Exploring Social Interaction in Co-located Multiplayer Games

Dennis L. Kappen
University of Ontario Institute of Technology
2000 Simcoe St N, Oshawa, ON L1H 7K4
dennis.kappen@uoit.ca

John Gregory
University of Ontario Institute of Technology
2000 Simcoe St N, Oshawa, ON L1H 7K4
john.uoit@hotmail.com

Daniel Stepchenko
University of Ontario Institute of Technology
2000 Simcoe St N, Oshawa, ON L1H 7K4
daniel.stepchenko@uoit.net

Rina R. Wehbe
University of Ontario Institute of Technology
200 Simcoe Street North
Oshawa, L1H7K4, Canada
rina.wehbe@uoit.ca

Lennart E. Nacke
University of Ontario Institute of Technology
2000 Simcoe St N, Oshawa, ON L1H 7K4
lennart.nacke@acm.org

CHI 2013 Extended Abstracts, April 27–May 2, 2013, Paris, France.
ACM 978-1-4503-1952-2/13/04.

Abstract
Games have always been a social activity. Playing digital games affords spending time with people; helps build personal connections between individuals and helps to redefine the personality of the player while in play. Games also enable to build the concept of togetherness as a means to foster and enhance the concept of social connectedness, mutual dependencies, collaboration, community living and social interaction. We present a work-in-progress digital game installation to create multi-level social interactions between the player, the spatial game environment and the digital game. We discuss *MagicDuel,* a multiplayer digital game, where we are in the process of evaluating the socio-spatial contextual relationship between the players, the audience and gameplay elements for this specific digital game.

Author Keywords
Interaction design; Co-located gaming; Social interaction; Industrial design; Entertainment technology; Human factors; Usability

ACM Classification Keywords
H.5.2. Information interfaces and presentation K.8.0 [Personal Computing]: General – Games

Introduction

Games allow us to spend time with people, they can foster a concept of togetherness that is often missing in public spaces. Some of the core concepts of playing come from acting and performing in public spaces. In the best theater performances, actors and audiences drive their social interaction toward a highly engaging experience. In this paper, we set out to explore the socio-spatial contextual relationship that players can have with each other, their audience and gameplay elements in public spaces.

Social interaction is the symbiotic relationship between an individual and a group of persons (i.e., audience) that directly or indirectly influences the behavior of the individual. This relationship can either become a mutually *inclusive* or a mutually *exclusive* relationship. This inclusiveness or exclusiveness is dependent on the behavioral characteristics of the audience and the responsive behavior of the individual towards the behavior of the audience within a specific domain of activity.

Digital games or video games present a medium where social interaction takes place on multiple levels. These games afford the possibility of player to audience interaction, defining an element inclusivity of the audience engagement to influence player engagement. It also encourages people of different generations; different skill levels to play together and people who are unable to leave their homes due to disability to play online [11]. These games help build meaningful empathy, encouragement, build morale and build co-dependent communities that help to nurture one another's kindred spirit. Contextual influences on the player are based on abstract attributes (social, spatial, temporal and cultural), player experience and concrete attributes of the game system [3].

Affective game experience is dependent on many variables. The inter-relationship between game content, game context and the player is shown in Figure 1.

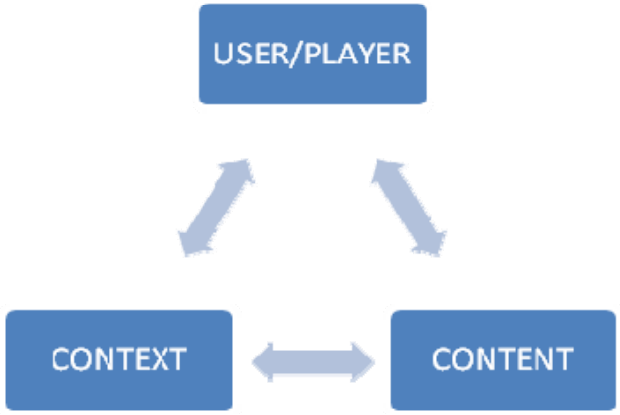

Figure 1. User–Content–Context interrelationship

The process of player-game interaction funnels the creation of Gameplay Experiences (GX) [12]. Based on the User Experience (UX) and Player Experience (PX) models, a three-layer framework for GX embodying game system experience, player experience and contextual experience, which could be used in the field of game-based learning and serious gaming for sports and health was proposed [12].

