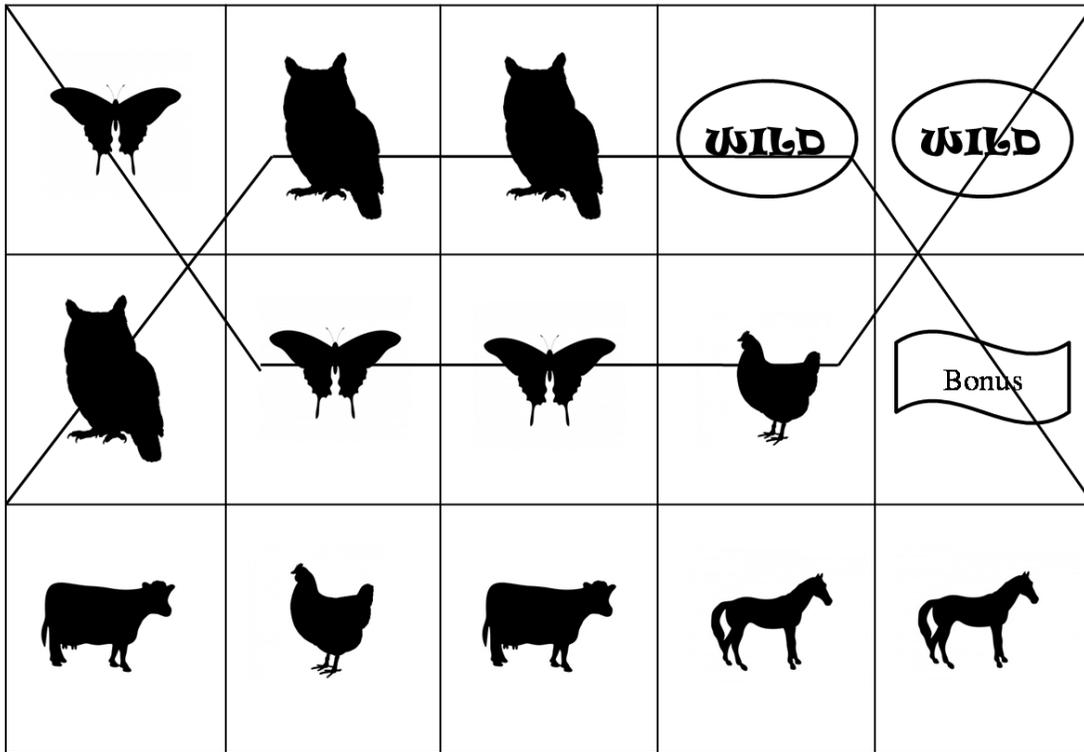
Figure 3: A 5X3 multi-reel layout showing two winning pay lines

It is not only the reels that have expanded in scope and importance. Newer designs also

play with the distribution of and size of the symbols themselves to create new patterns. Many

machines advertise the feature of stacked symbols or stacked wild symbols in the reels. In a

stacked symbol design, it is possible and relatively common for an entire column to contain the

same symbol or for a group of columns to contain the same symbol. The implications for this

are significant in terms of creating large paying patterns: if most of the symbols on all five

columns are the same (or wild), then every line wagered will pay out resulting in a significant

win. A more recent take on this design is the use of over-sized, giant symbols that seem to ignore the boundaries of the rows and columns and can occupy as much as half of the total game space.
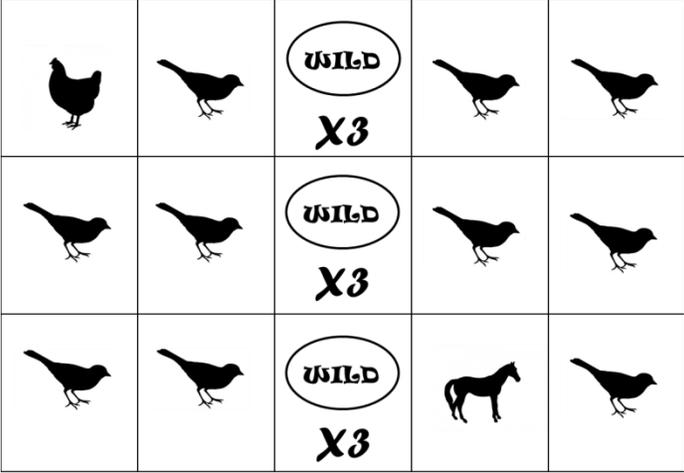
Figure 4: Stacked symbols and stacked wilds within a column produce a large number of winning lines
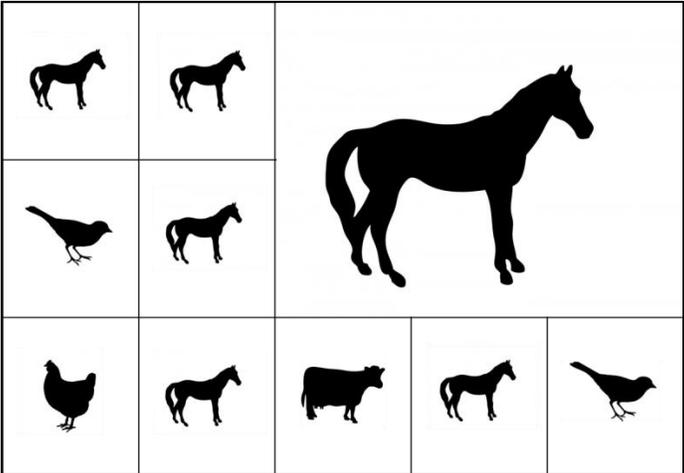
Figure 5: Example of an oversized icon

A giant symbol fills the space that would normally hold six smaller individual symbols, increasing the potential of hitting numerous lines in one spin and drawing attention to the importance of the symbol.

The use of stacked and giant symbols creates the potential for very large payouts, but the display of these symbols also produces a new form of near miss. In more traditional single pay line machines, a near miss occurs when very valuable symbols (like wilds or jackpot symbols) fall just above or below the single pay line. The implication is that the player came very close to hitting a big payout when in reality the placement of valuable symbols above or below the pay line does not reflect at all the mathematical probability of a big win. In multi-line games, it is difficult to create the near miss effect because every row is a paying row. By stacking symbols vertically into the columns, multi-reel slot games are able to create new near miss effects in two ways. The first way is by filling some columns with stacked symbols but leaving one or two key columns unfilled. Like with the traditional near miss, manufacturers are not obligated to distribute symbols equally in each column. As such, reels 2 through 5 may be very likely to contain a stack of the same, high-paying symbol while reel 1 contains far fewer symbols. An investigation into PAR sheets for Canadian slot machines by Harrigan and Dixon (2009) also indicates that the distribution of symbols varies greatly across reels. With this design, the player will see many opportunities to hit huge jackpots only to be thwarted with one uncooperative column. Some designs will alternate which specific symbol heavily populates most of the reels or alternate which column is likely to be filled with stacked symbols, creating even more diversity and complexity to the game space.

Multi-line slots also use the animation of the falling or spinning reels after a spin is initiated to also create near-miss experiences. The final positioning of each reel and each symbol on any slot machine in Nevada is a random outcome determined by the parameters of the random number generator (Scheri 2005). However, designers have much more flexibility in manipulating what symbols are revealed during the animation of spinning or falling reels in the

seconds prior to the final outcome. It is not uncommon in some machines to see, during the spinning phase, all five columns fill with the same symbol or wild symbols (implicating a significant payout is imminent) only to have the reels ultimately stop in a far less optimal configuration. This style of presentation (displaying a perfect pattern layout during the spinning animation) takes on new significance when matched with the stop-reel feature most machines offer. The stop-reel feature gives players the opportunity, after initiating a spin, to press the wager button again and skip the 2-3 second spinning-reel animation and jump straight to the final reel position. For those players who prefer to skip the animation to go straight to the final result, this feature is essential. But this small element of control may also produce the impression that a well-timed activation of the stop-reel feature can produce more favorable outcomes.

One reason for concern may be due to the use of pattern identification in real video games. A diverse range of video games, from puzzles to shooting games, employ a game structure that requires players' to respond to visual stimuli on the screen with a quick reflexive action on the controller. By observing the cues of the game and responding with the correct action at the correct time, a video gamer will be rewarded by the game when they get it right. At first glance, this style of slot machine offers game play similar to video games. But despite the similarities, the core game structure is completely different: the player has no control. There is no connection between visualizing an optimal pattern and triggering the stop-reel feature.

One unanswered question is whether the ability to skip the reel-spinning animation is viewed (incorrectly) by some players as an ability to exert some control over the final outcome of the spin. In situations where the cascading reels will occasionally reveal a saturation of one symbol across multiple columns, it is not difficult to envision a scenario where a player might use the stop-reel feature in an attempt to lock in a jackpot payout (despite the fact that the final

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position of each reel was calculated at the initiation of the wager and is not influenced by using the stop-reel feature). Certainly, a number of studies on problem gamblers have shown that some gamblers believe that their actions can control the outcome of the game (Walker and Phil 1992; Delfabbro 2004). For players who have this misconception, the presentation of the perfect configuration of symbols in the seconds before the actual slot result is revealed, coupled with the ability to seemingly stop the reel animation with timing, may make it natural to conclude that their actions are changing the game outcome.

What is the effect of all of these layers of increased complexity on the slot-playing experience? It is an important question when we consider that despite all the visual noise the amount of skill involved in slot play remains extremely limited. Yes skill is a major component of video game play, but it is not the only component of games that players enjoy. Yee's (2006a) analysis of achievement in video games highlighted other elements beyond skill development in terms of player motivation. Yee found that the process of learning the mechanics and rules of a game is also a significant part of the player's experience. In slot play, outside of reading the provided rules and pay tables, the process of learning the game-elements of the machine can only unfold through repeated betting sessions. Players who want to learn the dynamics of the game have to commit to multiple wagers over time to expose the hidden secrets of the machine.

The fundamental game structure of slot machines has changed little, but the amount of information players receive with each spin has expanded. This bears some similarity with the evolution of game play and design in video games. Though current video games offer a much broader array of game play options compared to slot machines, earlier video games offered much more simplistic game play. Salen and Zimmerman (2004) view game complexity as an important component in creating meaningful play in video games by giving players an

experience that rewards commitment and focus by providing an enhanced understanding and mastery of the game dynamics.

The new and complex machines on G2E floor present a similar dynamic: it can take time to figure out exactly what the underlying win/loss conditions of a machine are. With multiple lines, symbols and bonus features, there is a lot of information to process about how the game operates, information that is revealed through repeated engagement of the machine. When approaching a new machine, the mélange of images, animations, symbols and sounds presents a distorted experience and narrative. But as play continues, the patterns that produce wins/losses/or bonus games become clearer and anticipated. Delfabbro (2004) argues that games of pure chance are not entirely without skill due to the need to learn the complex rules and dynamics (games like craps, blackjack, and video poker, require learning the optimal playing strategy). Although slots offer no optimal strategy to develop, their complex array of sounds, symbols, and features offer a type of puzzle that is slowly revealed through consistent play.

Bonus Events.

Almost every new slot machine manufactured for the Nevada casino market contains at least one bonus event. Bonus features come in a wide range of styles. More basic machines may simply have one simple bonus event while other complex machine may offer more than a dozen. A bonus event can be a quick, seconds-long diversion from normal play or can last several minutes and constitute an almost separate gaming experience within the main game. The primary distinguishing feature of the bonus event is its disruption of, and distinction from, normal reel play. When a bonus event occurs, it looks and feels different from the normal wager/spin/result loop of the slot machine. Like all other dynamics of a slot machine's game play, bonus events are triggered intermittently and usually cannot be predicted. Bonus events are also important because they are almost always paired with some form of a win that can range

from a small amount of credits to a large jackpot in the thousands. It is arguable that compared to normal play, bonus games are the primary mechanism through which slot machines deliver sizeable and memorable wins. There is a surprisingly wide diversity of bonus events that can occur during slot play. But despite the many different themes and styles of bonus rounds, there are some very common formats that are present across machines and manufacturers.

Bonus rounds are triggered through normal reel play. The most frequent way a bonus round is triggered is through special symbols that appear randomly on different reels during a spin. A common configuration involves at least two (usually three) special bonus symbols appearing in any position on any of the reels. Bonus symbols rarely serve any other purpose other than to start the bonus round, and a bonus symbol on early reels will usually prevent other symbols from forming winning patterns. Bonus symbols usually have a stand-out design and their arrival on a reel is usually accompanied with a sound that is distinct from other symbols. In most machines, when only one more symbol is needed to trigger a bonus, the tension is drawn out by extending the amount of time the remaining reels spin and playing unique sounds and music.

The bonus-trigger mechanism within normal reel play also creates a large number of near-miss situations. Due to the simple nature of probability, it is much more common to receive two out of the three bonus symbols rather than trigger the bonus itself. Some machines may actually be designed to increase bonus-trigger near misses by including more bonus symbols in the early reels and less bonus symbols in the fourth and fifth reel (Harrigan and Dixon 2009). The impact of the near miss is amplified by the increase in sound and visual effects that are included when the player gets close to hitting a bonus (examples include dramatic music, flashing colors, and drawn-out reel spins).

Another way that some machines create near misses with bonus rounds is to take away the opportunity to play a bonus game after a slot spin has triggered the bonus option. For example, *Journey to Oz*, a *Wizard of Oz* themed slot made by WMS has five different bonus games that can be played. When a bonus is triggered, a wheel spin determines which bonus game will be played. Between each game is a small credit amount (usually between two and ten dollars in value); if the wheel stops on a credit amount players receive that as their win, do not get to play any bonus round, and are returned quickly to the normal game.

Free Spins:
Bonus rounds can broadly be divided into three categories: free spins, wheel spins, and interactive games. The free spins feature is the most common bonus round and can be found in most machines. When triggered, it usually offers players anywhere from 2 to 20 free reels spins at the previous wager-amount the player made. Free spins generally produce at least a small monetary gain at the conclusion of the round because the player has the benefit of hitting small, medium, and large paying combinations without depleting his own credit bank. Even a handful of small wins during free play can accumulate to a modest win. In the most basic version of a free-spins bonus, the free spins are indistinguishable from normal play. In most games, a free spins bonus can be retriggered by hitting the bonus symbols a second time. On very rare occasions, free spins might re-trigger two, three, four or even more times giving the player 10 to 20 minutes of bonus play and a sizeable win.

The free spins bonus will often use altered symbols or introduce new symbols relevant to the theme of the game. It is common for free spins to add features to the game that increase the likelihood of hitting an above-average win that might be 20 times the initial wager or more. Examples include doubling the value each paying line, more wilds in each column, more random

multipliers, the opportunity to win additional spins, additional stacked symbols or wilds, and additional bonus games to win.

Wheel Spin:

The wheel spin is another common bonus event that originated over twenty years ago. A popular (and obvious) example of this bonus format are the many *Wheel of Fortune* themed slot games, but there are many slot themes that use spinning wheels as part of a separate bonus event. During a wheel-spin bonus, the player gets to press a button and spin a physical wheel located at the top of the machine and whatever amount or multiplier the wheel lands on the player wins. Some versions might use multiple wheels with fixed amounts as well as multipliers, extra spins, or other positive outcomes. Different variants of this bonus game may not use a wheel but some other presented set of values or multipliers that are randomly selected by the machine by a device of some sort. Unlike free spins or other bonus events, the wheel bonus is usually quickly resolved and gets players back to spinning more efficiently.

Wheel bonuses also have a tendency to create their own unique form of near miss. The visual representation of the wheel divides all possible winning amounts (usually ranging from 5X the initial wager to 500X the initial wager) equally. To an unfamiliar player, it might appear that the 500X win has about a 1 in 35 chance of hitting because it occupies one slot out of thirty-five. In reality, the likelihood of hitting the 500X slot is far less than 1 in 35 and is determined by the probabilities for each possible outcome as predefined by the RNG chip. To add to the near-miss effect, some wheels will be programmed to favor the low paying slots that sit very close to the high paying slots so that as the wheel slows it gives the impression that it might stop on a big pay only to stop on the lower-paying spot instead (Turner and Horbey, 2004).

Interactive bonus games:

Interactive bonus games come in a very wide variety of styles and designs. But structurally, interactive bonus games offer little variation and follow the same pattern across machines. Interactive bonuses use touchscreen technology and offer players the opportunity to select one symbol or more from several options presented on the screen. Behind each symbol is an award, and, like with other bonus games, some awards are small and some awards are much bigger. Players choose symbols until they have either run out of turns or until they choose a game-ending symbol whereupon they receive the credit already won (see FIG. 6). After the player has finished the game, the program will reveal what was underneath the symbols not selected (and sometimes reveal better-paying selections the player missed). Like video games, some interactive bonus games have multiple levels with players selecting not only a credit amount but also the opportunity to move on to the next stage. Advancement bonus games will reward players with increasingly larger wins as they pick correctly and advance through higher levels. Unlike wheel spins, the distribution of pays underneath the symbols is representative of the actually odds. So, for example, if the odds of selecting a 1000 credit win are represented as 1 in 20 picks on the screen, the actual machine odds will also be 1 in 20.

Of the three styles of bonus games, the game play of interactive bonuses has the closest similarity to video games by inviting players to take an active role in the outcome of the game. Although skill remains nonexistent and chance ultimately determines the final amount won, interactive bonus games give players a much stronger sense of being in control of fate than the more standard act of wagering on slots (despite the fact that the underlying math that determines both outcomes is essentially the same). The act of wagering on the slot is passive (like playing roulette) the bet is made and the player watches the reels to see what the machine delivers. When an interactive bonus is triggered, players are presented a rare opportunity to touch the

machine and make their own fortune by picking the lucky symbols (like throwing dice). The fact

that skill plays no part in the outcome is irrelevant. Huizinga (1950) identifies the element of

chance, *alea,* as one of the four elemental components of play and there are many examples of

video games where some components of the game structure are essentially pure probability

(random events and rewards are a very large part of playing MMORPGS). The popularity of

interactive bonus games as a diversion from regular slot play may lie in the fact that players have

a stronger sense of impacting the outcome despite the fact that there is no avenue to apply skill or

knowledge to improve the payout.
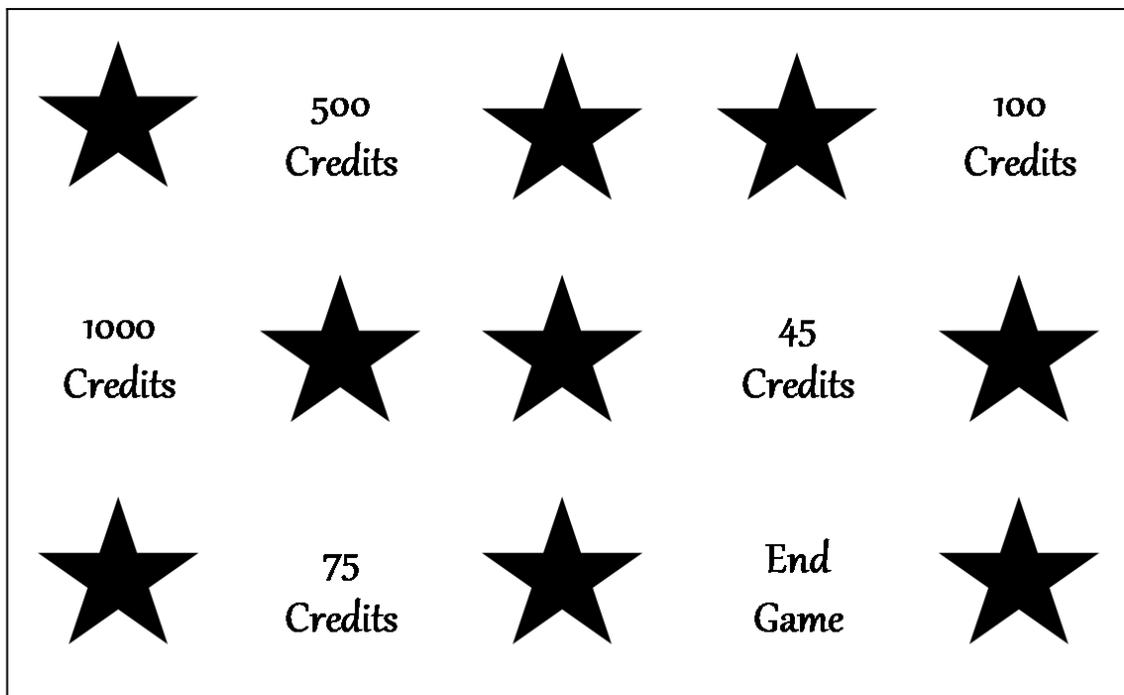
Figure 6: An example of a basic interactive bonus game

Players pick stars to reveal a hidden credit win. When the player picks the "End Game" symbol, the game is over and normal
play resumes.

