The Design Space of Body Games: Technological, Physical, and Social Design

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Body games
Not Only Technology!

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Problem

First, the technology is in many cases not ready for this responsibility.

Problem (continue)

Second, striving for precise sensing also leads to the technology controlling the users’ body.
How To Approach This Problem?

TAKING PHYSICAL AND SOCIAL DESIGN INTO ACCOUNT

Our **GOAL** is to develop a design approach in which all three factors, the technology, the physical properties, and the social setting, are systematically included in the design of body games.
BodyBug (Oriboo)

Intended to be a tool for exploring movement and dance, devised by Jin Moen.
BodyBug Limitations

- Only movement sensor in the device was a 3-axis accelerometer
- An antenna for wireless communication

Analysis of the situation at hand

Dance It
Dance It Issues

- Two major interaction model issue
  - Participants were found to keep their visual focus mostly directed at the BodyBug
  - Another issue with the game laid in the way the movement recognition interfered with the players' dance activity
Analyzing ‘Dance It’ from a movement perspective

Benford’s analytic model of user movement in relation to a moveable, physical, or mobile system.

Summarise, it is both the interaction design of the ‘Dance It’ game and the computational capabilities of the BodyBug that makes ‘Dance It’ appear as a rather stale and private game, compared to other body games such as ‘Twister’ or ‘B.U.T.T.O.N.’.
Core Design Principles

● Social Control
  1. design technology-supported rather than technology-sustained games

● Physical design
  1. Not use any visual display
  2. The goal was driven by a desire to move players’ focus away from the tiny screen, avoiding the artefact-focused interaction from ‘Dance It’
  3. But also could be reduced by good technology-supported

BODYSTORMING BODY GAMES
BODYSTORMING BODY GAMES

- Explore the design space provided by the physical features of the game setup and the affordances of the BodyBug
- Inspired by traditional body games for children (mainly outdoor games), as well as by ‘Heads Up Games’ in our desire to keep the players’ focus away from the device.

BODYSTORMING BODY GAMES (continue)

Example: “The Mirror”

- The children were paired up facing each other. One was told to play as ‘the leader’ coming up with movements; the other one played as the ‘follower’, mimicking the former.
- No real “winning” (Open game)
- Didn’t told the children what BodyBug measure
- Try to understand how these elements helped in shaping the activity
Example: “The Bomb”
- Players were placed in a big circle and were told to pass an imaginary bomb to each other.
- Used contextual beep sound; a beep that increased in frequency over time, ending in an explosion.
- Game aim was to explore whether a sound cue would be enough to trigger the children’s imagination and create, as suggested by an immersive game experience.

- Workshop place: A dance school
- 20 children aged 8-14 (target audience)
- Included both games that focused on fun and playful activities reported to be enjoyed by children
BODYSTORMING BODY GAMES (continue)

Method to capture data

- Two cameras, and placed them in roughly 90 degrees angle from each other.
- Created a recording where the events in the room could be seen from four directions with a big mirror.
- Videos were analyzed exhaustively to the level of physical description of the movements of singular players in relation to the physical planes in which they were performed, as well as in relation to the unfolding activity in the group.

Observations

- Some movements transcended the local space where they were performed.
- The difference in proprioceptive skills between children in different age groups.
- Players would both collaborate and compete.
- A core strength of the device is the physical design both constrains movement and encourages the user to explore movements that are slightly out of the ordinary.
- The BodyBug was also useful for the players in that it provided them with an excuse to perform ‘embarrassing’ movements, allowing them to not dance ‘well’, and to explore new movements.
- The device would trigger the players’ imagination. Like in ‘The Bomb’
EXPLORING THE ROLE OF TECHNOLOGY

- Find what role will be technology play in body games
- This test was designed to be implementable on the next version of the BodyBug.

Three game designs

- ‘Join My Move’: an extension of the game ‘Dance It’ into multiplayer mode.
- In this game, there is a ‘leader’ placed in front of the rest of the players who performs the movement that they should mimic.
- The main difference between this game and ‘Dance It’ is that it is the leader, rather than the device, who instruct the participants on which move to perform.
- We intentionally introduced mistakes in the simulated judgements, roughly corresponding to the BodyBug’s accuracy in ‘Dance It’.
Three game designs

‘The Blind Mirror’
We placed the participants in a circle. The BodyBug would mark slots of time during which each player would perform one movement. At the end of the round, the BodyBugs selects a ‘leader’ from the group, whose movement had to be remembered and mimicked by the rest of the players as fast and accurately as possible. The ‘leader’ decides who wins.

Three game designs

‘Make My Sound’
• The most playful and self-effacing design
• The BodyBug would play one of a repertoire of three music loops, depending on the movement quality of the player. Players were placed in a circle and told to try to generate the same music as a randomly selected ‘leader’
Three game designs

● Workshop: the same dance school
● Number of people: 13 participants, all of them were in previously bodystorming session
● Method to capture data: two-angle videotaping setup, only one coarse analysis of the videos, questionnaire and post-game interview

Evaluation

1. Designed games did not cause artefact-focussed interaction

For ‘Join My Move’, the two most frequent top choices were ‘My own movements’ and ‘Things and people around me’. By contrast, the two top responses for ‘Dance It’ were ‘The Bodybug’s display’ and ‘the Bodybug’.
Evaluation

2. Sensing limitations of the BodyBug that had previously constrained the game design were addressed in two ways: through reinventing the sensor mapping of player movements to movement qualities (‘Make My Sound’) rather on accuracy of performance, and also through designing games which did not rely on sensor data at all.

Evaluation

3. Goal-oriented: ‘Join My Move’ and ‘The Blind Mirror’. By contrast, ‘Make My Sound’ was more playful. All three games brought fun and enjoyment; however, ‘The Blind Mirror’ was rated as the least fun of the three.

The children (specially the youngest) preferred to be judged by the BodyBug (as in ‘Join My Move’) rather than by another participant (as in ‘The Blind Mirror’). they knew that the BodyBug made more mistakes than the ‘leader’ in the judgment.
Lessons

- The role of technology
- Sensed, Expected and Desired
- Bodystorming versus Playtesting

The role of technology

- The distribution of responsibilities between players and technology is not completely arbitrary.
- In particular, the requirements are different if we design for goal-oriented or self-effacing play.
Sensed, Expected and Desired

The approach proved useful in framing the limitations of our technology, our design goals, and the possibilities for design. In particular, we set our goal to extend ‘the desired’ to cover as much as possible of ‘the expected’ (See Fig 2, c)).

Bodystorming versus Playtesting

- Bodystorming proved useful for exploring the design space of physical affordances, space, and movements, and is also very easy to set up.
- Playtesting proved to be a very useful method to explore how players would organize themselves socially around an implemented functionality.
Conclusions

● When designing such games, the social and physical setting of the game become as important design resources, as the technology that supports the game.
● Designing the role of technology becomes a central design issue

Questions?