Jelly Polo: True Sport-Like Competition Using Small-Scale Exertion

Mike Sheinin
University of Saskatchewan
110 Science Place
Saskatoon, SK S7N 5C9 Canada
mike.sheinin@usask.ca

Carl Gutwin
University of Saskatchewan
110 Science Place
Saskatoon, SK S7N 5C9 Canada
gutwin@cs.usask.ca

Abstract

Sports video games attempt to be the best possible simulation of their real-world sport counterpart; the graphics are near perfect, the physics are highly realistic, and the in-game statistics of each character closely represent the real-world person they are mimicking. Overall, this has led to sports video games being heavily based on statistical simulations (e.g., how high a shot statistic is determines the success of a shot, not player skill). This takes away from the sport-like aspect of true competition between the players of the game. Jelly Polo is a team-based sports video game which uses small-scale exertion. By providing small-scale exertion, in terms of movement, players can gain expertise development, have individual differences in how they play, and get tired during the course of a game. This makes the game more sport-like and competitive because players have to work to strategize as a team, counter-balance fatigue, and increase their physical and mental skills to win against opponents.

Author Keywords

Sports video games; physical controls; exertion games; small-scale exertion

ACM Classification Keywords

H.5.2. Information interfaces (HCI): Interaction techniques

Jelly Polo

Game Concept

Jelly Polo is a 3-on-3 top-down 2D sports game which plays much like hockey or soccer. Two teams compete to score more goals in a certain time limit. The time limit is decided before each game and can be between 10-40 minutes, including a half-time break (e.g., a 20-minute game would consist of two 10-minute halves). After half, teams switch sides. Jelly Polo is an example of an exergame. An exergame is a game which causes exertion, usually through a unique interface [1]. The movement mechanic is what makes Jelly Polo an exergame.
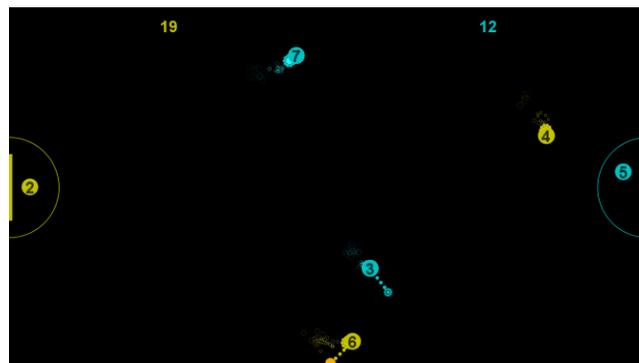

Figure 1. Jelly Polo game in progress (from [2]).

Unlike many other exergames, Jelly Polo only uses a traditional controller. The only controls in Jelly Polo are the left and right thumbsticks. The left thumbstick controls movement and the right thumbstick controls an arm for throwing. Jelly Polo should be in the 'Innovative Game Design' category because of both the movement and throwing mechanics.
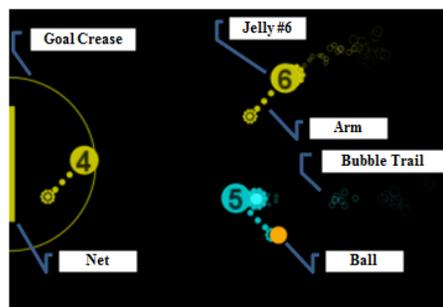

Figure 2. Jelly Polo close-up with annotations (from [2]).

Gameplay Innovations

Usually, movement in traditional sports games involves rate-based controls. Rate-based movement is when the player holds the thumbstick down to one side and their in-game character moves at a constant rate in that direction. This movement scheme makes sports video game different than real sports in three main ways: limited expertise development, lower player differentiation, and no physical fatigue experienced by the player. These three aspects are a major part in real-world sports and are lacking in today's sports video games because of rate-based movement.

Jelly Polo, however, uses impulse-based movement where the player has to constantly flick the thumbstick in the direction they want to move. The player moves faster when they flick the thumbstick faster. This is what causes small-scale exertion in Jelly Polo.

With impulse-based movement, players are able to get better at movement through practice (i.e., gain expertise development in terms of speed and maneuverability), have very different top speeds and levels of endurance (i.e., players have different skillsets), and are forced to change their strategies in each game because of fatigue. This leads to certain situations that would not be found in most traditional sports games. For example, in Jelly Polo, players have no set positions, but we often see players switching in and out of the 'goalie' position because it is less tiring.

Another phenomenon that happens in Jelly Polo is that players can catch up to other players that are on a breakaway. In traditional sports games, only if the character you are controlling has a higher speed statistic than the character on the breakaway can you

have a chance at catching up to them. In Jelly Polo, if you are physically faster (i.e., better) at flicking the thumbstick, then you can catch up to another, slower, player if they are on a breakaway. With this control scheme, we switch the competitive aspects of the game to be controlled by the player rather than by the statistics of characters in the game.