A handful of interactive bonuses observed at G2E tried to take bonus game play to the next level and essentially merge a video-game feel to the probability-determined game outcome. The boldest example of this on display at G2E was IGT's *Big Buck Hunter,* a slot machine directly modeled off of the popular arcade and video game of the same name where players use plastic guns, the mouse on their computer, or the touchscreen on their phone to aim a rifle scope and participate in a somewhat tacky hunting simulation. In the slot version, the interactive bonus allows players to target deer, wolves and other woodland creatures with actual plastic shotguns tethered to the machine itself (a design feature taken straight out of arcade video games). As players "hit" their targets, credit wins are revealed and accumulate. Of course, like all interactive bonuses there is no actual skill involved, and the total credit amount won was already predetermined by the random number generator before the first shot was made. The bonus game is essentially a simulation of a game that itself simulates hunting, it is an attempt to create the feel and fun of a skill-based shooting game while only providing the visual textural elements of the game without the actual skill mechanics.

In another IGT machine based of off the TV game show *The Amazing Race,* players must "dig" through a pile of sand to find a winning ticket. The instructions for the bonus game encourage players to touch the screen rapidly and successively to dig faster because the longer it takes to reveal the ticket, the lower the prize amount will. Of course, like with the hunting game, the final credit amount is already predetermined by the machine; the player's actions are merely a pretense. No matter how fast you dig (or how well you aim), you cannot improve the final amount won.

Despite the overwhelming popularity of interactive bonus games in newer slot machines, the popularity of bonus events that incorporate a hollow video-game simulation is low. *Big Buck*

Hunter was released in 2012 and yet three years later there is very little trace of this machine or others that use a similar design on casino floors in Las Vegas. One possible explanation for this failure in merging popular video-game game mechanics with slot play is the inability to actually deliver player control over the outcome. The relationship between player action and game response in video games must be synchronous and precise if players are to commit to the game and absorb themselves into the digital world (Lombard and Ditton, 1997; Salen and Zimmerman, 2004). Players with experience playing shooting-style video games might soon recognize that aspects such as their aim, response time, and accuracy ultimately do not contribute either positively or negatively to the outcome of the bonus round. This might make games like *Big Buck Hunter* feel foreign or even frustrating to these players. On the other hand, players who have little-to-no experience with video games may have been intimidated by the game mechanics of *Big Buck Hunter* and avoided the machine out of fear of making an error (and losing money). Interactive bonus games are more successful when they introduce an altered (and rare) playing dynamic that is complimentary and reflective of the random nature of slot play.

With Nevada's new willingness to allow some skill-based machine gaming, the question of how to best incorporate video game mechanics into slot dynamics is important. Skill-based machine gaming has thrived in Nevada for decades in the form of video poker, where player decisions can increase the payback percentage (although the player will always have a negative expected outcome). But video poker does not use the same visual structure or game structure of slot machines, nor do video games have the same graphical similarities with video games. What is unclear is how slot machines that can deliver video-game quality visuals incorporate skill-based game play that cannot overcome the need for a negative expected return.

To some degree, a small number of slots are introducing some video-game-like play options to their game. A small portion of machines allow players to make an additional wager that increases the number of bonus events available or increases the chances of triggering a bonus event. For example, WMS's *Hot Hot Super Respin* family of machines offers players the opportunity to make an additional wager and receive more bonus triggers. Other machines might include more bonus trigger symbols or in-reel bonus events if players increase their wagering total or make an additional side wager.

Game volatility is another game-play feature that players are occasionally allowed to control. IGT's *Twilight Zone* machines offers players the chance to select a low, medium or high level of volatility (low volatility offers more wilds with no multiplier while high volatility offers less wilds that contain a 3X multiplier). During a free-spin bonus, Aristocrat's *Longhorn Delxue* offers players the option to choose more free games with lower wild multipliers or sacrifice the number of spins to get bigger wild multipliers. Players who would prefer a more consistent number of smaller wins can choose low volatility while those willing to sacrifice smaller win amounts can chase larger payouts.

A very new development is the option to outright purchase a bonus event directly. Bally's *Acorn Pixies* offers players the opportunity to purchase a bonus-round-type session of free spins. For a lump-sum payment of twenty, forty, or even one hundred dollars, players can purchase a set number of the game's "free" spins, including the extra-special features that accompany the bonus (like more wilds and random multipliers). Of course these pre-purchased bonus spins will, over the long run, pay back less than paid in (whether this new design will gain traction with players is yet to be seen).

These types of features may not be present in the majority of machines, but are certainly common enough to be considered more than just oddities. Their success where other innovations fail may be because they embrace the nature of slot game play rather than trying to circumvent it. Slot machines are random, unpredictable, and uncontrollable, that is the core nature of playing on a slot machine. The inclusion of special features like paying for more bonus hits, controlling volatility, and buying bonus-type rounds offer players meaningful choices within the fundamental structure of slot game play by giving players genuine control over the elements of the game that *are* allowed to vary. Salen and Zimmerman (2004) argue that when creating a video game, the rules and player actions must be designed with consideration of the holistic game experience. In *Big Buck Hunter*, the illusion of precision, control, and skill in firing at the digital targets is contradicted firstly by the random nature of outcomes and secondly by the underlying reality that slot machines cannot be controlled. Fine (1983) argues that all games are grounded by what he calls a primary framework, or in other words the fantastical world of play will ultimately be evaluated through the lens of reality as well as the lens of fantasy. It may be that players will resist slot-play features that imply too strongly that they directly control outcomes with skill because it clashes with our cultural knowledge of slots and their function

Accumulation Bonus

Not all bonuses are entirely unpredictable. A small but significant number of machines offer an accumulation bonus, a bonus game that is triggered when, through sustained play, a meter or some other visual indicator of progress is filled. One example of this bonus design is Konami's *Rock Around the Clock* game. On a separate screen above the main screen there is an animated clock. With every spin the player makes, the clock moves very slowly towards the twelve positions. Occasionally, a spin will randomly award the player with rapid advancement on the meter. When the clock reaches the twelve, one of two bonus games is triggered. In

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another example, IGT's *Alice in Wonderland* slot game has five different pathways to five different bonus games (based on different characters from the book). During normal play, a player may earn one or more special symbol s that randomly illuminates one of the steps towards a bonus. When all of the steps in a bonus have been reached, the bonus game is triggered. On some machines, like IGT's *Star Wars, Droid Hunt* , if a player chooses to end play before reaching their earned bonus, the machine will pay the player some amount of money depending on how close to the bonus they were. Other machines, like *Rock Around the Clock*, will leave the earned progress towards the bonus game up on the screen for any new player to take over.
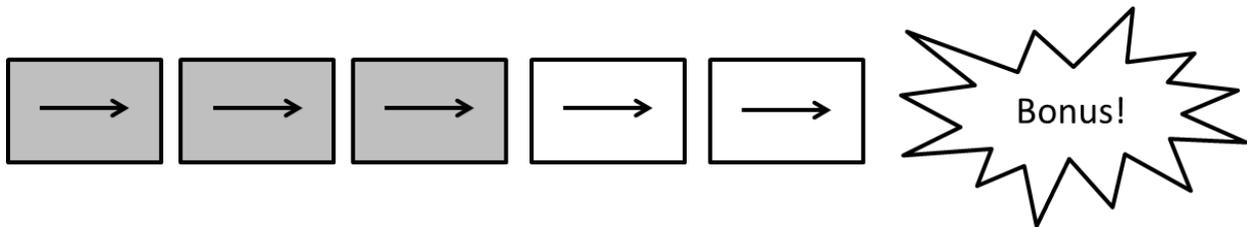
Figure 7: Example of the visual feedback for an accumulator bonus

When the player fills in all five squares, the bonus will be triggered. Squares are filled slowly through normal reel spins.

Mathematically, accumulation bonuses do not deviate radically from the traditional bonus structure in that these machines, like all machines, offer players a negative expected payback. But unlike the traditional bonus game where bonus games appear unpredictably, accumulation games offer players some visual reinforcement about their progress towards a desired goal. The use of a progress bar that advances incrementally through normal game play and indicates that a player is approaching a significant outcome within the game is a very big part of many video games. The visual representation of progress can be found across different categories of games like casual social games, console games, or MMORPGS. In slots, these progress bars create a

link between spins and give players an almost non-monetary indicator of progress and achievement in their game play and perhaps more importantly give an indication of the future. A player who sees a progress indicator that is 80% full has information that it will only take a small number of spins before the bonus game arrives and some form of guaranteed win (of a still uncertain amount) will occur.

In-Reel (Mini) Bonus Events

More advanced or premium games will often include a large number of mini-bonus events that occur briefly within normal reel play. Main bonus rounds require specific symbols to trigger them and will often divert the game play to a different screen configuration (or a different area of the machine altogether). These games can take up to several minutes to complete and are generally associated with medium to large wins. Although bonus rounds are very popular and common, too many bonus rounds that take too long to play can be a major disruption to the business of slot machines that rely on a steady pace of wagering. Mini-bonus events help fill the gap between the more substantial bonus rounds. Mini-bonus events, unlike regular bonus games, usually do not require any specific or unique symbol to trigger. They appear with very little warning during or immediately after a normal reel spin. In-reel bonus events may best be described as unpredictable gifts the machine gives to boost the outcome of a normal reel spin. Intermittently, the machine decides to transform a lackluster spin into a more profitable outcome (or sometimes a great spin into a fantastic outcome). The impression left is that the machine is providing a boost to the player's fortunes by giving them a temporary advantage. It is not surprising then that these quick bonus hits are sometimes referred to as upgrades by both player and manufacturers.

Like triggered bonus rounds, mini-bonus events introduce variation to the normal game play, but they do it quickly within normal game play. A common mini-bonus event is to replace

a number of plain symbols with wild symbols. In doing this, the machine transforms losing patterns into winning patterns. Another frequent example is to randomly double or triple (or more) the total amount won by the player during that spin. Aristocrat's *Buffalo Stampede* will randomly add more rows (and consequently more pay lines) to certain spins increasing the chance of making a paying line.

In-reel bonuses will alert players to the arrival of the special event before revealing the outcome on winnings. A new animation or sound may appear that player's associate with a special moment in the game. Just as triggered bonus rounds build anticipation before revealing the game, so too do the mini events create a much briefer moment of excitement and a break from the normal routine. The popular bonus pattern of announcement, special event, and outcome strongly suggests that delivering some wins through an altered or altogether different game play design is appealing to players. The short duration of mini-bonus events gives designers the flexibility to add more of these desirable breaks from routine play without disrupting the pace of wagering by the player.

In many premium machines (machines that have more elaborate cabinetry, larger video screens, and higher-quality graphics) it is not uncommon to see four or five triggered bonus games as well as five or more unique mini-bonus events contained in one game. Some machines allow players to choose which bonus game they want to play, but it is more common for machines to choose for the player which game to play. The machine may randomly assign different bonus games with equal frequency, or like in WMS's *Lord of the Rings, Land of Mordor,* some bonus games are more commonly awarded than others. If a player wishes to experience all of the playable bonus games in the machine, it might require hours of play time to trigger enough bonuses that then also trigger the specific bonus games that have not yet been

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played. Some bonus games might be so rare that their hit frequency is as uncommon as a large

win.

The popularity of bonus games, the presence of multiple games, and the existence of rare-

to-play bonus games may be partly explained by Yee's (2006) description of achievement in

video games. In video games, advancement through the game structure and the narrative

structure of the digital world is a significant motivator for many players. Not only is getting to

the next level or visiting an unexplored part of the game a major driving force, but so too is the

opportunity to explore the new rules and game dynamics that playing new games delivers.

Could it be that the desire to activate, play, and experience the multiple bonus events contained

in a machine interacts with the gambling motivations of the game (or perhaps is a separate

motivator altogether)?

The presence and importance of complex and numerous bonus events in slot machine

design of may reflect the need to intermittently provide the player with unique and memorable

moments. The increase in the number of reels, rows, and symbols used in most modern multi-

line slot games has also increased the number of hits. There are many games where at least a

few lines will hit for a small amount (usually less than the initial amount wagered) every second

or third spin. Winning something in multi-line slots is a more common event than what one

would experience playing a more traditional slot with three reels and one pay line. And yet, the

intermittent and unexpected nature of winning is considered the most important psychological

driving force behind player enjoyment in slot play. The clutter of information on the screen also

makes near-misses more difficult to identify. Bonus events may be so crucial to the new

generation of complicated slot machines because they are the only way to distribute meaningful

intermittent rewards in the game as well as noticeable near-miss events.   Bonus events use

different game play, graphics, and sound to randomly and unpredictably pull players out of the

normal game and into a new game system. If intermittent reinforcement is the fundamental

appeal of playing slot machines, then players may very well be playing for the mysterious bonus

events while normal reel play blurs into the background.

Video game designers, players, and scholars have a term for this dynamic "grinding"

(Rettberg, 2008). In games that ask for a large time-commitment from the player (like

MMORPGS and some social/casual games), the player's time in the game is often divided into

grinding activities which are periodically broken up by either the achievement of the goal the

grinding activity is building towards or the introduction of an unexpected event. If we consider

base reel spinning as "grinding" and the bonus events as goal attainment, there are strong

parallels between video game play and slot play at least in terms of the temporal spreading of

goals and rewards. It would be particularly interesting to conduct a study to measure the amount

of time players in video games spend grinding relative to the time they spend engaging the more

special rewards or goals of the game and compare it to the average amount of time slot players

spend spinning reels relative to the amount of time they spend playing the rare and special bonus

events.

Progressive Awards.

Many machines will prominently display a range of progressive awards available to be

won. Progressive awards start at a base level and slowly increase in value as the machine is

played until the progressive is finally hit. Progressive awards can be limited to a single machine

or linked between multiple machines within a casino or multiple machines between casinos

within an entire gaming district. IGT's *Megabucks* offers the largest progressive jackpots in Las

Vegas. This progress jackpot links hundreds of machines from multiple casinos and traditionally

has paid-out between 10 and 20 million dollars (as an annuity). Many of the premium slots like

WMS's *Wizard of Oz* games, IGT's *Wheel of Fortune* games, and Aristocrat's *Walking Dead* game also offer large progressive awards that might up to 2 million dollars. Progressive awards are not only limited to extremely rare gigantic jackpots, many machines offer a range of progressive awards that range from 10's of thousands to several hundred, to just ten or fifteen dollars. Konami's *Rock Around the Clock* offers four levels of progressive awards: Maxi (between 6 and 9 hundred dollars), Mega (between 1 and 2 hundred dollars), Major (around 30 dollars) and Mini (about 15 dollars). There are a number of ways for progressive awards to be won. Some machines, like the *Megabucks* or *Wizard of Oz* machines, the player must hit an extremely unlikely line combination while betting max credits to win the massive jackpot. Rock Around the Clock's four progressives are awarded during bonus round play and do not require a max bet to be hit.

Other designs award progressives unpredictably at the completion of a normal reel spin. In some designs, these in-reel progressive awards might allow the player to engage an entirely unique, secondary game. A simple example is WMS's *Jackpot Explosion*, a secondary game that can be integrated with most of their core machines. Machines that incorporate the Jackpot Explosion secondary gave have an animated screen of a volcano positioned on top of the main reel screen. Over multiple spins, the lava level in the volcano rises (indicating) that a progressive is getting close to hitting. At a completely unpredictable moment, the volcano will erupt and distribute one of the progressive awards to the player. Among the five game manufacturers studied at the 2011 G2E, four (IGT, WMS, Bally, and Konami) demonstrated a total of fifteen secondary-game titles that could be added to a large number of their basic or core machines (see appendix c-g for titles and descriptions).

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Group Bonus Events

Group bonus events were present in 5% of the machines examined at G2E. The defining characteristic of a group event (sometimes called a social or communal bonus round) is that the game play will include at least two or more players on linked machines (it's important to note that the group bonus will trigger even if only one player is actively wagering on the machine, and the player will engage the computer only). The majority of the game play on a group-bonus game is individual on a single machine. When a group event is triggered, the game play for the group bonus event will often occur on a separate screen which is often a large screen that extends above and across the linked individual slot screens.

Slot machines that incorporate periodic group bonus usually share several design characteristic. Like with most bonus events, group bonus events are triggered in an intermittent and relatively unpredictable way. In some designs the group event starts spontaneously and is not triggered by any of the main slot game play. Some machines, like IGT's *Wheel of Fortune Experience*, will trigger a group bonus even if one of the linked players hits the right combination of symbols (creating a collaborative play-structure that increases bonus triggers when more people are playing).

In order to qualify for the group bonus, each individual player has to have made a wager within a certain amount of time (anywhere from 5 to 10 seconds). So long as players continue play at a reasonable pace, they will qualify for the group bonus game when it is triggered. Many designs will display a timer counting down after each individual spins as a visual reminded to players that they need to make another wager if they want to keep their bonus eligibility. In this sense, the group bonus is presented somewhat like an accumulation bonus, the machine reminds players to continue play at a quick pace so that they do not miss out on the inevitable social bonus.

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Figure 8: A common screen configuration for a premium slot with a group bonus

When the group bonus is triggered, individual slot screens freeze and qualifying players are directed to observe the group game play on a separate, larger screen.

The game play of a social bonus event usually involves three styles: free spins, interactive games, or progressive awards.   Each individual player is represented in the new, communal game space in some way: through avatars which the players choose to represent themselves, the color of their machine, or their machine's number. The orientation of the game play can be either cooperative or competitive. WMS's *BattleShips* divides qualifying players into two opposing teams, red and blue. During the group bonus, a version of the traditional board game *Battleships* is played with players from each team taking turns launching attacks at the other team's ships. The team that sinks all of the other team's ships first wins a larger bonus amount while the losing team receives a smaller consolation amount. Generally, the base amount awarded to each player will be multiplied by the player's base bet as a way of

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encouraging larger wagers.   For example, if the red team is awarded 750 credits, a player wagering 1 penny per line will win $7.50 while a player wagering 5 pennies per line will win $37.50. This style of competitive group bonus events can be found in a number of premium machines like IGT's *The Dark Knight* or WMS's *Pirate Battle.* Of course, like all slot play, the victor in the group bonus is determined entirely by chance and player decisions and actions are ultimately inconsequential to the final outcome. Collaborative group bonus rounds were also present in a small number of machines. *Journey to Oz* offers frequent group bonus events. In one of the free-spins bonus games, each qualifying player takes a turn activating one of the free spins. The action is essentially irrelevant to the outcome of the game but it can lead to situations where one player's good fortune in spinning is shared among all players.

