Experiment on Social Multiplayer Multimodal Games

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Abstract—**This paper presents results from an experiment where 35 teenagers tested a social multiplayer multimodal games with the focus to discover attitude towards such games, and if there were any differences in terms of gender and how much the subjects play games every week.**

I. INTRODUCTION

"The mobile phone is enabling new ways of engaging with media content, and new ways of negotiating and communicating within both actual and virtual environments" [1]. Although mobile gaming has become popular, gaming on mobile phones gives an inferior gaming experience compared PC and console games due to small screens and a less immersive multiplayer experience. The MOOSES (Multiplayer On One Screen Entertainment System) platform combines the strengths of mobile gaming with the strengths of PC gaming to provide a new in-the-same-room social gaming platform. With MOOSES, the players use their own mobile phones as a game controller for a PC game displayed on a large screen (large public screens, in movie theaters etc.), utilizing features of the mobile phone such as the screen (private screen), vibration (rumble), loud speaker (local audio), microphone, camera, and various sensors.

A. Related Work

There have been several approaches allowing audience to interact with a large screen such as controlling onscreen activity by leaning left and right in their seats, batting a beach ball while its shadow is used as a pointing device, and pointing laser pointers at the screen [2]. A more similar approach to MOOSES is described in [3] where the 3D motion sensor in mobile phones was used as a controller for a multiplayer game displayed on a large screen. [4] describes experiences from developing a multiplayer video game on a large screen in a "Software for Embedded Systems" class. Each student in the class had to design his own accelerometer-based game controller that was used to allow up to 28 players play a soccer game simultaneously. [5] describes a similar approach where the accelerometer in a mobile phone was used to control a pointer to interact with content on large public displays. [6] presents the MobiToss application, which is an application for creating and sharing multimedia art on large public displays by "throwing" media content through movement gestures on large public displays using mobile phones. Another approach is to use a camera in front of a large screen to track lights emitted from users' mobile phone camera flashlights [7]. Volvo introduced an interactive commercial in a movie theater where the audience controlled a car by waving their hands left and right in front of a camera

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[8]. The Ghost in the Cave game aims at players between 13 and 16 years old [9] divided into two teams where the players on each team have to cooperate to be the first to enter the third cave through singing and dancing. Newsbreaker Live is another cinema style game where the audience controls the pad in an Arkanoid game through crowd movement [10].

B. The MOOSES Games

The two MOOSES games in the experiment described in this paper have very different game control characteristics. Actung is a is a player vs. player game where every player controls a snake and the goal is to stay alive without crashing into your own tale or into any other players (see Figure 1).
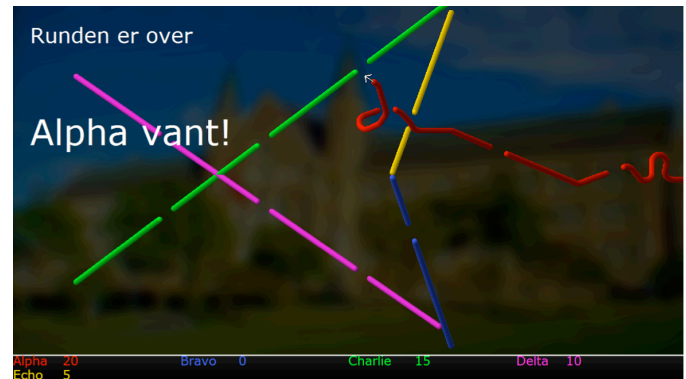

Figure 1 Screenshot from the Actung game

ProductBall is a game where the audience is split into two teams. Each team will collectively control a soda bottle with the aim of playing volleyball with a beach ball. The collective control reacts according to how many of the players on the same team press the keys in the same direction. If all players on one team press the left key, the bottle moves fast to the left. Similarly the bottle can move to the right and jump (which also must be synchronized to be able to make a high jump). A screenshot of the game is shown in Figure 2.

