i-dentity: Concealing Movement Representation Associations in Games

Jayden Garner
Exertion Games Lab
RMIT University
Melbourne, Australia
jayden@exertiongameslab.org

Gavin Wood
Culture Lab
Newcastle University
Newcastle Upon Tyne, UK
g.wood2@newcastle.ac.uk

Abstract
This paper details the design of i-dentity, a collaborative movement-based game where the game design deliberately conceals the players' associations to a digital representation. While movement-based digital games typically make it clear whose movement representation belongs to which player, we explore how making it ambiguous whose movement controls which representation can facilitate engaging play experiences. We call this "innominate movement representation" and explore this opportunity through our game "i-dentity". The game's setup has each player in a group hold Sony Move controllers, with one of the players' movements controlling all of the Move controller lights. Gameplay involves the group of players with Move controllers trying to perform movements together at the same time in order to conceal from other players whose movements are represented. With i-dentity, we aim to extend the range of multiplayer games with a novel and engaging approach to digital representation of player movement.

CHI 2014, Apr 26 - May 01, 2014, Toronto, ON, Canada.
ACM 978-1-4503-2474-8/14/04.
http://dx.doi.org/10.1145/2559206.2580102

Author Keywords
Movement representation; ambiguity; game design; digital play; social play; engagement; entertainment

ACM Classification Keywords
H.5.2. [Information interfaces and presentation]: User Interfaces – Interaction Styles

Introduction
HCI designers often use unconventional approaches that turn interactive entertainment and interaction design on its head to enable the creation of new and unexpected play experiences, such as uncomfortable, intense and exertion interactions [2, 11, 12]. Strategies to achieve such experiences include creating ambiguity

Fig.1. Playing i-dentity

Fig.2. Players' roles in i-dentity

rather than offering clarity [7], or withholding information to provoke interpretation [13]. This paper explores another unconventional strategy focused on digital play experiences: innominate movement representation. By this we mean a strategy in digital games where the design deliberately conceals whose movement representation belongs to which player.

Movement-based computer games generally utilize digital representations of players' movements, for example, most Nintendo Wii, Sony Move and Kinect games feature digital representations of players' movements on the screen, often achieved through avatars. We notice existing digital games often make the association between movement and avatar obvious, so that players know whose movements control which avatar. This is congruent with established game design and HCI principles that teach that feedback to player actions should be clear and non-confusing [3]. In contrast, we propose that game designers can deliberately make associations between movement and representation unclear and utilize it as a game element for engaging play experiences.

We created a game called i-dentity [5, 6, 8] to explore this opportunity. i-dentity is designed where players' movements can conceal from other players who controls which representation. We use i-dentity to explore how ambiguous player associations to a digital representation can be utilized as a game element to facilitate an engaging play experience. In particular, we focus on movement representation and call the result "innominate movement representation". With regard to innominate gameplay, this inspires questions such as: what happens if technology represented some players' actions but not others, if a player could take control over another player's representation or whether the representation could challenge players to perform their actions together at the same time? What if the challenge in the game centered around a lack of clear relationship between action and representation? For example, where it is not clear whose action is represented on a screen?

i-dentity: Using innominate movement representation as a digital game element

We now introduce i-dentity as a practical example of a game that uses innominate movement representation. i-dentity is a collaborative movement-based game involving four players that benefits from being played in front of an audience (Fig. 1). It is played with a set of Sony Move controllers [14] and no screen. Players assume the role of an interrogator or one of three spies (Fig. 2). The three spies each hold a Move controller. One Move controller is randomly selected by the game to represent the spies' leader. The leader's movements illuminate all three of the spies' controllers, while the spies' movements are ignored. Vibration feedback is discretely sent to the leader's controller when moved to let him/her know his/her role in the game. The leader's role is only known amongst the spies themselves.

