Effects of Co-player Visualization in a Location-based Chase-and-catch Game

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ABSTRACT

In our *FoxHunt* game, virtual foxes are chased on a playground. Foxes and hunters are rendered on a map displayed on GPS-enabled mobile phones. We collected data from three field tests, totalling 130 participants. Approximately half of the players were provided with positions and scores for the other hunters. In the rest of the games, only the foxes and the players' own avatars were rendered. Providing co-player information did *not* have a direct impact on gaming scores. However, it increased the reported fun factor.

Categories and Subject Descriptors

H.1.2 [**User/Machine Systems**]: Human factors; I.6.8 [**Types of Simulation**]: Gaming

General Terms

Human Factors, Experimentation, Design

Keywords

Location-Based Gaming, Player Awareness, FoxHunt, Mobile, GPS

1. INTRODUCTION

Affordable location-aware smart-phones have made it possible to design, develop and deploy mobile games, using the players' positions to combine real world experience with representation of virtual artifacts. Many of the these games have in common that they originate from traditional computer gaming. Some are direct adaptations of existing concepts, such as *PacMan* [1], others are heavily influenced by them, as in the case of *Botfighters* [2]. Another category of mobile games is inspired by board games, translating the boards to urban spaces and playgrounds, as in *Mobile Monopoly* [3].

Spikol et. al. [4], have, among others, investigated gaming as a means to engage youngsters in physical activities (exergames). As such, their work differs from mainstream mobile games; they augment an existing real life concept (orienteering) with the help of digital artifacts (mobile phones), rather than using the real world as an add-on to the computer game. *CatchBob!* is another example of a similar design [5]. This game builds on the simple *Chase and Catch* (*C&C*) concept, but adds complex elements from console gaming.

In the following, we report from a field study investigating effects of visualizing positions and game scores of co-players in a location-based game called *FoxHunt*.

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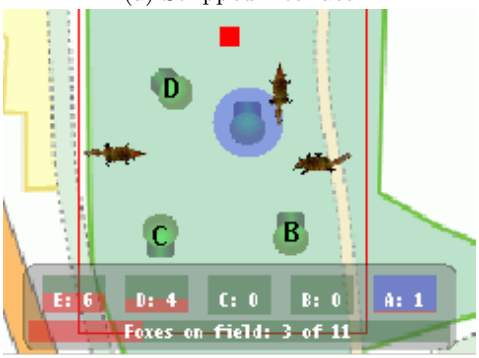
2. THE FOXHUNT GAME

The *FoxHunt* game, where real players hunt virtual foxes, is also in the *C&C* category. However, the implementation is quite close to traditional playground games. The bridge between physical and virtual space is a GPS-enabled mobile phone where foxes, hunters, and a background map are displayed. To catch a fox, the hunter has to physically move to its location.

(a) Stripped interface



(b) Co-player visualization

Figure 1: Cropped screen-shots of the *FoxHunt* mobile client

The game-play is governed by a server-based simulation engine that provides the foxes with semi-intelligent behavior.

Typically, the foxes will flock together, but try to disperse when a hunter is approaching.

We use two variants of visualizations, one without co-player information (Figure 1a), and one showing the other hunters along with their scores (Figure 1b).

3. EXPERIMENT DESIGN

The participants in the field tests were recruited from high school visitors (age 16-17) on three separate occasions. Each game was played by four or five hunters, lasting four minutes, on a field approximately 100 by 200 meters. The experiments were carried out on three separate occations; day one was wet and cloudy, day two was very cold, and on day three the temperature was around 0° Celsius with sunshine.

Most of the games were video taped, and we have secured observations both from the field and from conversations between other students watching the game. In addition, log files from the server provided more detailed information about each game.

Two questionnaires were filled out. In the pre-game form, the hunters stated their gender and inclination for physical exercise. After each game, they completed a second form where they rated how fun the game was, their own effort, whether they were in competition with other players, whether they cooperated with other players, and if they looked at other players in the field. Those playing the game with extra visualization were also asked if they looked at the other hunters on the screen.