Yee 's (2006) model for player motivation in video games lists social interaction within the game space as a distinct and primary motivator for players. The data for Yee's theoretical model came from MMORPG players, a game medium in which social interaction with other players is a major and rich part of the game play experience. As is apparent both in the quantitative and qualitative analysis, the use of social game play in slot machines is limited both in application as well as depth of game play. Group bonus events in slots more closely resemble the much more restrained and limited social play that is present in many social-network games like *Farmville* or *Candy Crush Saga* with an emphasis on both collaborative and competitive game play that is, at its core, shallow and not reflective of player skill or ability in the game. With the current generation of slots, social slot games are not really comparable to the range or importance of social interactions in video games. In their current incarnation, group bonus rounds are more appropriately categorized as part of the overall achievement and goal components of slot play. This may change in the future, if innovation in slot machine design

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makes greater use of the impact of sharing a meaningful gaming experience within the same digital space.

Quantitative Analysis: Game Structure

A review of the frequency distribution of the game-mechanics characteristics of machines reveals that some game structures are more common than others. Figure 9 shows the percentage of machines that were identified as having a branded, pop-culture theme and those machines identified as premium over core. It is important to note that these machines are not a perfect reflection of the machines available in a standard, Las Vegas casino but rather the range of newer products (most of which will eventually be on the casino floor). The majority of titles measured did not use a specific pop-culture brand while premium machines also made up a smaller proportion of the total titles on display. Of the two hundred and twenty-five machines evaluated, only 16% of machines were branded and 23% qualified as premium. It should be noted, however, that almost all branded machines (91%) were also classified as premium, suggesting that the use of valuable themes from popular culture merits a more elaborate platform on which to be showcased. Though premium machines represent slightly less than a quarter of all machines on display, it is also important to note that due to their size, their prominent positioning on the showroom floor, and more frequent advertising and displays, the premium machines garnered the majority of the attention from the convention attendees. In terms of the display of the reels themselves, 77.3% of all machines used a video display with 12% of machines using more traditional-looking mechanical reels and 10.7% using a hybrid of both mechanical and video.
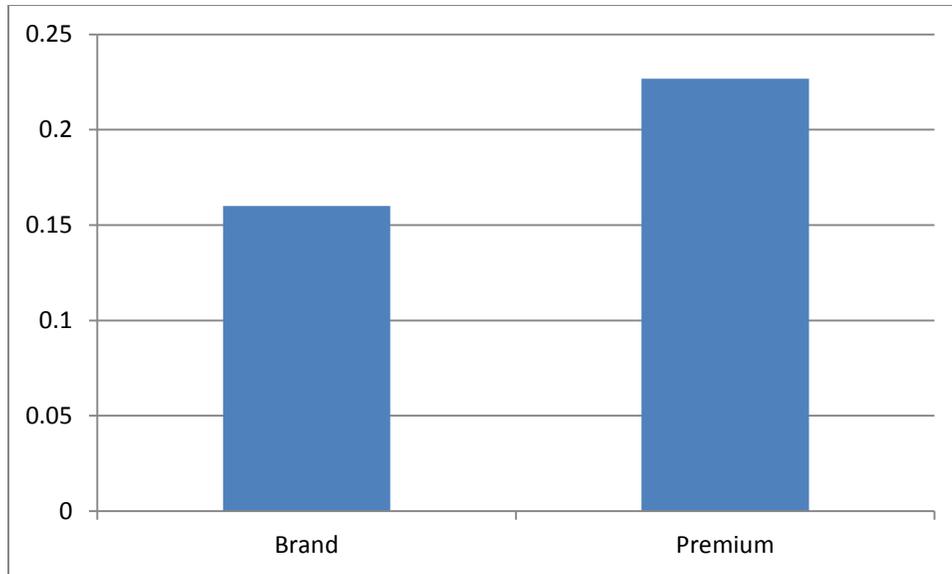
Figure 9: Proportion of machines categorized as premium and using a pop-culture brand.

An analysis of the various structural elements of the slot games also reveals some overwhelming trends as well as a degree of diversity. The vast majority of machines (98.8%) included at least one bonus feature in the game. In terms of the number of different bonuses each machine offered, 44% offered only one bonus event while 29.3% offered two and 25.5% included three or more. The largest number of either triggered bonus events or in-reel bonus events recorded in one title was fifteen on Bally's *Betty Boop Fortune Teller* premium machine. The mean number of bonus events and in-reel bonus events was 2.4. Figure 10 shows the different proportion of all machines that offered different types of bonus games. The most common bonus-game type was free-spins/wheel spin games (91.6%), followed by interactive games (32.4%), and in-reel bonus events (50.7%). Accumulation (12%) and group play (5.8%) occurred far less frequently. Over one third of machines (36%) used stacked reels or some other form of uncommon reel arrangement as part of normal reel play.
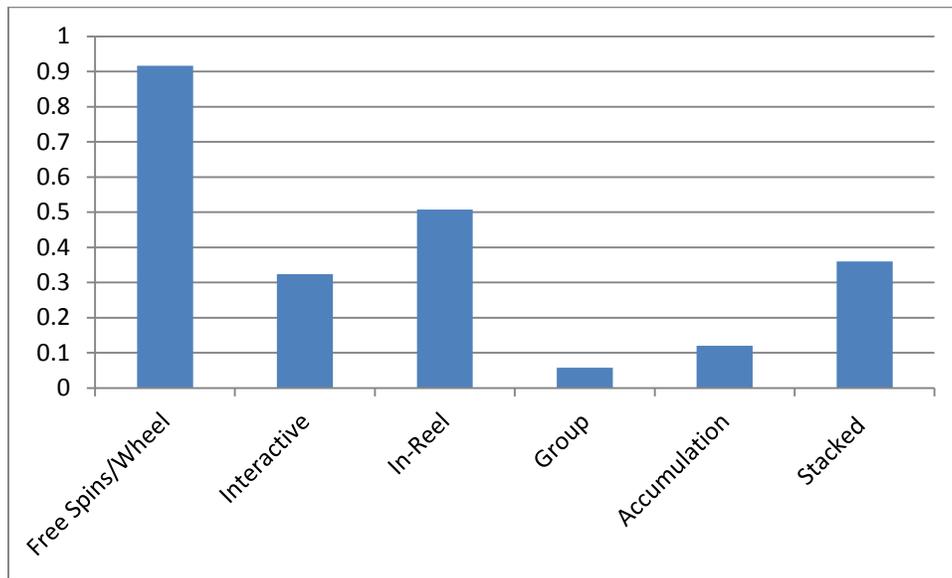
Figure 10: Proportion of machines that contained a specific special-game feature.

Immersion

In video games, immersion refers to the various elements that compose the visual, audio, and narrative components of the digital space. Immersive elements are built around the game structure and transform the series of actions and events of the game into a more meaningful experience (Salen and Zimmerman, 2004). Unlike the game-play structure of slots, there was a much greater degree of diversity with respect to the immersive elements of the machines at G2E. The collection of themes, graphics, and sounds reflect a broad range of styles and creativity. The use of immersion in slot machines bears the strongest similarity to the use of immersion in video games on many levels, particularly in terms of graphics, sound and theme and also, to a lesser degree, in terms of story.

Image Quality, Graphics, and Animation

The use of reels, symbols, and patterns as the core mechanic of slot machine play is a format determined by tradition and familiarly, rather than pure necessity, and in many ways

limits the variation of game structure among machines. However, in terms of their graphical

capabilities, slot machines can deliver the same diversity and quality of animation that any

contemporary arcade, computer, or console video can produce. The screen, indeed the entire

structure, is a blank canvas upon which designers can blend animated characters, movie clips, 3D

effects, and more with the structure of the slot play itself.

The majority of new slot machines offered for sale on the floor of G2E (and a significant

portion of slot machines that occupy the gaming floors of casinos in Las Vegas) use video

displays or a hybrid of physical reels and video displays.   Slot machines that use video displays

do not use physical reels and instead use animation to create the spinning reels effect. A small

number of new designs do keep the physical spinning reels, but will also incorporate other digital

effects like interactive bright colors, positioning a secondary video screen above the reels, or

even placing a transparent LED screen over the physical reels which allows for animation to

interact with the physical placement of the symbols.

The physical components of the slot machines at G2E: the cabinet, the screens, the lights,

even the chairs can reflect a shocking degree of engineering, creativity, and variety. The most

basic (core) machines generally have only one display screen and are built into a plain cabinet

housing. Core machines will usually display the title and theme of the game on a separate video

screen or illustrated glass panel above the main playing screen. Core machines are usually

smaller in terms of total screen size and cabinet size and the physical housing of the machine

can be interchanged with different titles (in fact many machines offer multiple games that players

may choose from or can be switched instantly by the casino operators).

In terms of the size and effort put into the external design of a machine, a fairly common

pattern that emerges across the big manufacturers is that a boost in one immersive element is

more likely to be matched with other higher-end immersive elements. WMS's *Willy Wonka*-themed slot machines are a good example of this dynamic. Having acquired the exclusive rights to use the images, sounds, and music from the 1971 film, WMS designed the machine to maximize the use of these costly and important elements in several ways. The size of the machine itself is significantly taller than a more typical core machine while the structure of the housing itself is custom crafted to include molded, brightly-colored plastic candies and lights as well as a large, illuminated photo of Willy Wonka taken from the film. Many high-end machines will accessorize the cabinet with elaborate, illuminated, and highly-detailed plastic molds in a way that both draws attention to machine as well as heightens the thematic elements of the game.

The Wonka machine uses two video screens, a long main screen placed directly in front of the player and a secondary smaller screen that sits above it. The presence of multiple screens offers a wider array of digital layout options and also serves multiple purposes in terms of player experience and machine advertisement. The main screen is where the primary gaming action takes place and usually where the bonus rounds are played. The secondary screen, during normal reel play, may play various animations or movie clips to provide a complimentary ambiance to the game play. When a bonus even or an in-reel event is triggered, the secondary screen may be incorporated into the game play on the main screen to accommodate the increase in action and animation that often accompanies an elaborate bonus game. This not only increases the level of detail and features the game can offer the player, but it also offers the game play experience to spectators near the machine who may be sharing the slot experience with a friend or partner or simply walking by and attracted by the noise, animation, and game play of the machine and would seem to make for excellent advertising.

The incorporation of multiple high-resolution LED screens in premium machines can produce surprisingly diverse configurations. On some machines, the size of the secondary screens that sit above the main game play can be enormous. A good example is IGT's line of social slot machines that link up to five individual machines to a single, giant unit. Sitting above the individual gaming screens is one giant screen that can range from 70 to 103 inches in diameter (IGT, 2015). During group bonus rounds, the action is often presented on the giant screen above so that all four players have the opportunity to observe the game play unimpeded. But perhaps an equally important role is the ability of the second screen to draw the attention of people in the vicinity of the machine. One of the biggest screens on display at G2E and in many casinos still today is Aruze's *Paradise Fishing* (Aruze is a smaller slot manufacturer not covered in the quantitative analysis). *Paradise Fishing* is a group slot game that links six separate machines to one massive unit. Above the six main screens are three large LED screens configured to present one unified animated screen. During normal reel play, a brilliantly animated underwater scene plays out above the players with numerous fish of different size swimming back and forth across the interlocked screens. During the group bonus event, all qualifying players engage in a fishing game (using a controller that looks like a fishing reel). The large screen is the ideal canvas from which to display the shared and interactive gaming experience for the benefit of the players and nearby spectators. Players move the controller up and down and try to catch a big fish (the bigger the fish, the bigger the credit award). Of course, as already established there is no skill and the credits awarded per fish caught are randomly determined. But the spectacle the machine creates with its oversized display is not only captivating to the player, but also enveloping --occupying even the extremities of the eye's peripheral range.

At the most recent G2E in 2014, the use of oversized and multiple screens took on a new dimension with the introduction of curved displayers. Bally's *Wonder Woman* themed slot is presented on a vertically mounted 40 inch curved LED screen (Bally, 2014). The curvature of the screen allows players to more easily observe the visual action at the top of the tall screen without straining their necks. In another example, WMS adds a physical curve to a giant digital wheel that sits atop the main screen of their latest *Lord of the Rings* machine, a design technique that makes their digitally-represented wheel appear more realistic.

Theories on creating presence in video games view seamless interaction with the senses as vital to diminishing the barrier of reality vs. unreality when interacting with digitally rendered spaces (Tamborini and Sklaski, 2006). The introduction of high-resolution displays, multiple screens, and large view-encompassing screens may work to increase players' absorption into the animation and game play of the machine by occupying nearly all of their vision with an almost overwhelming arrangement of colors, images, and animations.

Though the use of spinning reels and matching symbols is present in virtually all slot machines played in Las Vegas, in actuality the screen upon which the mechanics of the game are presented is best thought of as a blank canvas. The larger game manufacturers like IGT, WMS, Bally's Aristocrat, and Konami have both the workforce and the technological ability to deliver ultra-high-quality, high-resolution images and animation across their various displays. A premium slot machine is not just a set of spinning reels, it is also open digital space upon which a dazzling array of visual splendors can appear before the player and add excitement, unpredictability, creativity, and whimsy to the mathematical pronouncements of the core game play.

Theme and Story

An examination of the broad range of titles and themes used in the slot machines at G2E points to the ubiquity and importance of imparting the dance of reels, icons, and mathematical probability with a more complex layer of meaning. For any slot player, the process of machine gambling begins with the selection of a machine. The thematic elements of a machine: its title, artwork, colors, and animation are the only initial clues to the gaming experience that lies underneath. An examination of the titles and themes of the over 200 machines catalogued at G2E reveals a number of identifiable trends. A basic but useful method of categorizing slot themes is to identify the extent to which the theme shapes the gaming experience. The symbols, sound, and icons of any machine play multiple roles in the game play experience, but the primary role is to communicate the win or loss outcome of any spin. The theme that is produced by those symbols can manipulate the experience of wins and losses by tying them to other images and ideas.

Classic, or non-themed slots exclusively use traditional gambling and symbols like sevens, bars, cherries, and possibly playing-card rankings like 10,J,K,Q,A. Games that rely on these basic, direct, slot symbols generally have fairly to-the-point titles like *Quickhit Pro*, *Blazing Sevens*, and *Stars and Bars*. The symbols that populate the reels of the machine are effectively iconic representations of slot gambling itself: sevens, cherries, bars, wild symbols. Their association with slot machines is so entrenched with the history of slot design, their use as a machine's primary theme communicates an almost pure slot experience. Games that use such basic themes are more likely to be on mechanical reels, another element of the game's design that emphasizes a direct and relatively uncluttered gambling experience.

At the next level of thematic design are the generic themes. Unlike the use of classic symbols, generic themes introduce an overarching motif that influences the entire look and feel

of the game: the title, the cabinet art, the music and sound effects, the use of symbols in the reels, and any additional animation or highlights present in the machine. Generic-themed machines draw inspiration from a surprising range of topics. Themes based on ancient cultures and myths are the most popular. All of the slot manufacturers in the study displayed multiple romantic examples with titles like *Aztec Myth, Morocco, Temple of Mystery, Lady Buccaneer, and Knights of Fortune*. Other styles include nature and animal titles like *Wild Gorilla, Miss Kitty, and Lions of Africa*. The range of themes can be surprisingly diverse and can draw from literature like *Dr. Jekyl and Mr. Hide*, or food (*Candy Bar)*, there is even a popular game from IGT titled *Noah's Ark* (the rare biblical slot).

Generic themes are more commonly found in the simpler, core machines and were far more common at G2E than classic themed slots indicating a possible preference for some narrative element incorporated into the game play (no matter how shallow). The range of quality of such graphic and design elements like art, animation, music, and sound ranges from very basic illustrated symbols and cabinet art to highly detailed complex animations both of the slot symbols themselves as well as other elements of the game like backgrounds and bonus games. The artwork for both the icons and the animation can present a range of styles from ultra-realistic to cartoonish, to basic and simple drawings reminiscent of the book covers of old, inexpensive fantasy novels.

The use of themes or stories in *video games* is extremely common. Like with slots, some video games do not embrace a deep interpretation or narrative structure to their theme but rather use it to give a little flavor or style to the core game mechanics. For example, the extremely popular casual game *Candy Crush Saga* presents players with a magical candy world which they journey through with each puzzle completed. The structure of the game itself is not enhanced by

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using a candy narrative nor is it logically restricted to it. In fact, completely abstract or random

shapes could be used to represent the objects that are used as part of the core game play and the

game would be playable. The candy graphics, the bright colors, the playful music, the story of a

sweet girl making her way through a mystical candy land --all of these features simply make the

game play more fun. In fact, there are multiple games with different themes, different

animations, different music that employ game structure that is similar in many ways to *Candy*

Crush Saga.

Slot machines often do the exact same thing. Many times manufactures will release

multiple titles (in the industry, the term used is "skins) of an essentially identical game structure

in terms of hit frequency, reel layout and bonus round distribution to create a more diverse

portfolio of games to sell. IGTs *Shadow Panther* and *Golden Eclipse* are two machines that

present different sounds, animations and artwork but are essentially the same game underneath

the different skins.

The third and most engaging use of theme in slots incorporates various narrative elements

that are present in the theme far more deeply and intensely. These highly detailed thematic

games are more often found in the premium machines. These games share a number of qualities:

highly detailed artwork, intense and rich animation of the icons, the introduction of animated

characters or avatars that interact with the player on the screen, and very often the use of a

familiar brand drawn from pop culture. An excellent example of a game that blends narrative and

thematic elements deeply into the game play is WMS's *Lord of the Rings* slot game series. The

games take the imagery, music, and sound effects from Peter Jackson's blockbuster film series

and merge them with virtually every aspect of the gambling experience. For example, the

individual symbols displayed the reels are all tied into key characters or objects from the films.

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Pictures of noteworthy characters from the film like Viggo Mortenson's Aragorn, Liv Tyler's Arwen, and Elijah Wood's Frodo represent the high-paying icons within the base game. The mysterious One Ring, the namesake of the franchise is the symbol that triggers the coveted bonus events.

The images of the characters and actors from the film are not illustrations, but high-quality captured stills taken straight from the movie itself. When players make a winning combination, the still frames from the film will come to life and the player receives an added reward to the winning spin of a two to five second clip of the character within the movie. This design feature is common in many premium machines that incorporate films or other pop-culture brands like IGT's *Avatar*, Aristocrat's *The Mummy*, or Bally's *Michael Jackson* titles. The special or important events that occur as the player continues to spin the reels are thus highlighted not simply by the size of the monetary payout but by the presentation of new immersive experiences. Other examples of enhanced immersive elements intertwined with game play include playing brief movie cut scenes (which will often happen when a player triggers a bonus) or blending animation of characters or objects directly into the reels (almost as if they are transcending the hallowed gaming space).

The integration of animated characters dispersed along different game play moments represents design that is extremely immersive and similar in appearance and quality to the use of immersion in video games. For example, during one of the in-reel bonus events in a *Lord of the Rings* game, the character Gollum crawls all over the reels and symbols. Gollum will touch or interact with some of the symbols and convert them into more beneficial wild symbols. The game produces a brief moment where the *Lord of the Rings* movie comes alive and interacts with the player in a context that is meaningful to the objectives of the game (winning). Every one of

the numerous bonus events present in the multiple Lord of the Rings games takes a small but familiar slice from the films and works it into the game play of the bonus. Another example, WMS's *Alice in Wonderland* themed slot features a number of cartoon-styled characters from the book who will appear periodically and interact with the game play. These characters become your allies and their presence or introduction onto the screen will almost always indicate a favorable outcome for that particular spin. In fact, the use of animation and animated characters in slot machines can actually produce a near-miss effect in some in some instances where the appearance of an animated character only occasionally indicates a monetary gain while other times the appearance of that character is merely background ambiance.