Figure 2 Screenshot from the ProductBall game

II. THE EXPERIMENT

The focus of the experiment was to investigate differences in players' perceptions of the MOOSES platform and collaborative game control related to gender and time spent on playing games per week. The experiment consisted of three phases. *First*, the subjects played the MOOSES game SlagMark to get familiar with the controls and how the game platform worked. *Second*, the subjects played the two games Actung and ProductBall in game sessions of 6-10 players. *Third*, the subjects filled in a questionnaire with 11 statements related to MOOSES where they used the Likert scale from 1 (strongly disagree) to 5 (strongly agree). The experiment was carried out by 35 teenagers between 14 and 16 years old, where 43% were male and 57% were females. Further, 71% of the subjects were classified as *casual* gamers that play less than 5 hours per week (1-2 hours on average), and 29% as gamers that play more than 5 hours peer week (10-20 hours on average).

III. THE RESULTS AND CONCLUSION

The results from the experiment are shown in TABLE 1. Our hypothesis was that there should be no difference in how the different groups responded in terms of gender or how much games they played. The Kruskal-Wallis Test was used to do the hypothesis tests. The Kruskal-Wallis test is a non-parametric method for testing equality of population medians among groups [11]. This test was suitable for this survey, as we cannot assume a normal population and the sample sizes of the groups are different.

The results show a statistical difference ($p \leq 0.05$) in how much time the players play games and the gender related to the enjoyment of the ProductBall game. The results show that female and casual players are more positive to ProductBall and thus using collaborative game controls. The results also show statistically that female players to a larger degree find it useful to have a personal screen when playing MOOSES games. Also, that both male players and gamers are more positive about playing together gives a unique playing experience, play together increase the social value of the game, and it is an advantage to play together at a large screen. A curiosity of the results is that female players to a less degree (although not statistically significant p=0.10) agreed that they interacted with other players during the game. This statement is in strange as female players enjoyed the ProductBall game with collaborative control to a larger degree.

The subjects were in general positive about the MOOSES platform and its features. The subjects were least positive to use a mobile phone as a game controller, to use their own mobile phone as a game controller, and to have a personal screen. The main reason for this was that a keypad is inferior to dedicated game controller in operating a game, which means that MOOSES must provide simple game controls.

TABLE 1 Results from the experiment shown as average score (1-5) and p for Kruskal Wallis Test

Statement	All	Male	Female	p gender	Casual	Gamer	p gamer
1. I really enjoyed playing the ProductBall game	4,2	3,8	4,4	**P = 0.033**	4,6	4,4	**P = 0.040**
2. I really enjoyed playing the Acting game	4,6	4,6	4,6	P = 0.908	4,3	3,7	P = 0.461
3. Easy to use mobile phone as game controller	3,5	3,2	3,8	P = 0.155	3,6	3,2	P = 0.376
4. Prefer to use own mobile phone as controller	3,3	3,2	3,3	P = 0.658	3,4	2,8	P = 0.077
5. Useful to have a personal screen	3,4	2,8	3,9	**P = 0.036**	3,6	2,9	P = 0.214
6. Nice to have personal sounds and vibrations	3,8	3,7	3,9	P = 0.779	3,6	4,1	P = 0.241
7. Play together gives unique playing experience	4,6	5,0	4,3	**P = 0.003**	4,4	5,0	**P = 0.032**
8. Play together increase social value of game	4,5	5,0	4,2	**P = 0.002**	4,4	4,7	**P = 0.021**
9. Advantage to play together at large screen	4,4	4,7	4,2	**P = 0.029**	4,2	4,9	**P = 0.032**
10. Interacted with other players during game	4,3	4,6	4,1	P = 0.102	4,2	4,6	P = 0.314
11. Prefer MOOSES to passive commercials	4,8	5,0	4,6	P = 0.070	4,7	5,0	P = 0.186

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