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The Fall of the Fourth Wall:
Designing and Evaluating Interactive Spectator Experiences

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ABSTRACT

Over the past several years, the live-streaming of digital games has experienced a vast increase in popularity, coinciding with the rise of eSports as an entertainment medium. For a rapidly growing audience, streamed content provides material from an ever-increasing roster of games, tournaments, and special events. Recently, streaming platforms, game developers, and professional players have experimented with the inclusion of viewer interaction through mechanisms such as chat, broadcast messages, donations, and voting systems. With the advent of these mechanisms, the concept of game viewership has entered a transitory period; while still largely focused on consumption, for many spectators, the viewing experience is no longer an entirely passive act. The idea of interactive spectatorship (the authors refer to it as Spectator-players) carries the potential for audience members to engage with content at a much deeper level, participating actively in a novel form of entertainment and contributing to an enriched gaming community. This novel form of gaming interaction poses interesting challenges for game designers, as it requires design considerations to meet the needs of players, passive viewers, and active audience members alike. In this paper, the authors examine the opportunities and challenges presented by the design of interactive spectator experiences. Ultimately, they propose a series of design guidelines aimed at the exploration of development in the area of interactive spectator experiences.

KEYWORDS

Digital Games, eSports, Game Design, Game User Research, Player Experience, Spectator Experience, Spectator-Player

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INTRODUCTION

Although eSports are not a new phenomenon, their popularity has surged in recent years. Competitive gaming has seen a drastic increase in players, tournaments, and prize money over the past few years (e-Sports Earnings, 2017) (Figures 1, 2, and 3). In terms of total revenue, eSports generated $325 million in 2015, a figure projected to increase to over $1 billion by 2019 (Newzoo, 2016). This is staggering, given that many consider the beginning of eSports to have occurred in 1997 at the Red Annihilation tournament for Quake (id Software LLC, 1996), with just over 2000 participants. ESports initially focused on first-person shooters (FPS), sports games, and arcade games, but quickly adopted other genres, notably real-time-strategy (RTS) with the release of StarCraft: Brood War (Saffire Corporation & Blizzard Entertainment Inc, 1998). The nature of competitive games released in the late 1990s and 2000s allowed for fast-paced and compelling gameplay attracting both players and observers (Nagpa, 2015).

While there have been some issues in terms of socially legitimizing eSports (such as public perception and the differentiation between eSports and traditional sports) (Skubida, 2016), it is important to understand that despite the differences in play spaces and levels of physical exertion, both forms of competition have many common elements. On some level, the eSport industry takes many cues from traditional sport industries, including professional team structures and sponsorship deals (Schmidt & Shreffler, 2015). Commonalities between spectators and followers of sports and eSports exist as well, as Schmidt and Shreffler sought to identify motivations for eSport consumption using an existing analysis on traditional sports fanship (Trail & James, 2001) as part

