Bubble Popper:
Body Contact in Digital Games

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Abstract

Exertion games, digital games involving physical effort, are becoming more popular. Although some exertion games support social experiences, they rarely consider or support body contact. We believe overlooking body contact as part of social play experiences limits opportunities to design engaging exertion games. To explore this opportunity, we present Bubble Popper, an exertion game that considers and facilitates body contact. Bubble Popper, which uses very simple technology, also demonstrates that considering and facilitating body contact can be achieved without the need to sense body contact. Through reflecting

on our design and analyzing observations of play, we are able to articulate what impact physical space layout in relation to digital game elements, and physical disparity between input and digital display can have on body contact. Our results aid game designers in creating engaging exertion games by guiding them when considering body contact, ultimately helping players benefit more from engaging exertion games.

Author Keywords

Exertion games; exertion interfaces; exergames; movement-based interaction; body contact; game design.

ACM Classification Keywords

H.5.2 [Information Interfaces and Presentation]: User Interfaces.

Introduction

Exertion games are games that require physical effort in order to play [5]. Today the most well known commercial systems that allow for such interactions are Nintendo's Wii, Microsoft's Kinect and Sony's PlayStation Move. These experiences mostly require players to stand side-by-side, where they are not expected to engage in body contact, and therefore do not experience it. We suspect that this is mostly a consequence set by limitations of the involved technology. Although we acknowledge that body contact can be a cause of injury, we believe one of the reasons why these systems have been criticized of missing

Figure 1. Two players competing in Bubble Popper. The player on the right uses his arm to block the opponent.

opportunities for rich social play [2] is because they do not consider body contact. We take inspiration from such rich body contact games such as the playful Twister, and team sports such as basketball, where players experience the sharing of the physical space around them as a result of and a reason for body contact.

To explore this opportunity, we present Bubble Popper, an exertion game that facilitates body contact. This is achieved without the need for sensing body contact, hence Bubble Popper also demonstrates how to facilitate body contact through simple technology. Through reflecting on our designs and analyzing observations of play we are able to articulate what impact physical space layout in relation to digital game elements and physical disparity between input and digital display can have on body contact and therefore, how to design games that aim to consider and facilitate it.

Related Work

The users of TouchMeDare [1] engage and respond to each other's body movements on opposite sides of an interactive canvas. The initial design focused on separating the players' bodies by means of the canvas. However, when TouchMeDare was exhibited in a public setting (a large music festival) it triggered the opportunity for more than one player on either side to be present. Players were observed engaging in rich, intense body contact actions, appropriating the system such that they could even throw one another around.

Game designers have recently presented games that suggest body contact can be explicitly considered in the game design process. One of such games is Wilson et al.'s digitally enabled folk game J.S. Joust [9] that requires players to bump or push each other's hands or bodies to

eliminate them from the game. PlayStation Move controllers were used to detect motion. From J.S. Joust we learn that digital games can be designed so that they facilitate body contact as a core game mechanic. Similarly, the digital game B.U.T.T.O.N. [8] also facilitates body contact through game design. However, interestingly, the system does not sense it. Players must prevent their opponents from holding down a button on their controller for more than four seconds while trying to do so themselves. A video of the game in action suggests that the game can indeed facilitate very powerful body contact actions, all without the game system sensing it. We build on this idea of facilitating body contact without the need for sensing, and present an analytical account of how game designers may achieve this.

There have also been a number of art and interactive installations that have played with the notion of popping bubbles [7][10]. While we are also clearly inspired by the magical experience of popping bubbles, hence the name of our game "Bubble Popper", our work differs as it deliberately considers body contact through game design as part of the game experience.

These related works suggest that considering body contact in exertion games could be beneficial for facilitating engaging experiences for players. However, how game design can support this has only been analyzed to a limited extent. Our work therefore explores how body contact can be considered and facilitated in exertion games. We do this by reflecting on the design of Bubble Popper and analyzing play observations.