   In premium machines, the use of the different thematic elements is heightened even more during interactive bonus events. As discussed earlier, bonus events are infrequent moments that break up routine slot play. Bonus events are also significant because they are associated with some form of win (potentially a substantial win). These bonus events are the highlight of slot play so it is not surprising that in premium machines the characters, the music, the animation and the movie clips, will not only combine but also intensify during these rarer moments of play. During the bonus round in WMS's *Aladdin and the Magic Lamp*, the player's interaction with the narrative elements of the game reach the same level of depth, quality, and detail that would be found in a high production value video game of the same genre. The slot reels disappear and the player is transported to a dusty Arabian town, rendered in lifelike 3D detail (and very similar to the appearance of many first person perspective video games like *Prince of Persia*). The player takes on the role of Aladdin and navigates the streets of the town, encountering and defeating supernatural enemies. At this moment in game play, the player's opportunity to journey deeper into the fantastical, beautifully rendered world of the bonus event is directly

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linked to the amount of money they will win. The more enemies they successfully slay, the deeper into the town they go *and* the more credits they accumulate. If the player is lucky, the player will make it into the palace and confront the final villain (boss). If they defeat the boss, than they are likely going to receive a very substantial payout. Of course, skill is not involved and whether or not a player defeats the enemies and advances or is foiled, ending the bonus, is determined completely by the random number generator in the machine.

Within the past few years, popular video game titles themselves have become sources for slot machine themes. In 2012, Spielo released a machine that is based off of the popular casual mobile game *Plants vs Zombies*. The slot machine adopted identical graphic styling, characters, and maps that were featured in the mobile app. One of the bonus games that can be triggered on the slot machine looks and plays almost identically to the original video game. Another example of a popular slot machine taken from a video game is *Bejeweled*. Again, the immersive elements of the machine and even (to a lesser extent) the game play of the slot is extremely similar to the sights, sounds, and game play of the massively popular video game.

What is significant about these different examples is the intertwining of discovery of the immersive events in the machine and the amount of credits won. Premium machines offer an exciting range of the immersive elements to experience and enjoy, but opportunities to participate in these immersive elements are only made available as intermittently and unpredictably as the jackpots are. There are two ways to think about the importance of this relationship. Using our traditional understanding of arousal and stimulation in slot machine play, the release of these over the top, highly detailed, engaging, sometimes familiar immersive elements heightens the pleasure and excitement of a meaningful win. But perhaps getting to

discover and experience the hidden moments in the machine is a reward in and of itself and produces a separate motivation in the player for continued play. A

The introduction of a recognizable brand and the use of high-quality production in a slot machines design do not necessarily guarantee a major success. The slot graveyard is littered with branded machines from impressive popular culture pedigrees like *The Dark Knight* and *American Idol*. There may not be a guaranteed formula for successfully merging a well-known movie, music group, game, or TV show into a slot machine, but an quick examination of recent brand-based slot successes and failures suggests that the theme and story of a game is more than just a shallow addition. For example, the slot machine The Dark Knight released in 2011 seemed like the perfect blending of an exceptionally popular film franchise with a slot machine that offered a wide range of attractive, high-quality game-play and immersive features with actual cutscenes from the movie and animated combat sequences between the characters. And yet it's presence in various casinos in Las Vegas could be described as sporadic at best. Like with *Big Buck Hunter,* the game may have suffered from being too similar in appearance to real video games while ultimately contrasting with the nature of slot game play.

On the other side of the coin, an examination of themes that have excelled in the slot market suggest a need for the story of a slot machine to, on some level, reflect or acknowledge the fundamental nature of machine gambling. There are many premium brands, like *Wheel of Fortune, the Wizard of Oz, The Lord of the Rings,* and *Sex and the City* that have thrived on Las Vegas casino floors for years and sometimes decades. One possible key to their success is the fact that their fundamental themes: chance, fantasy, mystery, whimsy, and material wealth do not contract the fundamental gaming structure of slot machines. The TV show *Wheel of Fortune* presents a very popular and simple game to follow where contestants spin a money wheel of

chance and try to solve a semi-skilled game of hangman. Wisely, the designers of *Wheel of Fortune* slots make the money wheel the main focus of the game play. The giant wheel on top of a *Wheel of Fortune* slot machine is instantly understandable to anyone with knowledge of the TV show and suggests a desirable gambling outcome. In contrast, a *Jeopardy* slot machine (which have appeared from time to time) will likely never achieve much success because *Jeopardy* is almost wholly a game of skill, knowledge and precision: a game structure that cannot exist on a slot machine. The *Jeopardy* slot machine on display at the 2012 G2E was able to incorporate almost every element from the show (the hosts, the music, the sound, the overall display), but ultimately the playing experience seemed flat as the *Jeopardy* bonus rounds *looked* but did not *feel* at all like the *Jeopardy* experience on TV.

Another example of the successful use of a popular-culture themes in slot design are WMS's *The Wizard of Oz* games. *The Wizard of Oz* is a visually stunning, well-loved movie that tells a fantastical tale filled with unexpected surprises, mystery, and whimsy. These are thematic elements that complement the nature of slot-machine play. Slot machines may ultimately reflect hard mathematical precision, but to the average player with no understanding of their parameters of operation, they are mysterious, unpredictable, and temperamental. The magic of *The Wizard of Oz* slots is that it transforms the fundamental characteristics of machine gambling by representing the outcome of the random number generator as part of the unpredictable and mysterious characteristics of the world of Oz. When Glinda the Good Witch delivers an unexpected, in-reel bonus payout, it is really just a reflection of the output of the RNG chip. In the film, Glinda randomly appears at various points in the plot and assists the protagonists, so maybe her random appearance in slot play, delivering a credit boost, provides an almost natural translation of the weird ways that probability-drive game mechanics deliver rewards.

Theories of presence recognize that a compelling narrative element plays an important role in transporting the player into the world of the game (Lombard and Ditton, 1997; Biocca, Harms, and Burggon, 2003). The effect becomes even more powerful when other elements like realistic animation, enveloping sound, andlarge screens that dominate the field of view are also used to create the experience (Tamborini and Skalski, 2006). Yee's (2006a) model of video game player motivation identifies that for a significant number of players, interacting with the story, the characters, the art, and the design is the most important driver of their play.

Sound and Music

Sound is present and integral to almost every slot machine at G2E. Much like its use in other sophisticated media presentations like video games or even films, the slot machines on display at G2E used layers of sound for different thematic and structural purposes related to the different elements of the machine. Many studies have looked at the impact of sound and music on slot player behavior, although often with a very narrow focus on cause and effect. Research into the effect of player perception of wins/losses has established a link between the use of sounds associated with winning and an overestimation of winning success and arousal in players (Dixon, Harrigan, and Santesso, 2011; Spenwyn, Barrett, and Griffiths, 2008). Musical elements such as the structure and tempo of musical accompaniment have also shown limited effects on player's awareness of their time on device, their rate of play, and machine selection (Noseworthy and Finlay, 2009; Dixon, Trigg, and Griffiths, 2007). These layers of sound work with the graphics and game play of the machines with three distinct objectives: to create a sense of flow by bridging the very brief pauses in action that exist between wagers, to enhance narrative elements like animation and movie clips that are sprinkled through routine game play, and to highlight key events related to the underlying win/loss dynamics of the machine.

The importance of sound for the overall game play of slot machines becomes strikingly apparent in rare situations when I engaged a machine that did not emit sound (either due to malfunction or excessively loud noise in the room). After so many hours of playing slot machines (both at G2E and in real casino settings), it can be jarring to engage a machine without this key design element. The lack of sounds (when one expects its presence) makes the experience uncomfortable, or at least dissatisfying, when familiar visual cues in the game play do not have the corresponding aural response.

The first layer of sound in slot machines is the musical theme of the game. Though not a universal characteristic, normal reel play will often be accompanied by some basic melody (sometimes more than one) that plays concurrently with the spinning reels. Many machines employ rather basic background melodies and will often attach the same generic melody to multiple titles (this is especially true for more basic models). But it is also common for the characteristics of the melody itself (instrument selection, notes, harmony, and overall musical flavor) to reflect the overall story or theme of the machine. For example, in WMS's *Crystal Forest* the overall theme presented through the imagery and animation of the game is a fantasy landscape composed of magic crystals, living trees, and enchanted flora and fauna. The music, distributed in neat one-and-a-half second portions, is composed of tinny bells, gongs, and chimes that combine to form a semi-structured sound experience you might expect to find on a new-age relaxation disc. In *Jackpot Stampede,* a slot that uses fun, cartoonish imagery of America's pioneer west, the background music that accompanies the free spins feature clearly evokes Aaron Copland's *Hoe-Down*, an iconic American composition that captures the adventurous and care-free spirit of the region. Not only does the music aptly suit the narrative of the game, but its fast-

paced and fun tone enhances the positive emotions that already accompany the triggering of a rare free-spins bonus.

When background music is used during normal reel play, the employment of the music in relation to the spinning reels can take on different structural relationships. In some designs, the melody only plays in conjunction with the spinning of the reels. When the reels start, the tune beings, when the reels stop, the tune abruptly ends. A new spin reboots the melody, often at the point where it was left off leaving players with a somewhat disjointed tune (an effect that is minimized through more rapid play). Another, less-common, structural arrangement extends the melody one or two seconds after the reels stop spinning and will continue the tune, uninterrupted, if the player initiates another spin within this timeframe. A third, even rarer, arrangement between music and game play will take pains not to interrupt the background music as players spin the reels but will instead use each reel spin as an opportunity to introduce a variation of the music theme in response to the player's action.

Premium machines often incorporate various elements from contemporary sources of popular culture and the soundtrack will almost always take key musical pieces from a film or T.V. show's soundtrack, or an individual singer or music group's discography and adapt it to work with reel spins as well as bonus rounds and other special events. An excellent example of this is the use of music in the many *Wizard of Oz* themed slots that exist. Multiple distinct music pieces are blended into the entire game play experience with different pieces used at different points in the game. A soothing instrumental version of *Somewhere Over the Rainbow* might play in the background during normal slot play. When a bonus round is triggered, the tune and tempo changes to a more boisterous rendition of the *Wonderful Wizard of Oz*. If a key character from the film is highlighted during a special play feature, the soundtrack played will likely be a theme

that fans of the movie would recognize as being attached to that character (such as playing the theme of the Wicked Witch of the West when her character makes an appearance in the game).

Music does more than fill an empty auditory space in the digital environment of the game, it is very much integrated with both the theme/story of the machine as well as the game play of the machine. Even in slots that use music sparingly, important events that occur during slot play (such as a large win or a triggered secondary game event) will be accompanied by a spirited musical moment to both highlight and celebrate the specialness of the occasion. For example, WMS's *Country Girl* slot game uses the narrative of an attractive, female country music star as the binding theme of the game's different components. During normal reel play, the machine plays a simple and generic musical tune. When the player triggers a free spin bonus, players hear a rock and roll country theme that plays for the duration of the special event. It is just one example of the interesting relationship between music and game play and highlights how music can be used to enhance the immersive component of the machine during a rare but special gaming event within the overall game play. This surgical employment of music is part of what Salen and Zimmerman (2002) would define as the transformative effect of thematic elements on the overall game structure in video games.

Another excellent example of the use of music in this fashion occurs during bonus rounds and other special play events in Bally's *Michael Jackson* themed machines. Although popular songs from Jackson's catalogue are present throughout game play, when a player triggers a bonus round the music shifts from passive background to center stage in the game play. The song changes from a quiet background instrumental of a Jackson theme to the original recording of a different, popular song. Unsurprisingly, the three distinct bonus games for this slot machine are built around three classic Michael Jackson songs: *Bad*, *Billie Jean*, and *Don't Stop*. During

these bonus games, the music is paired with videos clips of Michael Jackson that are synched with both the music and the game play activity (for example, during a free spins bonus, Michael Jackson will dance onto the screen in tune with the song and positively alter the outcome of a reel spin to provide the player with a bigger monetary win).

Every slot machine on display at G2E, installed in Las Vegas casinos, and available in online social casinos uses sound effects to varying degrees. In more basic and inexpensive machines, the use of sound may be limited to beeps, bells, blips and tones while premium machines deliver effects that are intricate, varied, and broadcast through a high-quality system that can include speakers mounted onto the headrest of the player's chair. In games that employ a high degree of graphics and animation, the complexity of the sound will match the complexity of the visuals. The use of sound effects in contemporary slots can, like with music, be subtle and operate in the background of the digital space. Like with music, sound effects can range from subtle additions that are barely noticeable to boisterous blasts of heart-pumping noise designed to capture your attention and guide it to a specific event.

At its most simple level, sound is often used to simulate the original, mechanical sounds that were present in early slot machines but cannot exist, at least organically, in the now-dominant video slots. Examples of these simulations include the sound of spinning reels clicking and clacking when they stop or coins clanging into a hopper. The visual representation of motion in the machine, whether spinning reels or some other form of animation will have a logical sound effect attached to it. The original, mechanical slot machines produced natural sounds that, if not replicated in video-display machines, would be disorienting to players who expect certain sounds to occur with each reel spin. But even for individuals who have no

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experience on older models, the nature of sound in other digital devices we use daily like smart phones necessitate that certain visual cues are matched with appropriate sounds.

As explained by video game theorist Ken Birdwell (2006), sound is often the best way a player can receive an acknowledgement from the game that a significant action has been performed. By offering an appropriate audio feedback to a player's action or a significant action within the space, the designer encourages the player to embrace the other rules and dynamics of the game space. Taking this idea to the next level, it is possible that The relationship in digital spaces between the visual information presented and the corresponding sound effect is an important component to creating presence in the game (Tamborini and Skalinksi, 2006; Lombard and Ditton, 1997;). It is important that when a player anticipates a particular sound event, that this stimuli is not withheld or presented in a discordant fashion. The result would be to weaken the experience of presence in the digital space by drawing attention to the flaw in the design and potentially neutralizing the holistic intent of the game design.

Another fundamental and universal role of sound is to supplement the visual information received regarding events of significance that occur during game play. A basic and established example of sound in this role is as an indicator of credits won. Using a repetitive ringing sound or other basic tone played at a fast tempo, the machine is able to communicate the size of a win without requiring the player to shift their visual focus. A small win triggers a few blips on the credit meter, a medium-sized win might trigger ten to twenty pings, while the sound of credits accumulating could last for minutes when the player hits a substantial payout. Like with most visual and auditory stimuli, the player has the option to skip the animation and sound by pressing the wager button on the machine and quickly launching into a new spin.

Sound is often used to notify players of important events in the game play that might otherwise get lost in the visual display. The digital landscape of most advanced, premium slot machines is a fantastic but messy array of colors, symbols, animations, and numbers. As discussed earlier, the fundamental structure of all slot game play is to translate a multitude of symbols into numerical patterns, distribute them randomly on a visual grid, and award credits based on the formation of various pattern combinations. With the addition of more pay lines, vibrant icons, special features, and other extraneous animation, the player faces a surprisingly complicated flow of information. Adding to this visual confusion are increasingly bigger screens and multiple screens (driving significant portions of the visual action into the player's peripheral vision, if at all). Without sound, the bombardment of visual information is unorganized and those events that are of particular importance to the game play experience (such as mini-bonus events, bonus games, and other features of game play) would not come to the attention of the player efficiently.

Konami's *Rock Around the Clock* is a good example of how the use of sound can help orient players to key game events at the right time. *Rock Around the Clock* employs two separate spaces of visual information related to the game play experience. The main screen, located at the player's eye level when seated, contains physical slot reels (embellished with lights) that deliver the majority of the gaming experience outcome. A digital screen resting about 7 inches above the primary screen displays a giant stopwatch. As the player engages in normal slot play, the stopwatch hand slowly moves towards twelve with each spin (at which point a secondary bonus game is automatically triggered) and occasionally the minute hand moves a great distance. Whenever a significant event occurs on the separate screen, an audio cue, such as the sound of a

ticking clock or even a friendly female voice advising the player to "look up," is used to divert the player's focus of attention so they can be aware of the game development.

Sound is commonly used alert the player of an imminent bonus round or mini, in-reel bonus event. WMS's many *Lord of the Rings* themed slot machines incorporate many elements from the films into various features of the slot play. Many of the special features of the game involve interaction with important characters from the films. In addition to visual changes, auditory cues such as a shift in music or a spoken line of text taken straight from the movie will alert the player to the arrival of a significant change in game play.

Sometimes sound may be included in the design purely to enhance the narrative elements of the game. Many premium games that employ pop culture themes will include brief video clips that fans of the T.V. show, film, or artist would recognize and appreciate (these clips will almost always include the audio as well as the visual). In IGT's *Ghostbusters* themed machine, actor Dan Aykroyd (from the original film) can be heard guiding players though narrative elements of the game (such as offering instructions for bonus games and even offering a word of praise if the player increases his wager). Another IGT slot based on the classic film series *Godzilla* uses the monster's trademark scream frequently in various elements of its game play.

The appearance of bonus symbols during normal reel spins is almost universally associated with strong auditory cues. In most games, a bonus symbol appearing on an early reel will be accompanied by a loud and unique sound to indicate the potential that this reel spin will trigger a special gaming event. It is not uncommon, after the first bonus symbol has been announced, for a second bonus symbol to be paired with a louder variation of the first sound to indicate that a bonus round is imminent. When a player is one bonus symbol away from triggering the bonus round, the game will often employ a number of design tricks to draw out the

anticipation. Sound is clearly part of this mix and in many cases the machine will employ a range of sounds to both emphasize the potential for a bonus hit as well as contribute to the sensory stimulation. In premium machines that embed speakers into the headrest of the player's chair, the intensity of the bonus symbol sounds will often produce a vibration in the seat, effectively stimulating the visual, audio, and touch sensations of the body. Aristocrat's *Batman* themed slot (based off of the campy 60's television show) takes the combination of sight, sound, and touch to an advanced level by delivering a quick, vibrating pulse to the lower back (along with a loud, distinct bonus-specific sound) every time one, two, or three bonus symbols appear during reel play. Tamborini and Skalski (2006) argue that simultaneous stimulation of multiple senses increases the experience of presence in electronic gaming. Given the increased design emphasis on triggering and playing the secondary bonus games in so many slot machines, it is not surprising that the immersive elements of the machine are heightened when the bonus round is at play.

Video game designers have long recognized the vital role that sound and music play in their craft. Salen and Zimmerman (2004) argue that sound and music are fundamental to introducing emotional resonance and overall deeper meaning to the gamer's actions within the structure of the game. Of all the similarities between video game and slot machine design, the use of sound and music may be the strongest of all. The appearance of sound effects and music in slot machines (especially the advanced premium machines) is very familiar in both its structure and employment to sound in video games: it sets the narrative tone of the digital space, it corresponds with key visual cues on the screen giving a sense of enhance realism, and it is often used to draw my attention to key developments in the game play.