Figure 1. Total prize money (in dollars) by year

Figure 2. Total number of tournaments by year

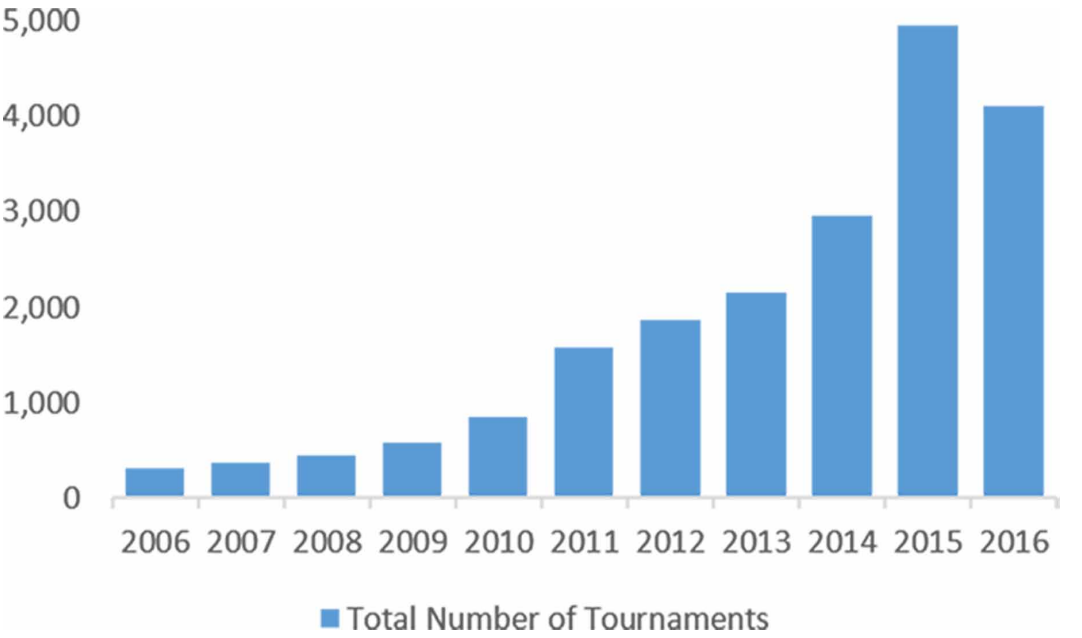
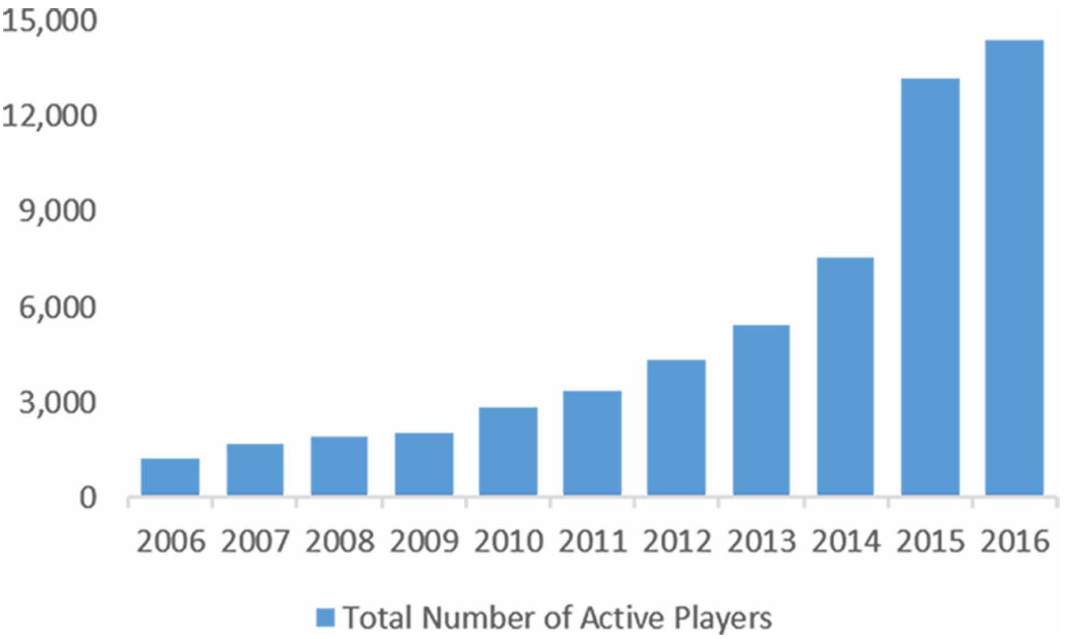


Figure 3. Total number of active professional players by year



of their theoretical basis. In contrast to some of those motivations that are similar to those of traditional sport consumption (such as competition, game participation and attendance (Lee & Schoenstedt, 2011)), studies have identified additional predictors

of eSport consumption frequency, including escapism and learning about the game being played (Hamari & Sjöblom, 2017). As the eSports industry continued to evolve, prominent teams and players garnered fans and followers, analogous to traditional sports. Simultaneously, as live streaming video became popular, it provided a platform for fans loyal to specific games, teams, or players to access and spectate professional games all across the world. To this end, both experts and casual players are able to regularly broadcast their gameplay to a wide audience online (Witkowski, Hutchins, & Carter, 2013).

Livestreaming

As eSports have continued to grow, so too have services allowing both organizations and players to live stream gameplay. The most popular such service is Twitch.tv, a game streaming service with over nine million daily users, and over 2 million unique broadcasters per month (Twitch, 2017). Of all games being broadcast, competitive games typically garner the largest viewing populations. According to data obtained from Twitch (Curtin, 2017), the most watched games on the streaming platform in 2016 were: *League of Legends* (*LoL*) (Riot Games, 2009), *Counter Strike: Global Offensive* (*CS:GO*) (Hidden Path Entertainment & Valve Corporation, 2012), *Defense of the Ancients 2* (*DotA 2*) (Valve Corporation, 2013), *Hearthstone* (Blizzard Entertainment Inc, 2014), and *Overwatch* (Blizzard Entertainment Inc, 2016). With the exception of *Hearthstone*, which is one-on-one, all of these games involve two opposing teams of players with relatively symmetrical gameplay goals. Furthermore, these games allow for a great deal of customization, both in terms of a player's ability to select characters or game objects with differing statistics and abilities, as well as allowing for drastically different gameplay strategies. The amount of choice available creates an incredibly large possibility space for any given session of gameplay, and may be part of the appeal to both play and spectate these types of games. No two gameplay sessions end up being identical, and therefore may be compelling for both players and spectators.