Digital gaming also gives rise to frequent and meaningful social interactions establishing a deeper connection to the real world of the gamer [8], influencing their in-game experience. In addition, there is also an interrelationship between the personalities and/or attribute

traits versus the experiential characteristics in each of the various states (content, user, context, and social) as indicated in the Figure 2.

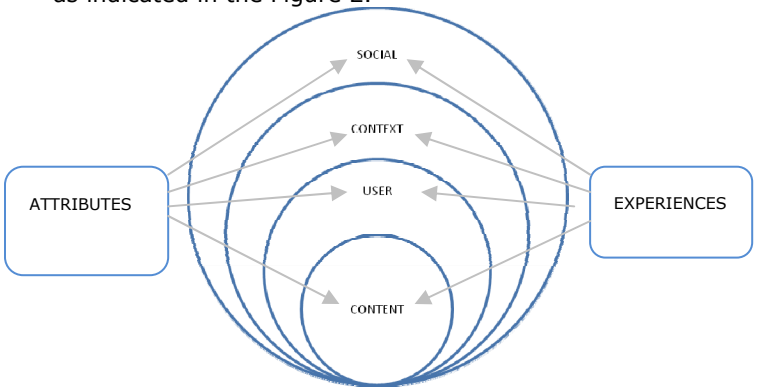

Figure 2. Attributes-Experience interrelationship matrix.

Much research has been done in the area of co-located gaming and has been focused towards creating a new gaming experience from the point of encouraging engaging and interactive gameplay [1, 2, 4, 5, 11]. Mobile gaming platforms have also been designed to enhance social gaming through networked devices. Measurement of gameplay experiences associated with co-located gaming is critical to evaluating the immersive nature of the game [6, 7, 8, 10]. Success of a co-located collaborative game is dependent on the levels of interaction and enjoyment [10]. In addition, we can find the following definitions of play in public spaces (or the contemporary city as Stevens calls it) [15]:

- Non-instrumental actions foster play
- Boundary conditions and rules separate play from everyday activities in a public space
- Specific activities are inherent in play, such as competition, chance, simulation, and vertigo, and allow us to test and expand our spatial limits
- Encounters with strangers are part of play in a public space

Social Interaction in *MagicDuel*

The aim of our experimental study is to identify and analyze the interplay of contextual conditions in *MagicDuel*, a co-located multi-player game (see Figure 3 for a screenshot of an early prototype).

Figure 3. An early prototype of the *MagicDuel* game.

Game Description

The main goal of the *MagicDuel* game is to facilitate play in a public space by using an assortment of human computer interaction (HCI) interface components, such as the Microsoft Kinect, Nintendo Wii BalanceBoard, and Leap Motion sensors. The combination of the Kinect and Balance Boards is uncommon in the industry. The Wii BalanceBoard was modified to work with Arduino sensors and the game combines the versatility of the Kinect sensors and the Wii BalanceBoard.

The object of the game is a magic elementary battle system where two players fight with magic using vari-

ous sensors supported by two other players. The actual interface will be a large cube physical installation with sheets on the side and a projector to the middle that shows a first person perspective. While the two main players can engage in direct combat, two players on the sidelines can provide defense magic that supports the two main players (see Figure 4 for the game space setup).