Quantitative Analysis: Immersion

Like the distribution of different bonus events, the presence and degree of immersive components in the machines examined reveals a significant degree of variation. Immersive effects like enhanced 3D graphics and surround sound embedded in the slot chair were only present in about 10% of machines. More common was the incorporation of film, T.V., music video, and animation clips blended into the game play at various intervals. Figure 11 shows the proportion of machines that contained each of these immersive elements.
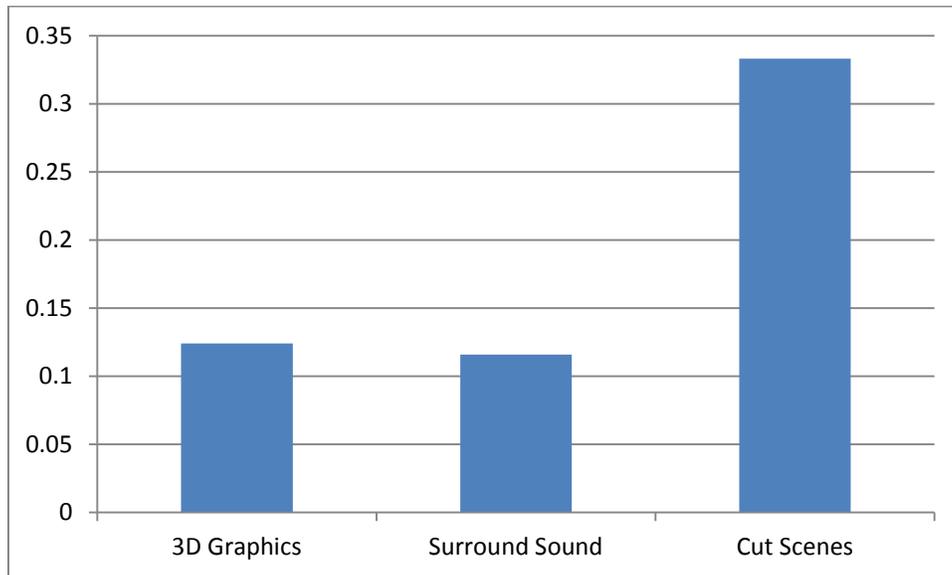
Figure 11: Proportion of machines that contain enhanced immersive elements

Figure 12 shows the level of detail in the animation and art of the machines as well as the extent to which the animated features were interactive within the game play itself. Almost half of machines (49.3%) were classified as having medium animation/art detail, with 29.3% offering very basic visuals and 21.3% delivering a high level of intense detail and animation. The presence of interactive animation such as animated characters or objects that appear to directly

manipulate and change the win/loss dynamic was not as common, with 19.1% of machines

reflecting high interaction, 22.2% medium, and 58.7% low.
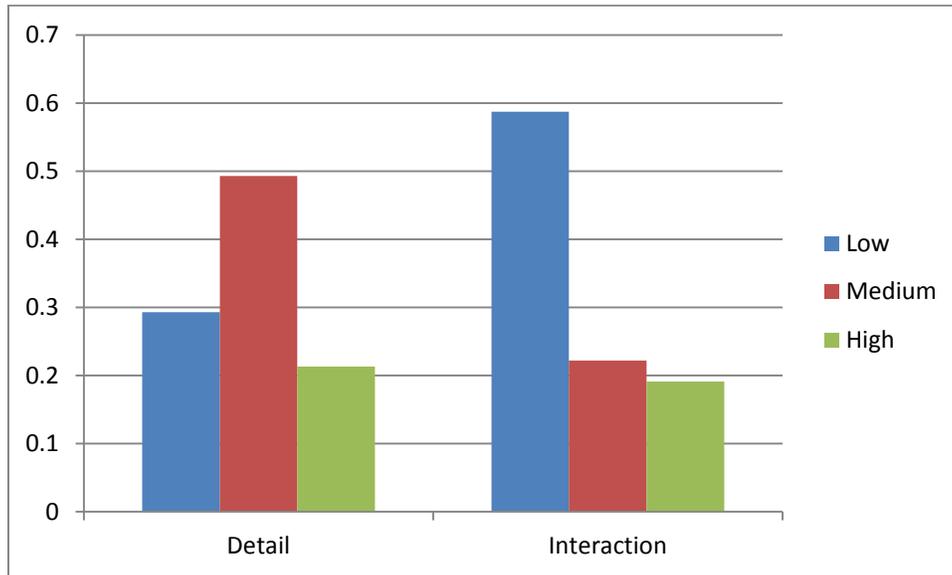
Figure 12: Distribution of animation detail levels and animation interaction levels

The Interplay of Game Mechanics and Immersive Elements.

      In a well-designed slot game, major game play events like bonuses and jackpot wins are

seamlessly combine with compelling immersive elements. Immersive elements serve not only to

heighten the emotional impact of different gaming events produced by the machine, they also

play an important role in minimizing the digital clutter of multiple betting lines and an array of

symbols and wilds and multipliers by helping focusing the player's attention to important events

in the machine. The frequency data from the 2011 G2E highlights the diverse distribution of

both game features and immersive elements in the machines.

      A simple bivariate, correlation analysis between some of the thematic, structural, and

immersive variables in the data reveals that machines that increase the frequency or intensity of

one component of their overall design (such as including a familiar pop-culture theme or

employing intense graphics and sound) are positively correlated with other elements. Table 1

shows correlations between seven variables in the data: the presence of a brand, the number of

unique bonus events that can be triggered, the use of unique reel and symbol patterns like

stacked wilds or oversized icons, the level of animation detail and the level of animation

interaction (high, medium, low), the presence of 3D Graphics and/or surround sounds, and the

use of animation or movie clips within the game.

Table 1: Correlations Between Achievement and Immersive Variables

		1	2	3	4	5	6	7
1	Brand	1	.581***	0.001	.495***	.604***	.590**	.591***
2	Number of Bonus Events	.581***	1	-0.023	.583***	.706***	.426***	.599***
3	Unique Reels	0.001	-0.023	1	0.046	0.012	-0.09	0
4	Animation Detail	.495***	.583***	0.046	1	.796***	.417***	.653***
5	Animation Interaction	.604***	.706***	0.012	.796***	1	.495***	.773***
6	3D Graphics/Sound	.590***	.426***	-0.09	.417***	.495***	1	.503***
7	Animated/Movie Clips	.591***	.599***	0	.653***	.773***	.503***	1

*** $p < .001$, n=225

With the exception of variable measuring unique reel and symbol patterns (which was not

significantly correlated with any of the other variables), all of the remaining variables measuring

key structural or immersive characteristics demonstrated strong or very-strong positive

correlations significant at $p < .001$. This indicates that the presence of any one of these slot

machine elements is positively linked with any of the other elements. For example, the use of a

pop-culture brand is positively correlated with the number of bonus events the machine offers, a

higher level of animation detail and animation interaction, the inclusion of 3D graphics and

advanced sound, and the inclusion of animated movie clips.

Logically, these findings are not entirely surprising (though the strength and consistency of the correlations between the variables is unusually strong). Consider the positive correlation between using a pop-culture brand and the other structural/immersive characteristics. When a slot manufacturer acquires the (usually) exclusive rights to a brand, there is an incentive to make good use of the expensive content. Consider Bally's *Michael Jackson* slot machine. Fans of Michael Jackson appreciate not just his hit music but other parts of his successful carrier like his iconic dancing and high-production music videos. These player fans will appreciate (if done correctly) the inclusion of these elements in their slot experience. Presence theory suggests that the immersive impact of Jackson's music and videos is enhanced if presented with image quality, animation, and sound that envelop the senses of the player at the same time as they stimulates positive emotional feelings.

In the vast majority of machines observed both at G2E and on Las Vegas casino floors, there is a very strong relationship between bonus events and immersive elements. If a machine contains cool animation, fun music or video clips, dazzling graphics and chest-thumping sound, the intensity of all of these features rise (usually conjunctively) at the trigger of an unpredictable bonus event. It is not surprising then that branding, animation detail, video clips, and graphic quality are positively correlated with the number of unique bonus games hidden within the machine. The more immersive a game is, the more bonus games it needs to showcase these elements. The combination of all of these enhanced game features occur during a period of game play where the player strongly anticipates (and usually receives) a sizeable winning outcome from their wager.

This linking of special immersive content with sporadic and spread out bonus events is very similar to the distribution of content in video games. Salen and Zimmerman (2004) argue

that successful video games must plan out how different game-play elements and differ narrative content will be dispersed to the player. A game that is too intense and quick in releasing new game structures and immersive treats might burn out the player or block out enjoyable game moments with too much noise. On the other hand, games that distribute immersive and structural features too slowly may become boring and discourage players from continuing to play.

Chapter 6: Interviews

The interviews were guided primarily by Yee's (2006a) findings on differences in player motivation in video games. While Yee categorized subjects as achievement, immersion, or social players, data from the content analysis conducted in Chapter 5 indicated that social interaction in the digital space of slot machines was not a common or detailed component of slot design. As a result, much of the focus of the interviews was on player's opinions achievement and immersion in slot machines as well as their attitudes and experiences regarding the traditional win/lose dynamics of slot play.

The Konami gaming lab is a particularly useful space to conduct interviews about players' experiences, interests, and preference with respect to gambling and slot play. The set-up of the Konami gaming lab resembles a small but pleasant casino space. The lab is open and airy and contains numerous slot machines as well as several table games, a roulette wheel, and a craps table. Despite the prevalence of gambling in Las Vegas, when it comes to discussing of gambling, much like a discussion about one's salary or the price of an expensive purchase, people can be reluctant to talk about their experiences. From the first interview, it was clear that the casino-like ambiance of the room helped facilitate a more open and honest conversation about gambling if only because the presence of various slot machines often served as a useful frame of reference for particpants to recall previous slot-play experiences.

The Importance of Structure and Winning

Gambling is about winning money, or at least it was a significant factor for the participants interviewed at the Konami Gaming lab. The importance of winning on player experience has been established through a number of empirical studies (eg Coventry and Hudson

2001; Knapp 1997). Winning money (occasionally redefined as not losing money by some participants) was the most consistent theme across all interviews with multiple references from each. For Sheila, an older UNLV student who gambles daily with her retired husband at many of the local casinos in Las Vegas, the issue of winning arises continually in the discussion of her gambling and slot preferences. From her perspective, certain games and certain titles pay much better and are a wiser choice. She mentions one of her favorite games, which I misquote as *Davinci Diamonds*. "***Double*** *Davinci Diamonds*!" she quickly corrects. I am familiar with the title, a popular but simple core game where symbols that form a winning line vanish and are replaced by a new line of symbols (symbols keep getting replaced until the winning stops). I ask her if there is a noticeable difference between the two titles and her answer is direct: "*You win more*." From her perspective, the addition of more special symbols and more wild symbols in *Double Davinci Diamonds* increases the frequency and size of the payouts compared to the original *Davinci Diamonds*. For every game we discuss, its ability to deliver wins of a satisfying amount is of paramount consideration.

Though Sheila may emphasize the importance (or at least the perception) of picking winners to the highest degree in all the interviews, all participants reference the importance of a big win, or at the very least playing a machine that gives back enough of what it takes in. David's recent experience with slot play has dissuaded him from future play, at least for the time being. "*I used to (play slots). But it's not as common. They're fun, but I don't like the eventual outcome. I just never win*". While Omar, an infrequent gambler, prefers simple machines with the opportunity to make big wagers per spin. He admits that with this gaming approach it's more likely he'll lose more quickly (at two or more dollars per spin). But he plays for that risk and for the thrill of the bigger rewards when they do hit.

That winning emerges as the foremost important goal of slot play is not surprising nor does it contradict video game theories on player motivation. The presence of one all-important goal that drives game play is present in many video games of different styles and genres. In games with a strong narrative element, pursuing the conclusion of the story is often the over-arching goal. In competitive games, winning the match and defeating opponents is the principal objective. While the extent to which a game can be single-goal driven can vary, but most games are not simply limited to just one goal. Many video games insert a number of smaller goals that are resolved faster as a way of keeping players motivated as they pursue the longer goals (Salen and Zimmerman, 2004).

Slot machines after all are gambling machines, and the rise and fall of credits through play reflects the most important goal of the game: hitting more winning spins than losing ones. Winning must always be at the forefront, for the accumulation of credits enables (if the player chooses) the extension of game play while the exhaustion of credits either interrupts the game (by requiring new money to be put in) or terminates it completely. In the early years of arcade video games, the game mechanics operated with a similar requirement of beating the game in order to avoid having to put more quarters in the machine (Gottschalk, 1995b).

Several of the participants reference the importance of managing the credit balance of the machine. Jessica often goes to the casino with her family and does not like being the first one out of money as she doesn't like "hovering" around others as they play and finds she gets impatient watching others. When her balance gets too low, she reduces the amount she wagers per spin to make it last longer. Jasmine, a relatively frequent slot player, talks about the stress that comes as the credits spiral downward. "*When I am really playing and losing I get anxiety when I am getting to the end of my cash. It's almost a desperation feeling.*"

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Sheila monitors her credit balance with the most precision. As a frequent gambler, the reward points she accumulates factor into her evaluation of smart play and makes frequent reference to the ratio of payouts per bet, favoring machines that have given her big payouts for small wagers. Shelia also frequently talks about the value of any wager relative to the payouts it produces. Six times during the interview she mentions the importance of playing a good-value machine, like *Double Davinci Diamonds*, *Outback Jack*, *Buffalo*, and *Double Bonus Poker.* She favors a particular *Buffalo* slot at a local casino that offers a secondary train-themed game that randomly triggered during normal reel play. In a surprisingly value-oriented assessment, Shelia outlines what makes that machine so good: "*If you play Buffalo at another place, it's 40 cents a minimum bet. But with the train it's 15 cents (more), that is 55 cents. But you can be playing the minimum bet and all of a sudden the train comes up and you can win hundreds of dollars.*" Sheila appreciates that for only 15 cents more, she can purchase a second-stage bonus event that, if triggered, can deliver a stimulating win amount.

The process by which a machine produces wins or losses frequently came up in conversations. When interacting with the machines on display, participants frequently made comments or raised questions about the basic wagering and game mechanics of the machine. The extent to which participants want to better understand the basic game play of each machine (even though ultimately it did not affect the outcome). The wagering structure for the *T-Rex* game requires players to choose the number of lines they wanted to play and the amount they want to wager per line separately. For the less-experienced slot players, the wagering options of the machine were confusing. Malaya gambles with her family on occasion, and during those sessions she prefers the simple, straight-forward, and low-risk video blackjack games. For her, it is not only easier to wager and understand the outcome of each bet, but she appreciates the

simplicity and predictability of the game. At a dollar per blackjack hand, you may not win a large amount but you are also less likely to lose it all quickly. When we approach the *T-Rex* game, Malaya explains her apprehension about the betting structure. "*I think it looks confusing. From what I know about it, I would choose the one line then I know it's times 3 or something…..1 times 3*." I ask her if she finds the line and wagering choices to be distracting. She indicates a worry that she will make bigger wagers than indented. "*I feel like I am spending more money with more lines.*" Malaya has a clear preference for the more traditional, simple slot mechanics. *"I like the original slot machines. I feel like these (video reel slots) are less likely to win because they're so computerized."* Jasmine volunteers the same anxieties of betting too much when we sit down at the *T-Rex.* She's made costly mistakes misreading the wagering information on a machine before. *"That's another thing…I never really know how to read it. I'd put $20 in a machine and press max bet and it ended up being one spin. I was very angry and it seemed unclear what I was wagering."* Sheila, on the other hand, is not at all confused by the T-Rex wagering but immediately notes disapprovingly that it lacks a max bet button.

For such a simple game, the interactions with the *T-Rex* provide unexpected glimpses into the process by which a player makes sense of the various visual and auditory signals a slot machine presents. The more novice players to video slots, Colleen, Omar, and Malaya, pay close attention to the conditions of winning and frequently made comments and ask questions about the purpose of different symbols and the patterns needed to produce a win. For the remaining participants, the machine was not confusing, but it was also rated as unenjoyable to play due to a low number of winning spins and overall lackluster design.

When the interview moves to the next machine, *Swinging Sixties*, different questions about the rules and structure of the game arise. Unlike *T-Rex*, this machine offers a more simple

wagering system: players select a total credit amount to bet that ranges from 60 to 600 credits (pennies). But despite the more stream-limed wagering, the game play of *Swinging Sixties* is much more complex. Players simultaneously spin two smaller sets of 5X3 reels plus one gigantic reel of 5X12 with a single wager. The game has one in-reel feature where certain wild symbols that appear in either of the first two sets of reels transfer to the gigantic reel and fill an entire column. To add to the visual noise, the colors used in the game are bright and, much like the style of the 60s, clashing.

For Nicole, it's too distracting and she is not interested in spending too much time on it. Jessica finds it a "*little busy*", but in a real casino she would give it several more spins (and possibly consult the instruction screen) to try to figure it out. Shelia appreciates the fact that you can play three separate reel sets at the same time and suggests that this type of design provides good gaming value. Novice Colleen is not satisfied with the cluttered game play of *Swinging Sixties*. When playing *T-Rex*, Colleen repeatedly made references to the winning conditions of each spin, inquiring after each spin about how the arrangements of symbols produced winning outcomes and taking the time to point out both winning combinations as well as almost-winning combinations. With the increased number of pay lines and a less clear layout of winning patterns *Swinging Sixties* is too distracting. Colleen also appreciates slot machines that give her more control and interaction over the action. The *T-Rex* game allows the player to double-tap the wager button to speed up the play and skip the animation of the scrolling reels, a feature she laughingly calls "Dangerous". *Swinging Sixties* does not off the ability to skip the reel animation and forces the player to complete the spinning animation for all reels --a drawback Colleen very quickly notices and is annoyed by.

The fact that several of the participants emphasize the importance of knowing the structure of the game: what produces wins, what triggers a bonus, what outcomes are correlated with different visuals and sound, compliments one of the dimensions of achievement in Yee's (2006a) model. Part of the overall experience that motivates video game players is the opportunity to discover new game mechanics and, through repeated engagement, build an understanding of the rules and expectations of unfamiliar game spaces. Participants, like Colleen, Malaya, Omar, Nicole, and David, during their interaction with the machines in the lab as well as their own recounting of past slot play, suggest that exploring and unravelling the mystery of a new machines can be an enjoyable part of the slot experience. For Malaya and Nicole, being unable to understand a game is a significant deterrent to continued play.

The need to discover and understand the mechanics of the game in order to appreciate the slot play experience has interesting implications for the question of how individual players develop preferences for various titles and styles. In order to understand the mechanics of a slot machine, it is necessary to trigger various winning outcomes including bonus events and in-reel bonuses. If, after several spins, an achievement-oriented player trying a new machine has not experienced any significant win or special feature, frustration may grow both due to the inability to learn or experience the hidden structure of the machine or due to the depletion of funds. In high-volatility machines with lower hit frequencies, this inextricable link between experiencing the game and making winning spins may risk alienating a significant number of potential players.

Bonus Events

At the beginning of each interview, I asked participants about their current and past video game experiences. All of the participants indicated that they currently played video games or had played video games in their youth. The genres played range from social games on *Facebook*

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like *Words with Friends* to shoot-em-up console games like *Counterstrike*. The participants descriptions of their video game habits indicated that they were all mainly casual video-game players and not dedicated hard-core gamers. Three of the participants, Jessica, Jasmine, and Sheila currently play or recently played social slots of some sort. In discussing her social slot play, Sheila provided a fascinating yet unexpected anecdote about when she played her social slots: at the casino. A near-daily gambler, Sheila and her husband enjoy low-limit live poker at a local Las Vegas casino. In between hands, Sheila admitted that she would often turn her attention to playing her social slots. I was surprised by this revelation and admitted that I did not know that was allowed. *"Oh",* Sheila responds *"almost everyone at the table will play games or text on their phones when they are not in a hand. It makes the game go by faster."* I did not think to ask if she ever turned to online social slots to provide a break from real slot play in the casino. This is an important questions as online social slot play not only strongly mimics the structure and design of slots but is also increasing in popularity and availability (Abarbanel and Rahman 2015).