This phenomenon is not limited to this small set of games. Despite the notion that video games are inherently an active form of entertainment, the ever-growing community of both livestream broadcasters and spectators shows that there is some desire for a passive game experience as well (Smith, Obrist, & Wright, 2013). For those broadcasting gameplay, some may even see value in playing as a social performance, rather than simply for their personal entertainment. Many eSports and competitive games in general have very high skill ceilings, and players have emphasized the need to train and practice in order to master a game's complex nuances. Players who achieve high levels of skill may be seen as performing for their audiences, in addition to simply playing the game (Ford, 2017). As we will discuss, the interactions afforded by livestreaming platforms such as Twitch create the possibility for viewers to engage with broadcasters as well as their gameplay in both direct and indirect ways. This introduces the notion that not all game spectatorship is completely passive, and a viewer may have different levels of involvement with the content that they are consuming.

Spectatorship and Spectator Interactions

Crowds in general pose an interesting design challenge. Even outside of the realm of video games and livestreaming, sociological evidence suggests that crowds behave differently than even similar, smaller groups. Human-computer interaction researchers have been exploring this to identify what kinds of interaction work best in terms of large scale, crowd-based computing (Brown, O'Hara, Kindberg, & Williams, 2009). Crowds were further explored at a sporting event to analyse how interactions were supported through a crowd. Members of crowds were seen to participate in synchronized activities, such as the emergence and escalation of songs and gestures in support of their favoured team. This highlighted the importance of research examining intra-crowd interactions, as well as the emergence of and participation in crowd-based activities (Kappen et al., 2014; Reeves, Sherwood, & Brown, 2010). This is especially relevant to eSports and livestreamed games in general, as the number of viewers can vary from tens to millions of people.

Event organizers have already recognized the implications and importance of large crowds. In order to facilitate spectator involvement, many events turn to outside technology and applications in order to further involve spectators. A field study was conducted in 2005 to explore how spectators could enhance and share their experiences using technology. Researchers found that users wanted a more active role in spectatorship, and noted possibilities for spectators to form and coordinate groups, as well as participate meaningfully with event content through a multimedia phone application (Jacucci, Oulasvirta, Salovaara, & Sarvas, 2005). Shortly afterwards, an application called CoMedia was evaluated in two separate events, both times in an attempt to integrate spectators with the proceedings. It allowed users to see event information, as well as coordinate with others and communicate with other spectators who were not at the site of the event (Jacucci, Oulasvirta, Ilmonen, Evans, & Salovaara, 2007).

Outside of the context of crowds, the concept of involving spectators and adding value to their experience is not inherently novel. In 2001, fantasy sports leagues were examined as a way to empower and encourage participation and competition within their communities. It was discussed that the idea of integrating some virtual activity with the spectatorship of a sport could be used to model other, similar types of spectator interaction in other media (Shipman, 2001). These principles can be seen in many game applications, such as Alternative Reality Games (ARGs). In ARGs, players and spectators alike participate in forums, chat rooms, and game interactions that take place in the real world. In one such game, it was discovered that not only did spectators and players participate in differing ways between virtual and real-world interactions, but also that many also considered the passive spectating experience to be important as well (O'Hara, Grian, & Williams, 2008).

As can be seen, there are many ways to spectate or otherwise be involved somehow in watching gameplay. Cheung and Huang looked at spectatorship specifically within the context of an eSport to determine exactly who these spectators are and why they choose to spectate. Using *StarCraft* (Saffire Corporation & Blizzard Entertainment

Inc, 1998) and *StarCraft 2* (Blizzard Entertainment Inc, 2010) as bases for their analysis, they outlined an initial set of personae for game spectators and attempted to infer what makes a game entertaining to watch by looking at the facial expressions of various spectators. Moreover, they identified some aspects that contribute to a spectator's experience, including not only the players and crowds, but also the gameplay commentators as well as the design of the game itself (Cheung & Huang, 2011). We will further discuss the spectator experience in the following section.

While there is an established body of work regarding video game players and their play experiences, these are not the only components of understanding gameplay broadcasting. In addition to players, there are also individuals to be considered participating at various levels as spectators. According to Tekin and Reeves, the role of spectating gameplay is accomplished both by collaboratively acting with the players as well as being engaged in the game. For example, spectators may support or critique the actions of players based upon their understanding of the game and its current state; being able to recognise and reflect on competent gameplay scenarios (Tekin & Reeves, 2017). A spectator's level of involvement with the gameplay may vary, however, and for the purposes of understanding a spectator's experience, we must first classify these differences.