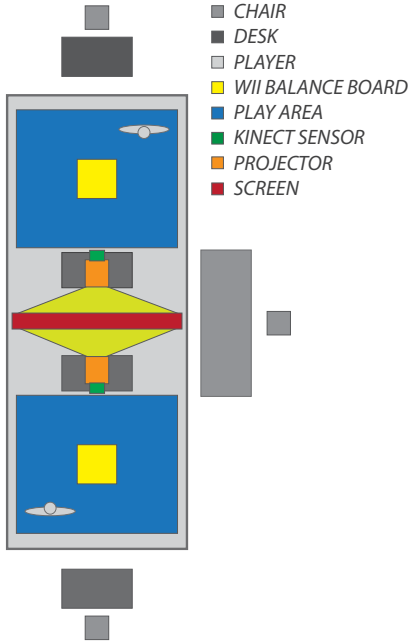

Figure 4. Spatial setup of the *MagicDuel* multiplayer game.

Players duel each other by casting spells back and forth and at the same time dodging each other's attacks. The players cast spells using the Kinect, Arduino sensors, and Leap Motion sensors.

Figure 5. Demonstration of Wii Balance Board in *MagicDuel*.

During the battle, players are also be able to jump onto the Wii Balance Board (see Figure 5) to enter a flying mode and soar up into the air above their opponent and fire down on them. The Kinect will be used for dodging attacks from the other player. When the main software and hardware are working properly we hope to add social aspects to the game by having Quick Response codes (QR) that people can scan with their smart phones, which would give them a benefit or an advantage in game as well as options to customize their in-game avatars and spells. The rewards collected in the real world would range from new powerful spells to cosmetic items like textures and costumes. We hope to use the codes inside stores or malls and generate traffic to the stores.

Game Social Interaction

The *MagicDuel* game is designed at present, to be played by two players, in a game environment which is a physical installation in a spatial context. Both players are not able to physically see one another. However, they will be able to see the actions of the opposing

player from a first person perspective and duel with the opponents' actions. This game also entails the design and development of various categories of modalities; written, oral or gestural interaction modalities. Irrespective of the game itself, the objective of this physical installation was to elicit participation from the audience, and engage the audience in influencing the performance of each player. Based on the socio-spatial context of the game installation itself, there are various levels of interaction that take place between player, game system, game installation and audience. These levels of possible interaction are shown in Figure 2.

The *MagicDuel* game is in its preliminary stages of design, development and testing. We have already carried out an initial pilot testing of the game in the foyer of the Faculty of Business and Information Technology (FBIT) at the UOIT campus. Our prototype testing of the *MagicDuel* game demonstrated the feasibility and applicability of this game as a potential installation in a public space. In addition to the Kinect and Wii Balance board which were present in the pilot testing of the game, we plan to incorporate infrared (IR) sensors into the interaction space. These sensors would be attached to the player's body and would enable them to activate different types of spells and initiate attacks by gestural motions of their hand on top of the sensors. Another possibility that we are working on is integrating the Leap Motion finger tracking system for spell casting.

The *MagicDuel* game defines a new experience of gameplay wherein the two players duel each other in a public space, providing an interaction platform for the audience to actively engage and add motivational excitement to the game experience. We examine the impact of audience engagement on the performance of the players to determine the level of correlation between audience motivation and gameplay experience.

A detailed study of the demographic involving qualitative methods such as interviews, focus groups and behavioral observations are planned. The aim of the experimental study is to conduct multiple experiments to identify the parameters which contribute to engaging and immersive gameplay experience; measurement of gameplay experiences in a socio-spatial context; and define a new interaction paradigm for social experience (SX) in relation to a co-located gaming installation.

Opportunities and Challenges

The key opportunity of this *MagicDuel* game is to establish, understand and evaluate the symbiotic relationship between the players who are immersed in the game and the audience engagement. Many available commercial games lack support for dynamic social interactions or are not suitable to be played in public spheres [5]. The challenges in the study of social experience in interactive gameplay in public spheres are itself an opportunity for research. The socio-spatial interdynamics between player-game system-audience engagement contexts are areas that influence gameplay experiences. This Work-in-Progress illustrates the need to explore the relationship between player in-game experience and the influence of the audience participation on the players and game experience. The challenge of game-system installation for public spaces is another area of research that could help identify the modularization challenges of game system design.