As observed in the content analysis, bonus events factor very significantly in slot machine design. The vast majority of machines offer at least one bonus feature, bonus features are a significant mechanism for delivering above-average wins, and bonus events are moments in game play where the immersive and achievement elements of game play are heightened. Many of the questions directed to participants inquired about their opinions, experiences, and preferences with bonus features. Every participant reflected an overall positive opinion about bonus events, with degrees of variation on more specific bonus characteristics. The universal appreciation for bonus events is understandable. Nearly every slot machine offers at least one bonus event and bonus events deliver many of the bigger, sought-after wins. More experienced

players expect that a bonus game will deliver a sizable win, and the failure of a bonus to deliver that win is a major disappointment. Sheila plays to win and her preference in bonuses is directly tied to her assumptions about how frequently they hit and how well they pay. One of Sheila's favorite games is Aristocrat's *Outback Jack*. From memory, Sheila can describe, in detail, all three bonus games that can be played.

In David's case, a bonus round with a poor payout may push him to abandon a machine out of frustration or simply reinforce a belief that the machine is a poor performer. But on the other hand, he also sees a large or even moderate bonus win as a logical stopping point. Sometimes David just wants to see what the bonus game is all about: *"I usually play until I get a bonus. And then I understand it."* The experienced players, even Sheila, all acknowledge that the appearance of two bonus symbols and the drawn-out wait to see if the third bonus symbol will land creates feelings of both anticipation and excitement. Bonus rounds are associated with positive outcomes and experiences. Jessica shares a memory of winning 135 dollars on a bonus from a small 35 cent bet as an example of how thrilling the can be. *"I loves my bonuses"* she exclaims. Nicole and Jasmine will only play machines that offer reliable bonus events. As Jasmine comments: *"They're very important, I get excited about them!"* And Nicole exclaims when she triggers free spins: *"I love bonuses!"*

For the less experienced participants, it does not take long during the play session for the importance of the bonus game to grab their attention. When playing *T-Rex* , Colleen is immediately drawn by the sound and look of the bonus-trigger symbols when they appear. After triggering three unique bonus rounds on three different machines, Colleen recognizes their significance in game play. *"It feels like you are getting something for nothing…you feel as if you are getting something back."* This notion, that the bonus events turn the tables on the machine

and give the player the advantage is shared by other participants. Malaya describes bonus events as moments where "*they give you more…and things go a little better.*"

The third machine played in the lab was Konami's *Rock Around the Clock*. This game offers an accumulation bonus that moves incrementally closer to twelve with each spin. All of the participants, when asked if the slowly-filling bonus meter encouraged them to continue playing, indicate that they do feel some desire to play the game until the bonus is reached. *"I would stay to try to get that bonus,"* Nicole says plainly, while Jessica notes that the build-up to the bonus draws her attention after each spin. As Omar describes it, *"It's like she's (the animated clock) taunting or encouraging me."*

The bonus rounds, when they trigger, nearly always prompt a noticeably physical change in the players' facial expressions, body posture, and degree of attention paid to the machine. Bonus rounds change the dynamics of the game and are associated with the assumption that some sort of favorable win is imminent. But bonus rounds are also those moments when the immersive elements of the machine, the graphics, the sound, the music, the animation, and the game play are amplified simultaneously. Many of the participants, during the bonus rounds, remark favorably about the machine's sudden shift in parameters.

Of the different types of bonus rounds, a large number of players indicate a preference for the interactive styles over free spins. David enjoys interactive bonus games because they *"take you away from the monotony of spinning reels. I like the ones where you feel you have more interaction with the machine, rather than just watching the wheels spin. I want to pick stuff or find hidden objects, something stupid."* I ask him how he feels when he makes the wrong choice and his interaction with the machine produces a disappointing outcome. *"It's kind of funny. One of two things will happen. I will either leave immediately and be like, 'this is stupid, I'll never*

play this game again.' Or, I may get angry and want to do it again, chase that bonus again."

Colleen feels the same way. *"I like the ones where you get to choose things."* Sheila, though she

enjoys playing bonus games and all the bells and whistles that come with them, views their

design characteristics as secondary to the much more pertinent concern-- do they pay? That's not

to say that immersive elements are irrelevant to Sheila, she much prefers the theme of *Swinging*

Sixties over *T-Rex* because, as she puts it, "*it's pretty boring.*" Like video games, the use of

story, images, sound, and music transform the slot gameplay in a meaningful way, but the

content of the theme also must also hold appeal to the player or it might actually be

counterintuitive (Salen and Zimmerman, 2004).

The *Rock Around the Clock* feature is one of the more unique bonus games to be found

on any slot machine in casinos today. A triggered win causes the physical reels themselves to

pivot and expose a hidden side of the machine which contains one of two very different types of

games. For those who have never played this machine before, the moment when the actual reels

turn to expose this totally new game can be surprising as is shown by Colleen when she lets out

an audible sound of amusement when the transformation occurs. The Konami bonus is not

simply about changing the surface of the game play—other elements of the game change as well.

New background music starts to play and you hear (appropriately) the 50s hit by Bill Haley and

His Comets' *Rock Around the Clock*. In addition, the game itself is no longer a slot machine in

the traditional sense, as players will be playing one of two wheel games that involve a higher

degree of animation, lights, and color. The changes a bonus round brings about are recognized

by players as significant. At different points throughout the interviews, many of the participants

made note of a change in music that they enjoyed. During the free spins bonus for *Swinging*

Sixties, the popular song *Wild Thing*, begins playing in the background. A number of the

participants, including Sheila, Colleen, and Malaya spontaneously comment on the new music in a positive way.

Music, along with other immersive elements, have an even greater impact on players when they were playing on the social slots. *Hit It Rich* is a social casino that you can play through Facebook on computers, tablets, and smart phones. This site is operated by Zynga, one of the largest game distributers on social media. Interestingly, the lead designer of their social slot division is Joe Kaminkow, a former slot designer for IGT and current Head of Development for Aristocrat. *Hit it Rich* offers dozens of titles to play. In so many ways, the games on this site resemble the games that you can play in any casino. The graphics are high-end, the animation is detailed and interactive, and many of the games available use premium themes from recent films, T.V., and music. The game mechanics are also similar to the real thing, with numerous bonus events, in-reel bonus events, and unique reel/symbol configurations (like stacked wilds). The one area in which these games are lacking is the hardware. A fifteen and half inch computer screen, tinny computer speakers, and a mouse/keyboard interface do not adequately recreate the experience of interacting with a real machine in a casino. Despite this limitation, the time participants spent on this and similar social casino sites was extremely useful because it gave me the opportunity to observe what games they wanted to play based on the title, the theme, and the look of the game.

When playing the social slots, most participants including Nicole, Malaya, Colleen, David, Jessica, and Omar gravitate towards titles that have pop-culture themes that speak to them. The first game Nicole picks when browsing the titles is a machine that is based off of the movie *Terminator 2*. *"That's a cool looking game,"* she remarks when clicking on it. After two or three spins, it's clear that the theme and layout of the game are very appealing to her. *"This*

one would probably make me procrastinate because I am a fan of Terminator. It's got great

graphics and music and I'd be more interested in it than the others." She is particularly

impressed with the achievement elements of the game and the fact that continued play unlocks

new features like bonus games or new animation/film clips. *"Every game should be like this."*

After five minutes of playing Terminator 2, we move on to a very different game called

Farmville 2. This game uses images, sound, and music from the actual *Farmville*, the online

social game that made Zynga famous. The music is soft and pleasant, and the images and

animations are cartoonish representations of life on a farm. Nicole is instantly turned off by the

whole presentation. *"Not as hectic as Terminator. Not really my thing."* Other games that Nicole

is drawn to during the session included *Duck Dynasty*. *"I am familiar with it so it's more*

comfortable." and a machine based off of the recent movie *Ted*. As with *Terminator*, she is

quickly pleased by the game's use of the visual and auditory elements from the movie. *"I already*

like this one. This game is more mellow to me, but I like it better than Farmville."

Malaya's theme selection and preferences are very different from Nicole's. The first

game she chooses is an ornately decorated butterfly game that features a special game play that

alters the number of wilds and the size of each reel after each spin. Malaya enjoys both the

theme and the unique game mechanics. When a spin makes a winning combination, the symbols

come alive and make funny noises, which is another feature that she enjoys. After the butterflies,

she stumbles across a game based off of the recent popular film *Bridesmaids*. *"Yes, I know that*

movie. I would play this only because I love this movie." While playing *Bridesmaids*, she

immediately identifies the song playing in the background as Wilson Phillips' *Hold On* (the

principal song from the movie). I ask her the extent to which music affects her slot experiences.

Malaya prefers games that have more soothing sounds and music, or, in the case with

Bridesmaids, a song that has a natural connection to the overall theme. Despite her enjoyment of both the theme and the music of the game, after about fifteen spins with few wins and no bonus events, Malaya becomes frustrated with the experience and looks for something else. We move on to play the same *Farmville* slot that Nicole disliked. Malaya really enjoys the cascading symbols, the animation, sounds effects, music and the overall whimsical look, which she calls, "*cute*." I ask her to rate this one compared to all of the other games she has played, "*It would be one of my favorites. The animation is really cute and clever and I like the hot air balloon animations.*"

David also references the importance of the immersive elements of the game, but his interaction with the theme music and animation is on a more ironic or bemused level. He and his girlfriend play a wide range of games together and are often make fun of the more off-beat titles. "*… We just like to play the cheesiest possible games. They're funny. They just make us laugh.*" He has mixed feelings about the more high-end games which he unexpectedly refers to as "*expensive video games.*" We talk about features like 3D graphics, surround sound, vibrating chairs, and group bonuses. I ask him what he thinks about their inclusion in newer machines. "*Meh. It's funny. People already get sucked into the machine as it is so that's just the next level of getting into that zone. Some of the really crazy ones with the moving chairs and stuff, it's too much.*" He laughs, "*I feel at that point you just really should play a video game.*"

Jessica is the exact opposite. She values the immersive elements of the machine as part of her playing experience. Her favorite slots are the *Lord of the Rings* themed machines, which dominate most of her slot play. Jessica is a very big fan of the film series, and the slot versions give her a new avenue to experience the narrative content she enjoys. The *Lord of the Rings* family of games are a highly immersive and blend many elements of the film: video clips, music,

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sounds, and story into the game play and especially into the bonus events. It is during these bonus events that the intersection of game play, gambling, and theme merge to produce an interactive experience. For Jessica, they are the most important part of her slot play. *"I want to see what they are. It's nice when nothing is happening and they like throw you a bone."*

The add-ons, like clips from the film, animation of the characters, and use of the film's soundtrack transform her gambling experience. For Jessica, a triggered bonus event gives her multiple positive outcomes: the potential to score a sizeable win and the chance to experience a favorite film in a new way. Her only complaint with playing highly-immersive games like *Lord of the Rings* is the attraction the noise and visuals can draws from other people around her. Jessica values solitude when playing slots and feels uncomfortable if her machine creates a scene. In the same way, she does not like watching other people play their game as she worries she is *"intruding on privacy"* and similarly she worries that music or sound effects that are too loud will attract unwanted eyes into her private gaming space. Jessica's hesitance to share her slot gaming experience with others strengthens the applicability of Yee's (2006a) classification of different players and suggests that there is a need to offer diversity, possibly even greater customization of the playing experience, to accommodate variation among players.

Colleen and Omar, who both have little experience with dynamic, video-reel slots, seemed the most affected by the graphics, the animation, and the sound/music of the machines. While playing *T-Rex*, Colleen fills the first three columns with the highest paying symbol which are the image of a T-Rex). In one of the only animated components of the game, all of the individual symbols in the three reels unexpectedly merge into a giant roaring Tyrannosaurus Rex, who almost appears to break through the screen. The animation draws surprised laughter from Colleen. I ask her about what she felt during that particular moment. *"Kinda neat, makes*

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you happy, like cool look what I did. And I assume that if there were other people around they would look at me. I almost feel that it's acknowledgement for the win…almost an added benefit."   Jasmine offers a similar perspective on the over-the-top *T-Rex* animation. "*It's exciting. It's very in the moment and calls attention to your win*." In contrast to Jessica, Colleen clearly appreciates the loud celebrations that accompany significant events in the game play.

Omar experiences his own intense immersive moment during the *Rock Around the Clock* bonus event. His attention becomes very focused as the elaborate bonus game presents the music, sound, animation, and unique game play that make up the elaborate orchestration. Despite all the fanfare, in the end the machine delivers a fairly disappointing win of less than 10 dollars. When the round is over, I ask him his thoughts about the experience. "*I think it's pretty captivating and I'm definitely distracted just because of the vibrant colors and graphics…it's pretty creative.*" I ask him if he is disappointed by the fairly small win of just 7 dollars. *"I was just caught up in the spectacle. I thought it was cool that it turned into a jukebox. I was more focused on the entertainment of it".*

Despite Omar's history of playing traditional and simple slot machines, his interaction with more immersive games during the interview engaged his attention and was an enjoyable experience. When the interview ends, Omar looks at the time and is shocked that an hour had passed. *"I hardly noticed the time"* he says *"just because of the captivating graphics."* Interestingly, Malaya, like Omar, also loses her sense of time throughout the interview. Also like Omar, her gambling experience favors no-nonsense and no-frills machine gambling like video blackjack. And yet, our interview lasts for over 90 minutes because she is eager to explore the many different game titles that are available on the social slot sites. Whether this is a coincidence or not isn't ascertainable, but it at least raises the possibility that the more complex

and confusing design of newer slots may be producing an intimidating barrier that repels some players who might actually really enjoy the experience. It also suggests that the use of immersive design features can also produce a time-loss effect on plays, perhaps increasing or strengthening the already strong influence on our perception on time that gaming often has (Wood, Griffiths, and Parke 2007; Schull 2012).

A Note about Social Gambling

As discussed in the content analysis section of this study, Yee's (2006a) third motivational component of social interaction in digital space does not appear in the majority of newer slot machines. And in those machines that do offer group bonuses, the time that players spend sharing a linked digital experience is brief and fairly shallow. The minimal presence of shared digital experiences in slot machines is reflected in participant's comments. When queried about their experience with such games (like *Paradise Fishing*) responses ranged from mild amusement to indifference to aversion. For a somewhat introverted person like Jessica, the idea of sharing a moment with the stranger seated next to her makes her very uncomfortable and is a definite deal breaker.

And yet, despite the low enthusiasm for group bonuses, six out of the eight participants (excluding Colleen and Omar) indicate that they frequently or only gamble with friends or family members. David and his girlfriend enjoy playing next to each other or sharing the experience on a single machine. When Sheila talks about her gambling, she references her husband's gambling experiences and outcomes as if they were her own as well. Nicole, Malaya, Jessica, and Jasmine always reference gambling with other people as a social event. Although the opportunity to engage in meaningful social interaction with other people in the digital space of the slot machine is relatively inconsequential, the slot machine experience is often a shared one in the physical space of the casino. In many ways, the design of slot machines makes it very easy to share the

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experience with others who are close to you. Player engagement with the machine, after all, is usually limited to making a quick wager and watching the outcome. The majority of the time players are watching the outcome rather than driving the action with their decisions.

Motivations in Slot Play

The findings from the interviews, like the data from the content analysis, suggest that Yee's model for video games is partially applicable to the slot experience. Like with video-game players, many of the participants indicated a desire to both explore and experience the game mechanics of the machine, characteristics that are very similar to achievement in video games. Immersive elements, like graphics, art, animation, theme, story, and music emerged in the analysis as important and distinct components of participant's enjoyment of the machine. One question that arises is how to address player's expectations and experiences with winning and losing in the emerging model. At first glance, the experience of making winning spins during slot play may seem like a good fit under achievement. Another possibility is that both the achievement and immersive elements identified as being present as part of a slot machine's design and experience are subcategories under the more dominant factor of winning. Both the achievement and immersive elements of a machine cannot really be experienced unless they occur through multiple winning events, indicating that the win/loss dynamics of the game form the base structure of slot play upon which other achievement and immersive elements exist.

Yee's model for player motivation in video games is seminal in video game studies not just for identifying different ways that video games appeal to players, but also for revealing differences in motivation among players themselves. Although the number of participants for this study was small, their comments and reactions to games suggest that a significant level diversity in motivation also exists among slot players. The two most opposite players in terms of motivation seemed to be Sheila and Jessica. Sheila placed an extremely high importance on

winning in her gambling experiences, with immersive and achievement elements being less important. Jessica, on the other hand, could be described as a very immersive slot player whose motivation in selecting and playing machines was principally driven by her desire to engage with different themes from pop-culture that appeal to her.

In the middle are the other participants. Colleen, more than all the others seemed to focus more on the game conditions that produce winning outcomes rather than the amount won. Omar and Malaya frequently referenced their preference for playing on simple, traditional, dollar machines that can deliver thrilling wins. And yet, as they experienced various immersive slots for the first time, they seemed truly engrossed by the digital splendor on display. Near the center on all factors were David, Nicole, and Jasmine who made reference to winning, achievement, and immersion, if not entirely equally, at least more consistently.

The implications for slot design and slot research are significant. In the same way that a video game developer might include different features that appeals to the preferences of different players, the increasingly complex and detailed game experience in a single slot may be able to offer different features that appeal to different types of players. This diversity might also strongly impact the way we research and treat problem gambling if the pull of different motivating elements becomes too strong . It may be that the assumptions and experiences of achievement-oriented problem gamblers may vary in significant ways compared to immersive-oriented gamblers and require refined treatment protocols.

Chapter 7: Discussion

This study looked at the extent to which video game elements like game structure, narrative structure, graphic design, and shared game play have migrated to present-day slot machines. The investigation was guided by theoretical and empirical works from a range of scholarly fields: gambling studies, video-game studies, digital communication, psychology, and sociology. Two methodological designs were employed. The first phase used a content analysis that identified the distribution of video-game styles and design in the most recent slot games on display at a major industry conference as well as in Las Vegas casinos. The second portion employed semi-structured interviews with both experienced and inexperienced slot players to assess the impact of different design elements on their playing experience and motivation to play.

The findings of both the content analysis and the interviews revealed that slot machine design and its influence on players is both complex and diverse. There are many clear links between video game and slot machine design, both in terms of structural elements such as the increase in rule complexity and the introduction of multiple goals and immersive elements like rich digital graphics, animation, and narration. The findings of this study have important research and policy implications in three fields: Gambling/Game Design, Problem Gambling, and the Sociology of Gambling.

Digital Presence, Rules, and Player Motivations

In creating a viable framework from which to assess the video-gamization of slot machines, three central theories from both digital media and video game scholarship were engaged: presence in digital space (Lombard and Ditton, 1997; Tamborini and Skalaski, 2006; Bracken and Skalaski, 2006), integrated game structure (Salen and Zimmerman, 2004), and

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motivating factors for players (Yee 2006a, 2006b). The findings of both the content analysis and the interviews provide some support for each of the principal theories.

When users experience presence in a digital space, they are essentially unaware or at least minimally aware of the boundaries (like the 2D screen, the speakers, the controllers) that physically separate them from the projected digital space they are engaging and the physical space they are occupying. The more detailed and interlinked these components are, the greater the effect of presence and the deeper players are pulled into the digital space. The effect of presence can also be heightened by social interaction with other people in digital space and the interplay of narrative elements and game play. Theories on presence are not applied frequently in the study of machine gambling, which is surprising given the extent to which many scholars on problem gambling refer to the supposed ability of slots to captivate a player's attention, distort their sense of time and effectively pull them into the machine (Wood et al, 2004; Schull, 2012). Even in the artificial setting of the casino lab, several of the participants interviewed demonstrated, at times, that they were absorbed by the dynamics of the slot games they were playing, even though no real money was at stake.