Bubble Popper

Bubble Popper (Figure. 1) is a 2-player exertion game. Players are assigned a color, yellow or pink, and must then
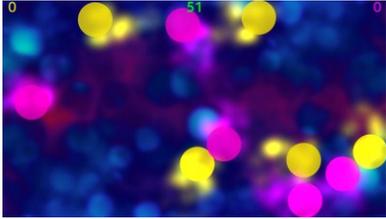
Figure 2. The visuals of Bubble Popper. Two differently colored bubbles, one for each player, a timer (top middle), and a score counter for each player.

pop their assigned colored bubbles as they appear on the projected surface (Figure 2) by hitting the surface with an augmented glove. When hit, a switch within the glove triggers a mounted infrared LED, which then informs a Wiimote positioned close to the projector the glove's screen position. The Wiimote is used as a sensor for the gloves' positions [4]. The Wiimote sends this information to a computer, which causes the bubbles to pop with a rewarding sound. The player who pops the most bubbles of their color within 60 seconds wins.To facilitate this we have made sure the bubbles were not static and instead were moving around the digital projection space and bouncing off each other. This not only supported players to move around to keep up with the bubbles, but also afforded colliding with the opponent and their path. In this situation the players had to choose between moving out of the way and letting their opponent score a point, or blocking their path to prevent them from scoring while also giving them an opportunity to score a point for themselves.

Findings
Through reflecting on our design and observations of play we identified the following aspects that designers should be aware of when aiming to consider and facilitate body contact in exertion games. We also articulate design strategies on how designers can use these aspects in their work to create more engaging exertion games by considering body contact.

Sensing body contact is not necessary to facilitate body contact and may not even be desired
We do not use complex sensors and tracking equipment to sense body contact as we thought it unnecessary. We believe that designing a game that rewards body contact (through assigning points for successful body contact for

example) may hinder the social experience. Another problem with using sensors to detect body contact is the possibility of the sensors not functioning as intended at all times (i.e. not registering body contact). This could disrupt the game and may frustrate players. Lastly, designers might also need to consider different sensing scenarios such as skin-to-skin contact, skin-to-clothes contact and clothes-to-clothes contact, making successful sensing challenging.

Varying physical disparity can facilitate body contact
Physical disparity, being the distance between the input device and the display, is constantly changing and varies between approximately 0 meters (hitting the bubbles) to 2 meters (moving away from the wall), unlike with sensors such as the Kinect, where the physical disparity is usually quite constant. Players have to move towards the display to pop bubbles, and away from it to see which bubble to hit next. This changing disparity facilitated players moving around, fueling the potential for reoccurring body contact.

Predispositions that digital games require players to refrain from engaging in body contact may exist
Our preliminary observations suggest that game designers need to be aware that players may have a predisposition that discourages them from engaging in body contact. We suspect that this could be due to the limited amount of digital games that have supported physical interaction between players in the past. One way of addressing this could be by showing depictions of players engaging in body contact whilst playing, for example as part of an introductory trailer. Another idea could be to dress players in sports uniforms, further cementing the idea that body contact can be a fundamental part of the game experience.

Familiarity between players

Our observations suggest that body contact appears to be facilitated easier between players who are familiar with one another. Familiarity between players and an audience might also affect body contact, as players are performing when playing Bubble Popper, and such a performance might affect and be affected by body contact as part of the experience.

Body contact might lead to aggressive play

We also point out that designers should consider any negative effects body contact may have, such as overly aggressive play. Previous research in sports science has investigated if body contact affects aggression in sports [3]. Although research suggests that considering risk can be beneficial in exertion games [6], limiting the potential for injury should always be priority for game designers.

Future Opportunities

We believe further research that explores body contact between more than two players (e.g. 1v1v1 or 2v2) will expand the understanding we put forward. Furthermore, balancing players who have different physical abilities in body contact games could also be a fruitful avenue for future research, extending prior work on non-contact exertion games [6].

Conclusion

We have presented Bubble Popper, an exertion game that supports, considers and facilitates body contact in digital games. Through reflecting on our design and analyzing observations of play we have articulated what impact physical space layout in relation to digital game elements and physical disparity between input and digital display can have on body contact and how to design games that aim to consider and facilitate it. Our results aid game designers in creating engaging exertion game experiences by guiding them when considering body contact, ultimately helping players benefit more from engaging exertion games.

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