For our purposes, a *player* is the broadcaster or the individual that is in primary control of the gameplay being observed (e.g. the player who controls the game character). We define a *passive viewer* as an individual that is watching the game in the same way that one might watch television or a movie. These kinds of viewers may be invested in the gameplay they are watching, but are not actively participating within any community of other spectators nor interacting with the player in any way. More relevant for our discussion will be those spectators that actively engage in the broadcast in some way, whether simply by chatting with other spectators and the player, or even influencing or participating in gameplay in some way. We refer to these kinds of spectators as spectator-players. When trying to understand the spectator experience, it is beneficial to understand this distinction, as although it may be easier to measure the involvement of spectator-players, that does not necessarily mean that passive viewers are experiencing less enjoyment or lower engagement with the content. The need for more research on spectators' interaction and their experience has been recognized by streaming services as well. In May of 2017, Twitch.tv began beta testing new interactivity features for their broadcasters. These came in the form of interactive broadcast overlays for several common forms of spectator interaction, such as creating and participating in polls, allowing spectators to see various player statistics, and so on (Albert, 2017). As broadcasting services are promoting spectators, players, and gameplay interactions, the need to discuss the design and evaluation of such interactions has gained increased importance and prominence.

Spectator-Player Experience (SPX)

Video games are designed to deliver immersive player experiences with the power to affect players across a wide spectrum of emotions. Game designers are tasked with the

goal of bringing meaningful engagement to this blend of emotions and interactions. However, the design of eSports must extend beyond these considerations, since game designers must cater to the needs and experiences of both spectators and players; we will discuss the expansion of this design philosophy to the concept of spectator-players in the following section. The design of eSports and interactive spectator experiences is therefore reliant on understanding the needs of players, passive viewers, and spectator-players alike. Current efforts in games user experience (UX) have been primarily focused on player experience (Zammitto, Mirza-Babaei, Livingston, Kobayashi, & Nacke, 2014), rather than the experience of other roles, such as those of game spectators. Thus, while understanding of the player experience is well-documented (Drachen, Mirza-Babaei, & Nacke, 2018), before moving forward, we should establish a basis for understanding the requirements of game spectators. To design this new form of experience, game designers and researchers need to enhance their toolbox beyond the creation of player experiences alone and create novel approaches for crafting the experience of viewers and spectator-players, as part of the game system.

Successful SPX design must begin with an understanding of the core actions and interactions comprising the experience. We emphasize three main aspects of this understanding which could be seen as key underlying elements to designing, studying and analyzing user experience in general (McAllister, Mirza-Babaei, & Avent, 2013). These include: Behaviour (What did the users do?); Rationale (Why did they behave as they did?), and Experience (How did this make them feel?). Hence, designers need to acquire information on spectator-player behaviour (i.e. interaction with the system), the reasons for this behaviour, and the experiences resulting from the interaction. By understanding the relationship between players' behaviours, reactions, and emotions, we can gain better insights into the complexities of the SPX. This can present a challenging task when designing SPX, as we are blending concepts underlying player experience design (such as theories for flow (Csikszentmihalyi, 1997) or fun (Koster, 2013), for example the intentional inclusion of challenges to make the experience fun (Thomsen, Petersen, Drachen, & Mirza-Babaei, 2016)) with those behind design guidelines in web-based or productivity applications (such as designing for ease-of-use to remove or restructure any possible constraints (Pagulayan, Keeker, Fuller, Wixon, & Romero, 2003)).

Data-driven game design (Kennerly, 2003), (e.g., through the application of game metrics (Seif El-Nasr, Drachen, & Canossa, 2013)), therefore, can help to identify spectator-players interactions, uncovering potential issues within the game and its interface design. However, unlike the study of player behaviour, which is often based solely on active interaction, spectator-players behaviour could be subcategorized as active interaction (interaction with the viewer interface) and passive attention (watching gameplay or listening to commentary without actively interacting).

The effectiveness of games designed to support interactive spectatorship will be dependent upon a plethora of design techniques tailored to the requirements of both players and spectators. A suitable approach for designing such systems must recognize and adapt to the differences in each user's needs arising from the nature

of their respective roles as player, passive viewer, and spectator-player. To this end, we focus on constructing a foundation for understanding the diverse experiences of users in this new interactive format, with the aim of informing the design of games integrating a community of players, viewers, and spectator-players. Following this, we will highlight a series of guidelines mapping interaction mechanics to pertinent goals in the design of interactive spectator experiences.