The advances in slot design over recent years suggest that the elements that create presence in video games are also part of slot machine design. Giant, high-resolution screens, speakers embedded into headrests, vibrating seats, 3d visuals, and haptic interactive animation are very common in premium machines and can be found, to a limited extent, in the basic core machines. These elements do not only captivate the senses and the imagination, they are also significant in terms of creating a sense of presence is the extent to which they complement the gambling elements of the game play. The seats will not rumble for every spin, but players will feel their bodies shake during important game events like bonus symbols, in-reel events, and

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large wins. It's the same for many of the other design elements: interactive animation is heightened during a winning phase of the machine, as is the overall use of graphics, sound, and music. Just as winning is intermittently distributed in slot play, so too are these other immersive elements intermittently experienced because of their strong correlation with wins. The implications for the study of machine design and problem gambling are significant, as they suggests that the player's slot machine experience as a whole must be considered when studying slot machine design. It's not simply the distribution of winning moments or the isolation of one specific design feature but rather as a choreography of specific game-structure events and the corresponding immersive content.

Salen and Zimmerman (2004) view the interplay of rules, narrative, and interface within the game as tools for constructing meaningful play experiences. The rules and goals of a game must be complementary and serve to reward and challenge players in ways that motivate engagement with the digital environment. Goals must be challenging but beatable, and in more complex game designs smaller tasks that are more quickly resolved help players maintain interest and focus as they pursue longer quests. Other elements, the incorporation of story and characters and the graphics and layout of the game's landscape serve to provide meaning to the players' actions and decisions.

The data collected in this study present a sort of conundrum. On the one hand, the fundamental structure of slot machines is essentially unchanged: the use of spinning reels and matching symbols and the probability determined outcome of each wager is essentially present in every machine. On the other hand, the fact that the base structure of slot game play varies little does not preclude the application of the theory. Video games are quite diverse in terms of structure, rules, and interactivity. But if video games are grouped by their base game mechanics,

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it is arguable that there are really a small number of genres that use an underlying structure that is copied from title to title (like puzzle games, role playing games, racing games, etc...). It is the introduction of rule variations on the main theme, in conjunction with diverse narrative elements, graphics, music (and unique ways to interweave structure with form) that delivers near endless video game titles (Gottschalk 1995b; Salen and Zimmerman 2004). This same concept: hundreds of variations on a single base platform reflects the variety of slot design.

Three of the more significant examples of directly-observable structure variation (as opposed to less-observable characteristics like volatility and payback percentage) are manipulated reels and symbols (like stacked symbols), in-reel bonus events, and separate bonus events. All three of these structural characteristics were employed in different ways, with different frequencies, and in different combinations in the machines observed. Some machines offer a range of complex winning dynamics including multiple in-reel bonus events, the use of stacked reels and increasing pay lines, and multiple different bonus games to be triggered. Additional variations include accumulation bonuses, progressive awards, second-stage games, and group bonus events and the layers that are further added through the use of theme, illustrations, animation, and other immersive techniques.

These alterations do change the slot experience. Bonus rounds shift the slot dynamic for a brief period and allow players' to engage the machine with confidence and the near-guarantee of a winning outcome. Yet, the financial outcome is the same whether a player wins 100 times her initial bet on a simple three sevens on a single pay line or through an elaborate bonus round that involves new graphics and new game rules. But, the experience of the two games is significantly different, even if the outcome is not. Every participant interviewed for the study reported that triggering bonus events were important and enjoyable part of the game play.

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Several indicated specifically that they enjoyed the break from routine spinning as well as enjoying the building anticipation that came from knowing that bonus rounds usually delivered a solid win.

As Salen and Zimmerman (2004) frequently emphasize, video games are not about the ending, they are about the journey. Nintendo's Mario has rescued the princess in dozens of different game titles over the decades. The end goal has rarely changed, and yet the game rules, the puzzles, the animation, artwork, and music were altered with each new version. By harnessing the many design tools (as well as sophisticated hardware) of video games, slot manufacturers are able to capitalize on this flexibility and continue to offer new playing experiences superimposed on a very old and inflexible game mechanic.

The guiding theory of this analysis was Yee's (2006a, 2006b) conclusions on player motivation in video games. His study of over 3000 MMORPG players identified three distinct types of players who favored certain elements of game play over others. Achievement gamers are active and value competition against others, progressing and succeeding at the core objective of the game, as well as learning, understanding, and mastering the rules of the game. Immersive gamers are more passive and focus more on enjoying their experience with the digital world the game creates: the story, the characters, the graphics and imagery. Social gamers enjoy the opportunity to engage other players in the digital space and develop relationships and a meaningful identity through these interactions. Yee's study collected data from MMORPG players which are among the most complex and diverse video games available to play often with thousands of immersive, achievement, and social options of game play. Clearly, slot machines cannot offer that level of depth or breadth in play experience. Nevertheless, the application of

Yee's model in both the content analysis and the interviews revealed both game design trends and player preferences that parallel his findings.

The numerous and complex patterns that produce winning and losing in slot machines through the use of stacked reels, multi-direction pay lines, in-reel bonus games, and multiple bonus events are similar to Yee's identification of advancement and mechanics in achievement. The use of high-intensity graphics and sound, animation and movie clips, interactive stories and characters reflect Yee's definition of discovery, role-playing, and escapism in immersion. There are also some elements to Yee's model that do not fit with the observations. The social or group-play elements identified in certain machines were so brief and so shallow in design that they lack much of the sophistication of social interaction in digital games that Yee describes. At this stage in slot design, group bonus rounds are more appropriately categorized under achievement as an additional unique game structure for players to trigger, experience, and understand with an added twist of sharing the achievement with other players.

The interviews were essential in establishing the applicability of Yee's model to slot machine design and player experience. Although only a relatively small number of participants were interviewed, this kind of in-depth data serves a purpose with exploratory research in fields like this one, and trends did emerge that indicated that different elements of a slot machine's design appeal to some players more than others. With their description of past gaming experiences as well as their interactions with the machines in the lab, some players demonstrated high interest and enjoyment from experiencing the immersive design of games while others were more interested in the structure of the game play and the conditions that produced wins, losses, and bonuses. The overall goal of winning was the principal driving force for at least one

participant, with achievement and immersive elements mattering less to her overall assessment of a slot machine's value.

The interviews can only provide preliminary data, but they strongly suggest that Yee's findings about player motivation may apply to slot machine players. As slot developers look to introduce video-game style skill into the new slot designs, the question of how radically new game structures will fit with players' expectations and preferences is significant. Some players may be more attracted to the interplay between different game structures and winning. Other players may be more drawn by the opportunity to experience gambling in a colorful and stimulating digital environment that celebrates exciting payouts with familiar pop-culture brands and captivating graphics and sound. Future examination into differences in slot player motivation will need to adapt Yee's model to account for the underlying gambling dynamics that drive slot play. This might be better accomplished using a quantitative survey design (as Yee did for his study) to collect a more representative picture of slot play habits and motivations.

Problem Gambling Implications

The possibility that players may have different underlying preferences that influence both their motivation to play as well as their personalized experience of play certainly opens new avenues for the study of problem gambling and treatment solutions. How does our understanding of factors such as arousal, chasing, intermittent reinforcement, the near-miss effect, and losses disguised as wins change when presented with new designs and new game mechanics? Arousal is the stimulating physiological and psychological effect of wins and near-wins during normal reel play (Grifiths, 1999). It is likely that arousal is impacted by the introduction of such intense and interactive graphic and sound design that is interwoven with the gambling dynamics of the machine. When images or sounds that may already contain a powerful emotional trigger are embedded directly in a player's winning moment (like hearing a

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hit Michael Jackson song or the appearance of Dorothy from the *Wizard of Oz*), does this heighten the psychological and physiological impact of the experience in a way that might increase the risk of problem gambling for some?

The possible impact of video game elements on factors such as intermittent reinforcement, near misses, and losses disguised as wins also becomes a valid question. The content analysis of this study shows that complexity of game mechanics can be surprisingly complex and intense with increases in the number of symbols, the size of symbols, the number of pay lines, the number of columns and rows, even the number of separate slot reels played on a single wager. These components combined with a number of multiple in-reel bonuses and triggered bonus events that can be contained in just one single machine drastically increases the number and variation of significant gaming events that one game can trigger. A typical slot spin can result in a complete loss, a partial return of the initial wager, a break-even win, a small win, a medium win, a large win, a jackpot win. But in complex slot designs, there are numerous pathways to any of these outcomes: a large win of 50X the initial wager might arrive thanks to a simple and quick arrangement of symbols from a basic spin or as part of an elaborate choreography of animation and interaction during a bonus event. The interviews suggest that some players may be strongly motivated to discover and engage a number of diverse and complex winning patterns. The use of multiple, randomly triggered pathways to winning combined with varying gameplay dynamics (and also rewarded with an equally diverse array of immersive rewards) might strongly impact a player's motivation to minimize the financial component of their play in order to simply continue their stimulating gaming experience.

The same might also be true for near-miss moments. In a simple 1x3 design, a near miss occurs when the player appears to have missed a large payout by just one symbol. Some

gambling scholars are critical of this design as it often misrepresents the much worse odds of hitting a huge payout (Schull, 2012; Maclin et al 2007). In more complex designs, near misses remain part of the playing experience, but they are represented in different ways. Games that use stacked reels might fill one half of the screen with a high-paying symbol but fail to fill out the crucial first reel. The most noticeable near-miss events occur during bonus round events when the machine only delivers two of the three symbols needed to trigger the game (and often the machine will alter the graphics, sound, and the speed of the reels to heighten the importance and anticipation of that third symbol). Even after the successful trigger of a bonus, the machine might still deliver a near-miss by adding a second stage trigger the player must succeed at in order to continue into the bonus event. The extent to which bonus round near-misses are noticed and impact players' perception of the game compared to more traditional near miss scenarios is unclear and merits further study.

One area where the data from the content analysis significantly challenges a well-recognized concern in problem-gambling literature is the concept of losses disguised as wins. Losses disguised as wins (LDWs) are described as moments in slot play when a winning spin pays back less than the initial wager. In two studies by Dixon and colleagues (2010; 2013), an experimental design conducted on forty novice gamers found that the physiological response to an LDW was identical to their response to an actual monetary gain. In addition, players on machines designed to produce a higher level LDWs perceived that they won more compared to the control group that received fewer LDWs.

A reflection on the methodological approach of the study raises doubts about the applicability of this type of experimental design to real-world gambling experiences and causes of problem gambling. At issue may be the limitations of experimental design to the mirror actual

conditions of real-life slot play. Although the experiments were conducted on a real, commercial

slot machine (*Lobstermania)* the participants were all novice gamers and the study only reflected

data collected from 200 spins (or roughly one and a half hour of play). Neither the reliability

nor the accuracy of the findings is in question; however, when evaluated in light of the data

collected in this study the extent to which LDW's actually exist and whether they truly are

misleading players understanding of slot play is questionable.

The content analysis demonstrates that in most machines, a small 50 cent win is

presented to the player in an entirely different fashion than a 10 dollar win, or a 20 dollar win.

To begin, small wins often occur from simple and relatively inconsequential pattern

arrangements during normal reel play. The larger the win, the more likely that it is going to

occur through a more unique bonus event of some nature. In addition, large wins of 50X the

wager or more are often celebrated in an elaborate fashion with animated coins and fireworks

splashing onto the screen and triumphant music blaring from the speakers. It seems improbable

that a player's conscious and subconscious reaction to the sedate and brief noise and graphics

that accompany a tiny win would be relatively indistinguishable to the elaborate choreography of

game play, graphics, and sound that most machines generate for a sizeable win.

If anything, in most game designs disappointing outcomes (like a micro win or no win at

all) are resolved quickly, with minimal fanfare, and players are encouraged to move on to the

next spin. But, in moments where the machine delivers an extremely positive outcome, such as a

large win, every element of the machine including sound, graphics, and music are presented in a

positive, exuberant, and extended moment of celebration. Perhaps too much weight has been

placed on the distorting effect of LDW's with not enough focus on the way that the heightened

celebration of significant wins, when contrasted with the minimal attention given to losses or small wins, reinforces a skewed perception of winning in slot play.

The implication from experimental data suggests that machines that give players a "win" that is smaller than their initial bet are essentially tricking them into perceiving that their fortunes are improving. But interviews with participants clearly show their awareness of different types of wins and a clear, unambiguous differentiation in response between a tiny win from a normal reel spin and a large win from a bonus event. Another important consideration is the fact that even tiny wins are part of the overall game play as they extend the number of spins a player can get out of a fixed bankroll.

Like with losses disguised as wins, much research into the impact of structural characteristics in slot machine design use a relatively narrow experimental design to establish important (and potentially problematic) design elements. Although these studies do produce valuable insights into the influence of structural characteristics on players' experiences, responses, and impressions of machine gambling, the focus on a small and isolated component of the machine risks either over or under-stating its importance of the findings. The data shows that slot machine design is diverse in terms of volatility, game structure, complexity, level of immersion, theme, and more. When the true degree of diversity in slot design is considered (as well as the diversity in player motivation), it raises doubt about the accuracy of broad assumptions about the dynamic between player and machine with the research design that does not account for all the variation.

It may be useful to re-examine recent literature on slot machine design and gambling behavior and assess the extent to which the true variation of machine characteristics and player motivations is reflected in both the method and the analysis. Problem gambling is a significant

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public health concern in societies where gambling is accessible. In order for regulatory bodies, communities, and treatment providers to develop appropriate responses to problem gambling prevention and treatment, the research that guides this process must reflect the actual reality of gambling. For example, the data clearly shows that bonus events are present in virtually all new machines, often with multiple different games to trigger. Any assesment of the emotional, physiological, or rational response to the win/loss dynamics would strongly benefit from developing a method that includes the unique properties of bonus events into the tools of measurement. A more holistic approach that recognizes the range of styles and player interests that make up slot play might reveal unrecognized associations between game structure and player response and help improve treatment options.

No Longer Goffman's Vegas: The Playfulness of Electronic Gambling

In the 1960's, when Goffman (1969) conducted his ethnography of Las Vegas, his definition of real gambling focused on what he called action: men who were willing to eschew social convention, demonstrate skill and knowledge of the games, and take meaningful risks. He dismissed slot machines as passive gambling and lacking the necessary elements to produce action. Despite his favoring of serious gambling almost fifty years ago, Goffman might not be surprised by the gambling landscape of today's Vegas and the prominent role of the slot machine. It is arguable that currently in Las Vegas, action occurs rarely such as at a craps table or a high stakes poker game. Goffman admired the real gamblers at the tables because he appreciated their willingness to take risks, both with their money and their social status. But these were traits he felt were in decline in modern American society. The rise in popularity of the current crop of elaborate machines and their similarities with other electronic games would fit Goffman's lament of the decline of mavericks in contemporary society. Caillois (2004) argued that games adapt to both the need and culture of a society. Perhaps gambling has simply

adapted to reflect the broader cultural forces of American Society that eschews the embrace of uncalculated risk (Giddens 1999). With such a cultural orientation, there is no social benefit to the performance of action on the casino floor, but there may still be a desire for the stimulation and amusement that comes with playing and winning.

In the latest slot machines we see three of Caillois's (2004) four game types represented frequently: alea (chance), mimesis (mimicry), and illinx (sensory distortion). Only agon (competition) is not found in any meaningful way in slot play (despite some attempts to introduce it). This study has categorized and identified levels of complexity and intensity in slot machine design in overall game structure, graphics, animation, sound, and theme. In addition, interviews with both novice and regular slot players suggest that players are affected by different design elements of machines at varying intensities. On the question of why slot machines incorporate the look and the feel of video games, the data suggests that the digital splendours of the programming are rewards themselves, and when coupled with the thrill of winning create a range of positive experiences. There is no question that the digital space of the slot machine frequently blends the wins and the losses determined by the random number generator with visuals and sounds that can range from flashy and exciting, to funny and cute, to beautiful and relaxing. The music captures the tone of the experience while animated characters seem to live alongside the reels, cheering us on and becoming part of the celebration when a big payday occurs. Slot machines use theme, game structure, narration, graphics, sound, and music to entertain, dazzle, and surprise in much the same way that video games do.

Several sociologists who have studied Las Vegas suggest that its opulent physical space-- the extravagant and often fantastical interior and exterior architecture of the strip, the advertisements, the lights, the shows, even Las Vegas's isolated desert locale-- serve to reorient

the visitor to a transformed social awareness where the rules and expectations favor the consumerist and gambling agenda of the industry (Gottschalk, 1995; Gottdiener, Collins, and Dickens, 1999; Reith, 2002). For Reith, the act of gambling in these spectacular spaces heightens the playing experience while dulling the more lasting consequences of risking (and often losing) money. The focus of gambling in the 21st century is now oriented towards the experience of play, an experience that can only be enjoyed and explored so long as the wagers are continued reasonably uninterrupted (Reith, 2002). Russell Belk (2000) a marketing professor at York University has a much more bleak take on play, arguing that the landscape and culture of Vegas infantilize the visitor, ultimately removing any authenticity of experience with a convenient and hollow facade that ultimately produces the desire for compulsive need fulfilment.

If the physical spectacle of the casino, the strip, even the city of Las Vegas disorients visitors and gamblers and promotes the consumerist/entertainment/self-indulgent nature of the city, I suggest that the digital space generated by slot machines also produces its own disorientation. In a well-designed machine, sharp images, 3D-graphics, intense sound, and creative narrative are integrated into one multi-sensory gambling experience. These are the same conditions that create presence, the experience of unmediated participation in a digital landscape. We are not just playing on a slot machine; we are playing in the virtual playground generated by the machine. These digital environments can be as influential in affecting our state of mind as the physical structures that house them.

It's Slots of Fun: Play in the Digital Space of Machine Gambling
The digital space of the machine shapes the player's experience of gambling by both emphasizing and superimposing fun and whimsical play over the fundamental gambling dynamics of the game. Of particular importance is the incorporation of immersive elements, particularly theme. Critical Sociologists advocate the idea that post-industrial cultures are

integrating play, or at least the appearance of play, into aspects of life where play has never existed before. Gottdiener (2001) writes about the use of themed spaces of consumption in Western commerce. Theming is designed to produce appropriate consumption behaviors of those who enter it by instilling purposefully crafted emotional reactions.

Why is the slot experience for so many players more appealing when paired with an interactive, visually beautiful and detailed presentation of a favorite movie or T.V. character, or popular music group? Why do so many slot players prefer to experience a winning spin as part of an extended complex bonus event over the quick and simple delivery of information that classic machines used to offer? The use of immersive elements like brands, colorful graphics, engaging sound and music, video clips, and animated characters in slot machines may represent a type of digital theming as they filter the gambling experience with symbolic layers that emphasize play, fun, and engagement over the more consequential financial realities of gambling.

If we consider Gottdiener's thesis, that themed spaces not only influence spaces of consumption but are actually expected by the consumer, it may be that contemporary players require a highly immersive digital presentation to make the consumptive act of machine gambling more appealing. If anything, the digital space created by machine gambling is ideal for theming, as the ideal consumption today is presented as a continually replicated process, with no clear end point (much like the reality of slot play). In the end, machine gambling is consumption of gambling entertainment where the inherent (and effectively unbeatable) mathematical disadvantage of the game is the price that needs to be paid for those dazzling moments where we can enjoy a much-pursued winning event in captivating style.