We are not claiming to have invented impulse-based movement, as some games in the past have used similar physical controls (e.g., *Mattel Football,* Olympic games for the NES). We do, however, use this control scheme in a unique way. Old games like the Olympic-style games or *Mario Party* use fatiguing controls like pressing two buttons back and forth as fast as possible, or rotating a thumbstick as fast as possible. The problem with these games is that they require quick as possible movements for short amounts of time. Most traditional sports require constant movement for long periods of time. Players cannot play the games discussed above for long periods of time and no breaks without the chance of injury (e.g., RSI).

What we have created with Jelly Polo is a game that can be played for long time periods. We have found that players strategize against the fatigue, just like in real sports. Players cannot go full speed chasing after the ball the whole game because they will get tired. A well balanced team is one that moves the ball well, picks their moments to rush or play defense, and switches positions to keep fatigue at a minimum.

The other control mechanic in Jelly Polo is precision throwing. Using the right thumbstick, if the player has the ball, flicking the thumbstick will cause the ball to be thrown in the exact direction the thumbstick is pointing.

The speed of the ball as it is thrown is determined by how hard the thumbstick is flicked. This leads to much more skill development in passing and shooting as opposed to some traditional sports video games which only need a single button press to make a perfect pass.

We want to stress, though, that these mechanics (i.e., impulse-based movement and precision passing) are by no means original control mechanics. They have been around for many years, but seem to have been lost in the world of ever-increasing graphics and realistic simulations [2].

Game Modes
There are two game modes in Jelly Polo. The first is the traditional game mode where you can play a Jelly Polo game with 2-6 players for 10-40 minutes. The second game mode is a training mode consisting of three drills. The training mode is meant to help individual players gain expertise development in terms of movement speed, maneuvering, and passing/shooting.

First is a running race where players go from one end of the screen to another as fast as they can. Maximum and average speeds are given so players can track their progress. Second is an obstacle course where players have to go around obstacles to reach a goal as fast as they can. Third is a passing drill where players have to pass as close to a moving target as possible. These training drills were added to Jelly Polo late in development but are key features displaying the ability for players to get better and have different skillsets.

Implementation
Jelly Polo was built with Processing using the proControll library for the controllers. We used a

Figure 3. Jelly Polo title screen.

Windows 7 desktop PC with Logitech Dual Shock controllers for each game session.

Research
Jelly Polo has been used to run three major studies. Each study has brought us more knowledge and gave us valuable information on how to refine and structure the game. In addition, we have created a new category of exergame research, small-scale exertion games which focus more on exertion as a gameplay element rather than health benefits of a full-body exergame.

Our first study was an exploratory study to see what impulse-based movement and precision passing had to offer. Our second study compared impulse-based movement to rate-based movement in terms of engagement and enjoyment of the game. Our third study was to quantify our findings and show that players can get better and have different skillsets with impulse-based controls rather than rate-based controls.

All three of our studies were successful. We determined the three drawbacks rate-based controls bring to sports video games (i.e., limited expertise development, player differentiation, and fatigue) [2]. We also found that impulse-based controls were more engaging and just as enjoying as rate-based controls. Finally, we found that players increased their skills (i.e,. speed, maneuverability, and passing) significantly more with impulse-based controls rather than rate-based controls (e.g., 13% increase vs 1.2% increase, in one case).

Our research adds a new element to exergame research because we focus on exertion as a gameplay element using traditional video game controllers which is not currently seen in the area.

Conclusion
Jelly Polo is a new and exciting gaming experience. By using small-scale exertion in a sports video game, we can have truly competitive and sport-like video games. Games have the opportunity to no longer be controlled by statistical simulations. Picking a better team at the start of a game, which may work well for traditional sports games, can now be eliminated from the process; as now, the players *are* the in-game characters they control. Player speed is based on their physical skills (i.e., strength and endurance) and their passing/shooting is also heavily skill-based. These are aspects that are controlled by the game developer in traditional sports video games, not by the players.

Small-scale exertion can add the opportunity for expertise development, can increase the amount of differentiation between players, and can add fatigue as a major game element. This allows for teams to train together, and increase their skills like real athletes. eSports would be a great arena for games like Jelly Polo where players are essentially athletes.

There were many unique situations that we found with Jelly Polo that cannot be seen in any other current video game. It is truly a unique experience and we hope players and developers alike will embrace what we have learned and use it to their own benefits.

References
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[2]   Sheinin, M. Gutwin, C. Exertion in the small: improving differentiation and expressiveness in sports games with physical controls. *CHI '14*, 1845—1854.