DESIGNING INTERACTIVE SPECTATOR-PLAYER EXPERIENCES

Creating a game that is engaging for both players and spectator-players presents interesting design challenges, as it combines the goals of interactive design with more traditional entertainment media. Ultimately, the design must be able to create a cohesive experience providing compelling content that satisfies the needs of players, passive viewers, and spectator-players alike. Many games in the eSports community have succeeded in captivating players and viewers, though meaningfully interactive spectatorship remains a relatively new and largely unexplored area of game design. In the pursuit of creating an engaging game that effectively uses the concept of spectator interaction, we can learn from successes in the realm of eSports and interactive streaming. In this section, we employ a multi-step process to propose guidelines supporting the creation of interactive spectator experiences. Ultimately, we will define a set of mechanics and design objectives with the goal of enriching the spectator-player experience in interactive designs.

Approach

Before examining potential avenues for the design of interactive streamed games, we explored common features of existing successful eSports and streamed titles as a basis for our analysis, discussed in the following section. Analyzing core game features for increasing watchability can provide us with a starting point for designing game experiences with streaming in mind. However, to design an experience that is also meaningfully interactive for spectators, we sought out to propose a new set of mechanics allowing for active participation in the game watched, as well as goals underlying the design process.

In the interest of this endeavour, we identified a list of potential mechanics based on the findings from our initial analysis, described in the following section, and then conducted a small focus group to discuss and expand on these mechanics. The group consisted of four participants, all of whom were experienced game developers or designers that frequently watch eSports and other streamed games. Participants were given note cards during group conversation and instructed to write down their ideas, one per card, regarding design goals and potential interaction mechanics. After the group discussion was concluded, we collected and reviewed 45 individual note cards summarizing focus group ideas. We used these findings to inform our list of potential interactive mechanics and design goals supporting the creation of interactive spectator experiences, described in the section titled Exploring Game Mechanics for Interactive Spectatorship.

Commonalities for Increasing Watchability

Successful eSports games are those that are able to provide an experience that is engaging for players while providing enough entertainment value to sustain a sufficiently large population of passive viewers. For our initial exploratory analysis, we examined a collection of the most-streamed games on Twitch as a representative sample of titles achieving significant success in the entertainment market. Measured by average viewers per hour, the top five Twitch games of 2016 were *League of Legends* (Riot Games, 2009), *Counter-Strike: Global Offensive* (Hidden Path Entertainment & Valve Corporation, 2012), *DotA 2* (Valve Corporation, 2013), *Hearthstone* (Blizzard Entertainment Inc, 2014), and *Overwatch* (Blizzard Entertainment Inc, 2016) (Curtin, 2017). Each of these titles is a competitive multiplayer game with an active eSports community. Furthermore, these games share a number of common attributes which may account in part for their success in the eSports and streaming communities. In the first phase of formulating our understanding of interactive design, we examine these features as potential guidelines for increasing the watchability of a game designed to facilitate meaningful spectatorship:

Multiplayer Competition

We define multiplayer competition as a situation in which multiple individuals play a game together via co-location or network functionality, where there is a distinct difference in player outcomes depending on the course of the game (i.e. winner(s) and loser(s)). It is important to note that characteristics afforded by this feature, such as a competitive environment and a drive to improve skill, are key factors in traditional sport, a familiarity which may account in part for the popularity of eSports games (Lee & Schoenstedt, 2011).

While single-player games (such as *Minecraft* (Mojang, 2011)) do receive substantial viewership on Twitch, they are largely outpaced by their multiplayer eSports counterparts (Twitch, 2015). This may be due to a few key advantages afforded by a multiplayer system, particularly in a competitive environment. These include the idea of sportsmanship, increased sociality, the ability to cheer for a favourite team or personality, and the unpredictability or suspense offered by rivals represented by human players, rather than computer entities (Wehbe & Nacke, 2015). This injection of the human factor increases the content available to viewers, as competitive play creates a diversity of scenarios atypical of single-player games.

Content Variety

Here, *content* in a general sense refers to the material consumed by viewers - game scenarios, player commentary, and so on. Variation in this matter can be achieved through both game content (e.g., different levels, characters, and game modes) and human factors (e.g., social player interactions, streamer commentary, player created content or mods). While designers cannot account for all player behaviour, certain steps can be taken to help improve the variation that a game can provide; for instance, including multiple maps to play on, having many viable competitive characters, and including social features for matchmaking and communication. To sustain long-term

viewership, a game should consider these and other possibilities to provide adequate variation in content consumed by spectators. In competitive games, this variety can arise naturally from the emergence of new play strategies, the unpredictability of human opponents, and the appeal of special events such as tournaments. For many games, sustained viewership can be a problem as viewership enthusiasm declines post-release (Curtin, 2017). However, even single-player games, such as *Minecraft* (Mojang, 2011), can be capable of maintaining sizeable viewership - perhaps due in part to their ability to generate new entertainment through player-created game content (such as worlds and structures) and sandbox-like gameplay.