The Sociology of Las Vegas is somewhat of a niche area of study in the broader

discipline. Despite this, Las Vegas is frequently analyzed in numerous important sociological

works (Goffman 1969; Gottdeiner, 2001; Rizter, 2010) due to the fact that in many ways the

culture of Vegas doesn't stay in Vegas but expands to other regions and parts of Western society.

Gottschalk (1995), Gottdeiner et al (1999), and Reith's (2002) depiction of Las Vegas as an

environment that encourages consumption and gambling by manufacturing an entertainment

culture that minimizes consequences and emphasizes play. With what is basically a limitless

capacity to design digital experiences, slot machines may be out-Vegasing Vegas itself and

creating a uniquely powerful and compelling gambling experience.

This is not insignificant when one considers that the same slot machines that sit in

Caesar's Palace or the Bellagio are also in casinos in Indiana, Florida, Canada, Europe and

countless other local jurisdictions . Our exposure to slot games no longer stops at the casino

door; many of the very machines described in this study can be played by any person, of any age,

in a "free" social casino on Facebook. There is also the rising trend of micro transactions in non-

slot video gaming, where rather than offering the illusion of winning popular games ask for

small, dollar-sized purchases of in-game content to allow players to make it to the next level and

experience all of the wonders it contains.

Limitations of Study and Future Research

This study is the first to examine slot machine design and slot player motivation through

the lens of video game theory. While both the content analysis and the interviews yielded some

confirmation that slot machine design and player motivation did in fact share characteristics with

video game design and player motivation, there are several limitations to the research design that

merit consideration.

One significant limitation to the applicability of the findings to the design and distribution of machine gambling is that the study focused solely on the players' perception and experiences. When creating new slot machines, the appeal to the player is only half the concern, the machines must also meet the expectation of casino operators on factors such as a player's time on device, spins per hour, and the machine's daily hold (the amount the machine made for the house). A machine must be both popular among players and sufficiently profitable for casino operators to survive. The inclusion of data and theory from the operator perspective is needed to form a more complete picture about slot machine design and its effect on gambling behavior. Although G2E offered easy access to the latest generation of slot designs, it is important to note that the machines on display included some titles that would likely never hit the floor and other titles that would likely have a limited presence on actual gaming floors due to low popularity. The data collected at G2E would be more useful if cross referenced with the distribution of each title in actual Nevada casinos.

Given the experimental nature of the content analysis and the interviews (both in terms of method design and theoretical guidelines), all data was collected and analyzed solely by the author. The use of a sole collector and coder increases the risk of error to validity due to biases that may be related to both the author's prior experiences and preferences with gambling as well as the potential for verification error due to the author's desire to make the data fit the theory.

The study was limited to the Las Vegas perspective due to the convenience the city and its gambling industry offered. But machine gambling occurs across many geographic regions and cultures throughout the globe. Future research designs would benefit from incorporating a broader international perspective on machine gambling. This includes slot gambling on the internet, which is prohibited in the United States but legal and widely practiced in Canada and

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parts of Europe. Online social casinos are another key area for future study. Individuals who play on social slots do so for entertainment purposes only as credits won cannot be withdrawn for real money (though real money can be used to purchase credits for extended play). Despite the fundamental lack of real gambling, the game mechanics and design of many online social slots are extremely similar to real, casino machines. A better understanding of what factors motivate players on social casinos might provide further insight into how video game design elements make slot games appealing and enjoyable to play.

The demographic characteristics of slot players was not heavily factored into this analysis. But gambling research shows that player characteristics like age, gender, race, and social class can alter perceptions of gambling, gambling preferences, and problem gambling risks (eg Potenza et al 2001; Tavares et al 2001; Binde 2007). If player's can be categorized according to play preferences, it would be interesting to know whether immersive elements, or an increase in complex gameplay affected men differently from women, or younger, inexperienced players from older more experienced players.

One significant component of many video games, customization and control over the experience, was not found to any great degree in the content analysis. A few machines offered game players limited, meaningful control (like choosing which bonus game to play or choosing the volatility of the game), but overall the entire experience of control is limited to the brief decision to make a wager for a particular amount. Indeed, despite the number of bonus events, reel configurations, sounds, themes, and graphics, at its core slot machines remain mathematically rigid. The core argument of this study is that slot machine design has evolved in parallel with video game design (and video game design has also evolved in response to an increasingly connected and portable digital communications network).

As video games become more connected, more customizable, and more portable, and more social will we see a similar shift with slot machines? Certainly, the rise of social slots and online real-money slot gambling indicates that slot games are moving beyond the casino floor. But these games, for the most part, remain essentially clones of their brick and mortar cousins. The big challenge for the future of slot game design will be to create meaningful social experiences (experiences that actually impact and change the gameplay) as well as create machines that can about the player from their gameplay and tailor an appropriate experience. The incorporation of limited skill may be the solution for this difficult but necessary problem as introducing layers of puzzles or reflex-based actions to probability-based as it may allow for a logical introduction of avatars, social engagement, and an adaptive game system that recognizes the playing style of the player.

Gambling is a complicated social phenomenon, and its study is made more challenging when the games upon which wagers are placed increase, seemingly exponentially, in complexity. This study hopes to provide a new framework from which old questions related to industry research, treatment research, and sociological research can find new, exciting, and relevant opportunities to expand on why and how we gamble and what the impact and risk of this leisure activity truly are.

Appendix A

Survey Questionnaire

1. What is your age? (Select one option)
>   21 to 24
>   25 to 34
>   35 to 44
>   45 to 54
>   55 to 64
>   65 to 74
>   75 or older

2. What is your gender? (Select one option)
>   Female
>   Male

3. Which category best describes your employment status?

  (Select one option)
>   Employed, working full-time
>   Employed, working part-time
>   Not employed
>   Retired
>   Student

4. What is your approximate household income?

  (Select one option)
> $0-24,999
> $25,000-$49,999
> $50,000-$100,000
>   Over $100,000

5. Which of the following categories best reflects your racial identification. (Select one option)
>   American Indian or Alaskan Native
>   Asian
>   Black or African-American
>   Native Hawaiian or other Pacific Islander
>   White
>   From multiple races.

6. How frequently do you gamble? (including real-money online gambling) (Select one option)
>   Daily
>   Weekly
>   Monthly
>   A few times a year
>   Never/Very Rarely

7. Which of the following is your most frequent gambling activity? (Select one option)

Table Games
Slot Machines
Video Poker
Sports Betting
Poker
Bingo/Keno
Other

8. How long would you describe your typical gambling session lasting? (Select one option)
More than 3 hours
1-3 hours
About one hour
About a half-hour
Less than 15 minutes.

9. Consider the total amount of money you have spent gambling in the past 12 months. Which of the following statements best reflects your financial outcome: (Select one option)
I won a large amount of money over the past year.
I won a small amount of money over the past year.
I broke even.
I lost a small amount of money over the past year.
I lost a large amount of money over the past year.

10. Which of the following best describes your interest in video games? (Select one option)
I play a video game daily
I play a video game once or twice a week
I play a video game once or twice a month.
I rarely play a video game
I never play a video game

11. How often do you gamble? (including real-money online gambling) (Select one option)
Two or more times a week
Once a week
Two or three times a month
Once a month
Two or three times a year
Once a year
Never/Very Rarely

12. Which of the following is your most frequent gambling activity? (Select one option)
Table Games
Slot Machines
Video Poker
Sports Betting
Poker
Bingo/Keno

13. How long would you describe your typical gambling session lasting? (Select one option)

More than 3 hours
1-3 hours
About one hour
About a half-hour
Less than 15 minutes.

14. Consider the amount of money you have spent gambling in the past 12 months. Which of the following statements best reflects your financial outcome: (Select one option)
I won a large amount of money over the past year.
I won a small amount of money over the past year.
I broke even.
I lost a small sum of money over the past year.
I lost a large sum of money over the past year.

15. Which of the following best describes your interest in video games? (including casual video games on social media) (Select one option)
I play a video game daily
I play a video game once or twice a week
I play a video game once or twice a month.
I rarely play a video game
I never play a video game

Appendix B

Semi-Structured Interview Questions

1. Which of the following: slot machines, table games, sports betting, or video poker is your favorite gambling activity?   Why?

2. Which of the following: slot machines, table games, sports betting, or video poker do you spend the most time gambling on?

3. When choosing a slot machine to play, what features do you look for?

4. Do you have a favorite slot machine type? Is there a specific machine/game you prefer?

5. Does the theme of a slot machine affect your preference?

6. Does the inclusion of things like animated characters/movie clips, and high-end graphics/sound matter when you play slots?   Do you prefer machines that have a lot of high-end graphics?

7. Do you look for certain kinds of bonus rounds when you play slots? Are there any slot bonus games you really like? Are there any slot bonus games you really dislike?

8. If a slot machine has more than one different bonus game, do you try to play enough to trigger each available game?

9. Do you try to play the same bonus round more than once so you can play it better and win a bigger amount?

10. What is your opinion of slot bonus games that have let more than one person play at one time?   Does it affect your machine selection positively or negatively?

11. Do you have any other comments about slot machine design that you would like to share?

Appendix C

IGT Machines

Machine Name	General Theme
Golden Goddess	Ancient Culture
Black Widow	Art Deco Mystery
Candy Bar	Candy
Shadow Panther	Big Cats
Midnight Eclipse	Ancient Culture
Lucky Larry's Lobstermania 2	Cartoon
Cash Coaster	Amusement Park
Pearl Bay	Underwater
Wild Horses	Horses
Boing Beans	Cartoon
Rocket City Bonanza	Cartoon Space
Four Chinese Beauties	Ancient Culture
Jaguar Princess	Jungle/Tribal
White Falls	Tropical
Royal Lion	Cartoon Lions
Diamond Jubilee	Classic Slot
Pink Diamonds	Classic Slot
DaVinci Diamonds	Renaissance Art
Triple Double Hot Peppers	Classic Slot
Double Gold	Classic Slot
Triple Diamond	Classic Slot
Ghostbusters	Film
Swan Lake	Swan Lake
Money Combs	Cartoon Honey Bees
Megabucks	Classic Vegas
Ghostbusters (2nd style)	Film
Breakfast at Tiffanies	Film
Twilight Zone	TV
Siberian Tigers	Big Cats
Hangover	Film
Wheel of Fortune	TV Game Show
Sex and the City	TV
Wheel of Fortune Wild Getaway	TV Game Show
Wheel of Fortune Puzzle Solve	TV Game Show
Joker's Heist	Film
Texas Tea	Cartoon
Ruby Reels	Classic
Diamond Stars	Classic
Wheel of Fortune Secret Spin	TV Game Show

Big Buck Hunter	Video Game
Pinball	Arcade Game
Godzilla	Film
Elvis	Music
Three Kings	Medieval Lions
Day of the Dead Slots	Cartoon
Don Juan	Romantic Europe
Exotic Island	Jungle
Jekel and Hylde	Literature
Wolf Run 2 (Into the Wild)	Timber Wolves
Wild Cherry	Classic
Double Diamond	Classic
Triple 7	Classic
Diamonds Unlimited	Classic
Haywire Jackpot	Classic
Sky Pilot	Cartoon
Vodoo Vixens	Femme Fatale

Appendix D

WMS Machines

Machine Name	General Theme
Queen of the Wild	Jungle
Buffalo Spirit	wild west
Robin Hood and the Golden Arrow	Fantasy Medieval
Dragon's Fire	Fantasy Medieval
Plataea	Ancient Culture
Sword of Scaramouche	Pirate
Winter Wolf	Wolves
Cirque de Masquerade	Romantic Europe
Napoleon and Josephine	Romantic Europe
Palace of Riches	Fantasy Medieval
Jake Monkey	Modern Asia
Pirate Ship	Pirates
Zanzibar	Middle East
Jackpot Comet	Fantasy Science Fiction
Luck-o-Lantern	Halloween
X Marks the Spot	Pirate
Blazing Phoenix	Ancient Myth
King of the Wild	Jungle
Star Trek	TV
Pharos of the Deep	Ancient Culture
Crystal Forest	Myth
Alice in Wonderland	Literature/Cartoon
Village People Party	Music
Airplane	Film
Battleship	Board Game
Lions of Africa	Jungle
King and the Sword	Fantasy Medieval
Jungle Wild Three	Jungle
Bierhaus	Romantic Europe
Bird of Prey	Fantasy Science Fiction
Stars and Bars	Classic
Silver Sword	Fantasy Samurai
Appaloosa	Wild West
El Torrador	Romantic Europe
Super Team	Comic Book
Princess Bride	Film
Knights Keep	Fantasy Medieval
Super Jungle Wild	Jungle

Press your Luck	TV Game Show
Monopoly Pary Train	Board Game
Monopoly Around the Board	Board Game
Crescent Moon	Fantasy
Golden Apple	Fantasy
Pirates of the Deep	Pirate
Sparatcus	Ancient Culture
Clue	Board Game
Wizard of Oz Journey to Oz	Film
3 Times Wild Zone	Classic
Triple Golden Cherries	Classic
Zeus II SuperHot Respin	Ancient Culture
Invaders from the Planet Moolah	Cartoon Science Fiction
Reel Rich Devil	Cartoon Myth
The Great and Powerful Oz	Film
Aladdin and the Magic Quest	Myth

Appendix E

Bally Machines

Machine Name	General Theme
Moment of Mayhem	Classic
Blazing 7's	Classic
Moon Goddess	Myth
Cash Cruise	Cruise Ship
Midnight Diamonds	Classic
Beijing Treasures	Modern Asia
Space Attack	Fantasy Science Fiction
Venice Nights	Romantic Europe
Love is in the air	Cartoon Cupid
Quickhit Pro	Classic
Hot Rocks	Gemstones
String of Pearls	Underwater
Morocco	Middle East
Spartan's Gold	Ancient Culture
Playboy Hot Zone	Playboy
Break the Ice	Cartoon Penguins
Temple of Mystery	Ancient Culture
Hidden Paradise	Ancient Culture
Paradise Beach	Beach
Money Moon	Beach
Jackpot Carousel	Carnival
Bullseye Bonus	Classic
Ole Jalapeno	Cartoon Peppers
Wild Stripes	Tigers
Peacock Plenty	Peacocks
Wild Huskies	Dogs
Mustang	Horses
Gold Bug Bonus	Cartoon Insects
Big Vegas	Las Vegas
Bacchus Gold	Ancient Culture
Michael Jackson King of Pop	Music
Money Wheel	Classic
Seagull Sam	Birds
Instant Riches	Classic
USPIN	Classic
Lightning Jackpot	Classic
Grease	Film
Emerald Falls	Irish
Power Strike	Classic

Betty Boop Love Meter	Cartoon Film/TV
Betty Boop Fortune Teller	Cartoon Film/TV
Skee Ball	Game
Easy Cash Eddy	Cartoon Stereotypes
Aztec Dream	Ancient Culture
Wicked Winnings	Fantasy Witches
Jazz	Music

Appendix F

Machine Name	General Theme
Konami Machines	
Machine Name	**General Theme**
Rock around the Clock	50's diner
China Shores	Modern Asia
Queen's Shores	Ancient Culture
Jumping Jalapenos	Cartoon
Treasure Voyage	Tall Ships
Moon Diamond	Forest Animals
Exuberant Lilies	Classic
Gigantic 7's	Classic
Gigantic Dragons	Fantasy Medieval
Sovereign Lion	Classic
Olympic Fortunes	Ancient Culture
Flight of Hermes	Ancient Culture
Jackpot Island	Fantasy Island
Quest for Diamonds	Gorillas/Gemstones
How Winning Wilds	Classic
Straight and Arrow	Fantasy Medieval
Money in the Bank	Classic
Lucky Faries	Myth

Appendix G

Aristocrat Machines

Machine Name	General Theme
Fortune Fire Cracker	Cartoon Asia
Captain Cutthroat	Pirate
50 Dragons	Myth
Miss Kitty	Cartoon Cat
Dragon Emperor	Ancient Culture
Lady Buccaneer	Pirate
Pharaoh's Prize	Ancient Culture
Persian Palace	Ancient Culture
Tiger Garden	Cartoon Tigers
Aztec Dreams	Ancient Culture
The Phantom	Comic Book
Ultra Spin	Classic
Ruby Saloon	Classic
Diamond Destiny	Classic
Stormin Jackpots Lotus	Modern Asia
Persian Prize	Ancient Culture
Stuntman Sam	Cartoon Character
Tall Tales	Myth
Headless Horseman	Myth
Jaws	Film
All Puffed UP	Underwater
Trick or Treat	Halloween
Rocking Olives	Cartoon Music
Five Dragons	Myth
Queen of the Nile	Ancient Culture
Chariot Champion	Ancient Culture
Wild Tooth	Sabretooth Tiger
Knights of Fortune	Fantasy Medieval
Paws of Fortune	Cats
Pyramid Magic	Ancient Culture
Wild Gorilla	Jungle
More Chilies	Cartoon Peppers
More Hearts	Symbols
Geisha	Romantic Asia
Tiki Torch	Ancient Culture
Whales of Cash	Cartoon Whales
Barber Shop	Cartoon Barbers
Outback Jack	Cartoon Australia
More Pearls	Underwater

Persian Palace	Ancient Culture
Mission Impossible	TV
Superman	Comic Book
Lex Luthor	Comic Book
Victory Quest	Fantasy Medieval
The Mummy	Film
Tarzan	Cartoon Jungle
Sherlock Holmes	Literature
Crazy Taxis	Cartoon Taxis
Zorro	Literature

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Education

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Areas of Interest

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Professional Appointments

2014-Present   University of Nevada, Las Vegas, Graduate Assistant

2010-2014   University of Nevada, Las Vegas, Part-Time Instructor

2004-2010   University of Nevada, Las Vegas, Graduate Assistant

Publications

Sahl, Daniel & Jennifer Reid Keene, 2012. "The Effects of Age, Authority, and Gender on Perceptions of Stautory Rape Offenders." *Journal of Interpersonal Violence*. 29(12): (3701-3722)

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Papers Presented at Professional Meetings

"It's Slots of Fun: Play in the Digital Space of Machine Gambling." Paper presentated at the annual meeting of the Society for the Study of Social Problems, Chicago, IL, August 2015

"A Comparative Analysis of Design and Motivation in Slot Machines and Video Games." Poster presented at the International Conference on Gambling and Risk Taking, Las Vegas, NV, June 2013

"The effect of Age, Authority, and Gender on Perceptions of Sex Offenders." at the *Regular Session: Violence* at the annual meeting of the American Sociological Association, Las Vegas, NV, August 2011

"Game changer: How new technology and design elements are transforming the slot machine experience into more than gambling." Paper presented at the Responsible Gaming Council Discovery 2011, Ottawa, ON, Canada, April 2011

"The social output of structure and context in online 3d spaces: comparing identity and interaction in Second Life and World of Warcraft." Paper at the Couch-Stone Symposium, Las Vegas, NV, April 2011

"Sex tourism: attitudes and practices of adult entertainment enthusiasts in Las Vegas" Paper presented at the *Sexual Perceptions, Scripts, & Behaviors: Historical Trends & Current Perspectives* session at the annual meeting of The Society for the Scientific Study of Sexuality, Las Vegas, NV, November 2010.

"The effect of respondent gender on perceptions of adult-teen sexual scenarios.**"** Paper presented at the *Sex and Gender* roundtable at the annual meeting of the American Sociological Association, San Francisco, CA, August 2009.

"The influence of age, authority, and the sexual double standard on perceptions of adult-teen sexual relationships." Paper presented at the *Quantitative Studies in Sexuality* session at the annual meetings of the Southwestern Social Science Association, Las Vegas, NV, March 2008.