4. RESULTS AND DISCUSSION

The play

When the players recognise that the game has started they run onto the field laughing and talking loudly for 5-15 seconds: "In what direction should I hold this thing?", "Where are the foxes?", "I am going to beat you!". After this brief togetherness the players go silent and disperse.

After a short while, the players start meeting on the field because they are hunting the same foxes. Sometimes the screen takes all the attention so that the players almost crash into each-other. Most of the time the players do not interact at all. They throw a brief glimpse at each-other and run in opposite directions. When a meeting triggers interaction, this is often a shout without reciprocation. Sometimes an encounter leads to proper two way communication between the players. The conversation is mostly about being lost or the game standing.

When the game is over, they often convene on the playing ground and walk together back to the starting area. The conversations is mostly about who did best and the fact that the game is really exhausting.

More is not more

It was expected that the players who could see the other hunters represented on the screen would exploit and benefit from this extra information. However, the results show that additional display information has no significant impact on their performance. They do not catch more foxes and they do not run more or less than the players without this information. Analysis of field observations reveals no major differences in behavior between the two groups.

An explanation might be that information about other players is not needed in order to play the game. You can catch foxes without cooperating with other players. The display is just an aid to view what is hidden in the physical world. The participants are playing for fun, and they do not need to develop smart strategies for accomplishing that.

Player experience

The level of reported fun is high, with an average of 4.1 on a scale from one to five. Visualization of other hunters play a significant role, especially when looking at day three. Here, the average in the group without visualization is 3.8, whereas those with visualization report an average of 4.5. We find the same indication, albeit to a lesser degree, on the reported level of effort put into the game.

Further, the level of enjoyment or reported effort does not seem to be correlated with gender or preferences for sports or physical exercise. The game obviously appeals to users with diverse physical interests and abilities. This is consistent with field observations and feedback from teachers accompanying the students. As such, *FoxHunt* might well fit the role of a motivational tool in sports classes.

5. FINAL REMARKS

We have created and investigated a *C&C* game called *FoxHunt*, in which players use location-aware mobile phones to hunt virtual foxes in a physical environment. The results of the pilot study have shown that adding information about co-players' positions and scores on the display does not improve performance. However, it seems to have a positive effect on how the players experience the game. Another interesting finding is that the level of reported fun does not correlate with gender or preferences for sports and physical exercise.

6. REFERENCES

[1] O. Rashid, W. Bamford, P. Coulton, R. Edwards, and J. Scheible, "PAC-LAN: mixed-reality gaming with RFID-enabled mobile phones," *Computers in Entertainment (CIE)*, vol. 4, no. 4, 2006.

[2] O. Sotamaa, "All the World's A Botfighter Stage: Notes on Location-Based Multi-User Gaming," in *Computer Games and Digital Cultures Conference. Proceedings.* Tampere University Press, 2002, pp. 35–45.

[3] M. Li, M. J. O'Grady, and O. Gregory M.P, "Geo-gaming: The mobile monopoly experience," in *Proceedings of the Fourth International Conference on Web Information Systems*, J. Cordeiro, J. Filipe, and S. Hammoudi, Eds., vol. 1. INSTICC, May 2008, pp. 220–223.

[4] D. Spikol and M. Milrad, "Combining Physical Activities and Mobile Games to Promote Novel Learning Practices," in *Wireless, Mobile, and Ubiquitous Technology in Education. Fifth IEEE International Conference on*, 2008, pp. 31–38.

[5] N. Nova, F. Girardin, G. Molinari, and P. Dillenbourg, "The Underwhelming Effects of Automatic Location-Awareness on Collaboration in a Pervasive Game," in *International Conference on Cooperative Systems Design.* IOS Press, 2006, pp. 224–238.