Round- or Match-Based Play

In games, a *round* traditionally refers to a single segment of play in which there is a clear goal or win condition (e.g., kill opponent, score more points than opponent) and a defined outcome (e.g., win, loss, draw). A *match* can be comprised of one or more rounds, with the outcome of the match determined by the combination of outcomes from all contained rounds (e.g., best two out of three). ESports games are overwhelmingly divisible into distinct rounds or matches of fairly regular length, which gives them an episodic quality. This may help to increase viewer appeal by creating self-contained pieces of entertainment that can provide viewers with a reliably fulfilling source of easily digestible content. Furthermore, it allows spectators to plan for sessions of predictable length without having to miss key moments of play, much like the time that may be set aside to view athletic events.

Team Play

Team play refers to a paradigm in which players are divided into two or more distinct groups, where each group cooperates toward a common goal (i.e., victory) and independent teams are most often directly or indirectly opposed to others. In addition to enhancing situational complexity through the introduction of more players, team play in eSports has created a thriving collection of team brands similar to those found in traditional athletics. Groups like Team Newbee, Evil Geniuses, and Team Liquid attract the attention of viewers and major sponsors, building momentum and recognition within the eSports community (Gaudiosi, 2014). The existence of these brands provides audiences with common ideals to support and cheer on, fostering social camaraderie and a competitive spirit, which may enhance engagement and viewer excitement. Over time, team loyalty can grow as viewers develop social relationships with one another and appreciate the history of their team. Further common bonds can be found in supporting players or teams representing affiliations outside the game world, such as their school, community, or country. Additionally, the psychology of cheering for a successful team or performer can provide viewers with a sense of accomplishment (Robert B. et al., 1976).

Exploring Game Mechanics for Interactive Spectatorship

Based on the insights derived from our analysis of existing eSports games and our focus group discussion, we propose a formalized list of mechanics that may be integrated within an interactive spectator experience. In this collection, we consider some of the techniques used in existing and past interactive streaming experiences, as well as the potential for as-yet unexplored mechanics:

Chat Input

Chat mechanisms allow spectators to share written messages with players as well as fellow viewers, typically through a communal live message board with text input. While chat functionality is generally reserved for purely social purposes, it has been used as a pseudo-polling mechanic for controlling game input, turning a single-player experience into a collaborative effort among thousands of live participating viewers. Through parsing and interpretation by a streaming platform or game extension, chat messages can be used as a voting or game input system. The 2014 phenomenon Twitch Plays Pokémon explored the latter possibility by translating Twitch chat messages from thousands of users into input commands for the game *Pokémon Red* (Game Freak, 1996). The resulting pandemonium created a notorious, chaotic, and incredibly entertaining spectacle for its participants and viewers (Prell, 2014).

The hectic nature of controlling a game through thousands of near-simultaneous inputs has the potential to create a joyful anarchy which drives a shared experience among community members as they strive for a common goal. Furthermore, this mechanic can be conceivably adapted to facilitate participation by allowing spectator-players to control a limited subset of the game scenario (e.g., enemies, resources, etc.) in a more traditional game system. This type of system can be made more organized through the implementation of aggregate-based polling, which takes into account the will of the majority, rather than every individual action. *Choice Chamber* (Studio Bean, 2015), for instance, uses Twitch chat aggregation to modify game levels and decide on in-game resources for streaming players.

Voting/Polling

Voting mechanisms attempt to capture community consensus by aggregating the opinions of individual users, often through allowing users to select options from a list of possible alternatives. Compared to chat mechanics, voting and polling may prove to be a more sophisticated or orderly form of spectator participation. This may include the implementation of a simple interface for voting on game actions to be taken by streamers, or to select the next game that should be played based on community interests. This allows spectator-players to engage meaningfully with watched content without creating a large barrier to entry, as well as providing a starting point for consensus or dissonance within the viewing community. Recently, researchers have investigated the utility of tools designed for input aggregation in the card-based strategy game *Hearthstone* (Blizzard Entertainment Inc, 2014) to facilitate viewer interaction primarily by providing feedback on player actions (Lessel, Vielhauer, & Krüger,

2017). Such interaction ability can provide the audience with a sense of influence, contributing to increased participation (Lessel et al., 2017).

Affiliation

Consider the act of in-game affiliation, permanently or semi-permanently declaring one's allegiance to a particular player or team, as a spectator-based extension of team play. A game using affiliation as a mechanic may use spectators' affiliation, for example, to determine available interactions (e.g., being able to vote on actions for their declared team only). Conceivably, the number of spectators declaring their allegiance to a particular team may influence that team's in-game strength, akin to a form of sponsorship.