Finally, the study of social interaction aspects of the younger demographic, defined by social experience (SX) is a domain that could lead to creation of digital

games affording the enhancement of human lifestyle, creation of memorable and motivated human experiences for any specific demographic in public spheres. This study of the aspect of social interaction and social experience in gameplay can be extended to the older adult demographic. This aspect of gaming combined with universal design and barrier free design are concepts that could help create engaging *humancentric affective game design* for the specific demographics.

Acknowledgements

We thank all the volunteers, students and staff that helped us. We would like to thank NSERC, GRAND NCE (AFEVAL, GAMFIT), SSHRC IMMERSe (895-2011-1014) for their research support.

References

[1] Casey, S., Kirman, B., & Rowland, D. (2007). The Gopher Game : A Social , Mobile , Locative Game with User Generated Content and Peer Review, *Proc. of ACE'07*, pp. 9–16.

[2] Competition, S. G. (2012). BombPlus : Using NFC and Orientation- Sensing to Enhance Social Gaming Experience for Co-located Players, *Proc. of CHI EA'12,* pp. 1339–1344.

[3] Engl, S., Nacke, L.E. (2012) Contextual Influences on Mobile Player Experience – A Game User Experience Model. In *Entertainment Computing,* 4(1), pp.83-91.

[4] Grønbæk, K., Iversen, O. S., Kortbek, K. J., Nielsen, K. R., & Aagaard, L. (2007). iGameFloor — A Platform for Co-Located Collaborative Games, *Proc. of ACE'07*, pp. 64–71.

[5] Habermas, Jurgen (German (1962) English Translation 1989). *The Structural Transformation of the Public Sphere*, Thomas Burger, Cambridge Massachusetts: The MIT Press, p. 305

[6] Kauko, J., & Häkkilä, J. (2010). Shared-screen social gaming with portable devices. *Proc. of MobileHCI '10*, 317. doi:10.1145/1851600.1851657

[7] Kirman, B., Björk, S., Deterding, S., Paavilainen, J., & Rao, V. (2011). Social game studies at CHI 2011. *Proc. of CHI EA'11*, 17. DOI:10.1145/1979742.1979590

[8] Korhonen, H., Paavilainen, J., Saarenpää, H. (2009). Expert Review Method in Game Evaluations – Comparison of Two Playability Heuristic Sets, *Proc. of MindTrek'09*, pp. 74–81.

[9] Kort, Y. A. W. D. E., & Ijsselsteijn, W. A. (2008). People , Places , and Play : Player Experience in a Socio-Spatial Context, *ACM CiE 6*(2), 1–11.

[10] Mandryk, R. L., & Inkpen, K. M. (2004). Physiological indicators for the evaluation of co-located collaborative play. *Proc. of CSCW'04*, 102.

[11] McLaughlin, a., Gandy, M., Allaire, J., & Whitlock, L. (2012). Putting Fun into Video Games for Older Adults. *Ergonomics in Design*, *20*(2), 13–22.

[12] Nacke, L., Drachen, A., & Göbel, S. (2009). Methods for Evaluating Gameplay Experience in a Serious Gaming Context, Journal of CS in Sport, pp. 1–12.

[13] Stenros, J., Paavilainen, J., & Kinnunen, J. (2011). Giving Good " Face ": Playful Performances of Self in Facebook, Proc. of MindTrek'11. pp. 153–160.

[14] Stenros, J., Paavilainen, J., & Mäyrä, F. (2009). The many faces of sociability and social play in games. *Proc. of MindTrek '09*, 82.

[15] Stevens, Q. *The Ludic City: Exploring the Potential of Public Spaces.* Routledge, 2007.