Betting

Wagering in-game or "play" currency has been used as a mechanic to motivate spectator interest in fighting games, for example, in the web-based system *Salty Bet* (Salty, 2013), creating the appeal of chance-based spectator play akin to gambling in a relatively risk-free environment (Miller, 2013). It is conceivable that such a system may be directly designed for by embedding in-game interfaces, communication with streaming platforms, and linking to game rewards. However, it should be noted that, as in traditional sport, betting can easily take place outside of the intended context, which may present further design challenges.

Cheering and Donation Incentives

Twitch's "cheer" mechanic allows viewers to spend small amounts of money on virtual tokens which can be used to display special emoticons during live streams (Fontaine, 2016). Additionally, game streamers often offer call-outs or read on-screen viewer messages to spectators that donate or subscribe to their channels. Queue systems and interaction limits at times of high traffic can be implemented to help reduce the chaos of many spectators attempting to be heard simultaneously. Larger communities, such as Awesome Games Done Quick (AGDQ), which hosts game speed-running marathons for charity, use in-game choices, such as character names and narrative decisions, to motivate viewer donations, by allowing the community to vote collectively on selected topics (AGDQ, 2017). These types of incentives allow spectators to influence the outcome of the content they watch while supporting good causes or their favourite channels, and may prove a viable stream of income for interactive viewing experiences.

Commentary and Interviews

ESports or streaming commentary can be delivered through two main channels; players, and commentators. The practice of interviewing players after tournament games is fairly commonplace in the eSports community. Apart from gameplay itself, these activities supplement streaming content with human perspectives on topics related to games and competition. Game tournaments, like athletic tournaments, often enlist the talents of commentators to provide viewers with informed insights on player behaviour and game mechanics (Sachgau, 2016). Furthermore, many players will verbally chronicle

their experience as they play, sharing their ideas, strategy, frustration, and victory with viewers in a social fashion. Interviews can take this a step further by relating aspects of player personalities and play-styles, giving spectators an opportunity to learn more about players they admire or the game itself. This additional stream of content may encourage viewership, as the acquisition of knowledge has been associated positively with eSports viewing frequency (Hamari & Sjöblom, 2017). By opening up this type of interaction to include user-submitted questions or commentary, this could allow spectator-players to interact at a much deeper or more personal level with their favourite players. This form of engagement also has the potential to inject additional entertainment value into the viewing experience, as it can supplement game content with human insights, humour, sociability, and so on.

Direct Viewer Participation/Lotteries

Here, we refer to *direct viewer participation* as the act of a spectator actively entering and playing the game watched, interacting in-game with the streaming player(s). This concept has been explored in *Upsilon Circuit* (Robot Loves Kitty, n.d.), touted as a fantasy RPG-meets-game show where players are selected on a lottery basis from a viewing population to participate in the game. The proposed system is supplemented with additional participation mechanics (e.g., allowing viewers to help power up player characters) to avoid discouraging those not selected for active gameplay. While the game's developer has cited financial challenges as indefinitely postponing production, initial community interest in the game's premise may be an indicator of promise for the concept of "game show"-type spectator play (Grayson, 2016). Giving spectator-players a chance to step into the spotlight and play with or compete against popular players could provide a highly interactive and socially rewarding game experience. Whether this means directly participating in play as a main character, or enlisting a cast of extras to control minor allies and enemies in-game, this option provides a deeply interactive experience for spectator-players. Furthermore, being chosen to participate directly in play could be seen as an elusive and highly rewarding prize, enticing spectators to stay engaged for their chance to have a moment in the limelight.

Viewer-Created Content

A more creative and interesting form of participation is the submission of original game content (e.g., levels) by spectator-players, to be played and broadcast on live channels. *Super Mario Maker* (Nintendo EAD, 2015) streams have featured viewer-submitted levels played live, spawning online tools facilitating user communication and level submission (Quanix Studio, 2016; Warp World LLC, n.d.). While this form of interaction affords a slower pace than other mechanics, it provides spectator-players with a deep level of interaction and a highly rewarding experience if their creation is shared and broadcast to their peers. It also gives passive viewers the opportunity to discover other users' content for use in their own game playthroughs, enriching their experience with additional material. Such a system would likely be supplemented with

more passive mechanics, such as voting, to ensure that all spectators would maintain some degree of participation during play.

Content or Game Modification

This approach may be thought of as a less demanding variation on direct viewer participation or viewer-created content, by allowing spectators to exert some agency or indirect influence over aspects of the game environment. Spectator-players may conceivably interact with streamed content by modifying elements of the game world, such as dispatching enemies, sending in-game resources, supplying dialogue, or changing visual aspects of the game. This has been demonstrated to a limited extent with donation incentives based on game decisions, such as those at AGDQ (AGDQ, 2017). However, this crowdsourced form of decision-making precludes the possibility of individual spectator-players assuming responsibility for some small part of a game on a temporary basis, which may allow for individual users to feel a meaningful personal contribution to their entertainment experience. The game *Streamline* (Proletariat Inc, 2016), for instance, allows viewers to support players by enacting special game conditions such as environmental hazards and rule changes.

With a plethora of potential mechanics available for designers to explore, it may be challenging to tailor an interactive spectatorship experience so that it is equally fulfilling for either large or small populations of viewers. Both scenarios pose their own unique challenges; in a small group, viewers may feel a lack of excitement, and low participation may lend the game a sense of emptiness. Conversely, in a group that is overly large, viewers may feel that their individual contribution to the game has been diminished, or that their participation is insignificant within the crowd. Part of the challenge in dealing with these issues stems from the fact that any new experience would likely have to account for both of these extremes in its design. A possible way of combatting this effect would be to combine standard large-scale mechanics (such as polling) with a lottery-based form of deeper interaction, such as content creation or direct participation. As a result, viewers in small groups would have frequent opportunities to engage more deeply, and those in large groups would be encouraged by the chance of finding themselves at the center of the action in a substantial crowd.

Beyond the challenges specific to spectator interaction, any such game would also need to ensure that it satisfy the needs of its players and passive viewers. Thus, within the genre, a successful title would need to fulfill three key requirements: A rewarding game experience for its players, a quality evaluated by conventional player experience research; Watchability for passive viewers and for spectators that have not yet learned or made the decision to interact actively with the game; and Interactivity for those spectators that are actively participating. With this in mind, the successful design of a complete game experience in this space demands attention to the needs of all users, whether players, passive viewers, and spectator-players.

SUMMARY OF DESIGN GOALS

Designing for an interactive game audience can explore a number of mechanics tailored to the experience of spectator-players. These mechanics, enumerated in the previous section, span a range of implementations and interaction depths. Each mechanic can be thought of as having a particular impact on the experience of not only spectator-players, but passive viewers as well. Well-designed interactive mechanics have the potential to increase viewer engagement by bolstering entertainment value, demanding increased viewer attention, or encouraging viewers to seek a deeper level of interaction and become spectator-players. Key design goals for each mechanic are summarized in the table below.

The successful fulfillment and evaluation of experience goals across three different user populations (players, passive viewers, and spectator-players) will undoubtedly continue to pose challenges for game developers. This evolving design process will undoubtedly be enriched by the efforts of developers and researchers alike exploring these new interaction modes in the gaming community, serving as a basis for future work in the domain of interactive spectatorship.

CONCLUSION

This paper presented design opportunities and challenges for the design and development of novel games aimed at delivering interactive spectator experiences. This new category of games will need to effectively engage players, spectators, and spectator-players to fulfill its potential, providing both enjoyable gameplay and compelling entertainment. Hence, our findings may be applied outside of the games industry, having wider applications in the field of interactive entertainment, such as interactive television programming and sports broadcasting.

During the preparation of our work, we have been exposed to a handful of novel games utilizing one or two mechanics discussed in this paper (in fact, members of our team contributed to two such projects). Given the increased popularity of eSports, we expect to see a significant rise in games that focus mainly on the interaction of spectator-players in the near future. With this contribution, we hope to provide a foundation for future work in the design and evaluation of games centered on an interactive spectator experience.

Table 1. Summary of design goals for spectator interaction mechanics from the perspective of spectator-players vs. passive viewers

Interaction Mechanic	Spectator-Player Experience Design Goals	Viewer Experience Design Goals
Chat messages	- Social engagement - Opportunity for discussion - Vocalization of opinion - Level of engagement	- Interesting dialogue - Create humour and conflict
Voting	- Sense of influencing the game - Feeling of team participation - Level of engagement	- Create unpredictability
Affiliation	- Sense of influencing the game - Feeling of team participation - Foster team spirit - Social engagement	- Foster team spirit - Create conflict
Betting	- Feeling of risk/reward - Randomness/chance - Level of engagement	- Create unpredictability - Offer reward for participation
Cheering	- Foster team spirit - Feeling of supporting players - Level of engagement	- Foster team spirit
Donation Incentives	- Personalization/customization - Feeling of supporting cause/player - Level of engagement	- Create unpredictability - Encourage participation
Commentary & Player Interviews	- Inform other interactions (e.g. voting, judging plays, making suggestions) - Engage with celebrity players	- Learn about celebrity players - Learn about the game - Create sociability and humour
Viewer Participation & Lotteries	- Feel “famous” - Rare, highly desirable reward - Engage with celebrity players	- Create gameplay variety - Encourage participation
Viewer-Created Content	- Exercise creativity, self-expression - Feeling of fame	- Create content variety - Offer unique content - Prolong view sessions
Game Modification	- Sense of influencing the game - Sense of agency - Level of engagement	- Create unpredictability - Create content variety

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