The interrogator, whose goal is to identify the spies' leader, conducts or asks the spies to perform movements. For example, we observed commands such as asking the group to jump up and down, they could be asked to "pretend they had just been shot", or to play air guitar. However, the interrogator can only address the spies together, as a group (so the interrogator cannot say "only the person in the middle should jump"). While the leader moves through acting out a command, everyone's light turns on. When the leader is stationary the lights go out. The spies copy their movements in an attempt to innominate the

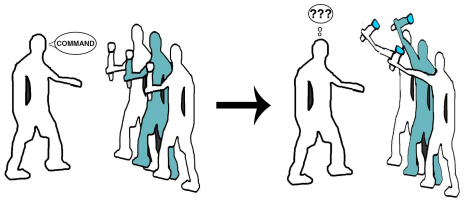

Fig.3. The interrogator commands, "Raise your arm!" The leader and his/her spies coordinate their movements so it is difficult for the interrogator to identify whose movements light up all controllers.

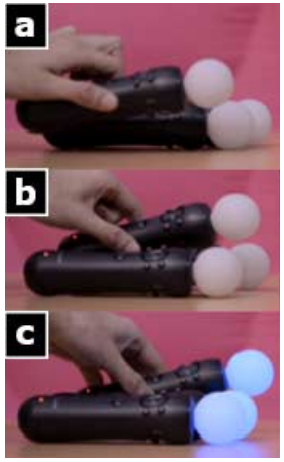

Fig.4a, 4b. Two of the Move controllers do not respond when moved. **Fig.4c.** The movement representation of a third controller is spread across all of the controller lights.

representation so the interrogator cannot work out whose movements control the light (Fig. 3).

The game continues until the interrogator believes she/he knows the identity of the spies' leader. At this stage, the interrogator points towards the leader. The chosen leader waves their controller; if all the spies' controllers illuminate, the interrogator wins and the spies and interrogator switch roles, otherwise the leader and the spies win. Players often agreed upon a limit to the amount of commands that could be asked before requiring the interrogator to select a leader.

Alternative setup: Two teams of three spies
We have also implemented a variation of the system to better accommodate more players by having two teams of three spies (with one team's controllers lighting up a different color than the other team), as opposed to one team of spies and an interrogator. This was in response to players' feedback during playtesting. Teams take turns to give movement commands to the other team.

Implementation
The players' Sony Move controllers are connected to a computer via Bluetooth. When the leader moves, all controllers light up with the same color (Fig. 4c). Controller orientation determines the light's color. Speed, measured from accelerometer and gyroscope sensor values, determines the level of illumination, with fast movements resulting in brighter colors.

Ambiguity as a game design resource

There are many interactive designs that explore practical use of ambiguity to engage people with technological systems [7]. While conveying unclear information is traditionally regarded as a problem to the design of usable systems, Gaver et al.'s work [7] shows how incorporating ambiguity into the design of interactive systems can have intriguing, mysterious, and delightful outcomes, such as the ambiguity of using indirect sensor mappings of embodied interaction (e.g. [1]), or exploring the interpretive space of embodied and situated aspects of interaction that results in physical play facilitating discovery (e.g. [15]). Thus, we were inspired to extend the notion of ambiguous interaction design to the representation of movement to uncover whether having an unclear relationship between movement and representation can facilitate engaging play experiences. We explore ambiguity that is a result of having concealed player associations to digital representations. In our case, ambiguous player associations to a movement representation is achieved by giving only one of the players control of all the Sony Move light representations.

Considering the importance of non-digital elements in movement game design

We learn from the new games movement [4] that we should explore the novel opportunities for play that digital technology can enable. We are inspired by its advocates such as Bernard De Koven [9], who suggests that designers should renew interest in play by reconsidering old playground games and exploring how we play together. JS Joust [16] is an example inspired by this thinking that shows how digital elements can enhance a play experience by retaining non-digital elements of collaboration, light-hearted playfulness and face-to-face interaction. Technological support for such types of physical play experiences is minimal, with an often-increased reliance on player judgement (e.g.[10]). We consider these non-digital elements important to our design for how concealing digital representation can enable new opportunities for engaging play. However, we believe that concealing whose movements are

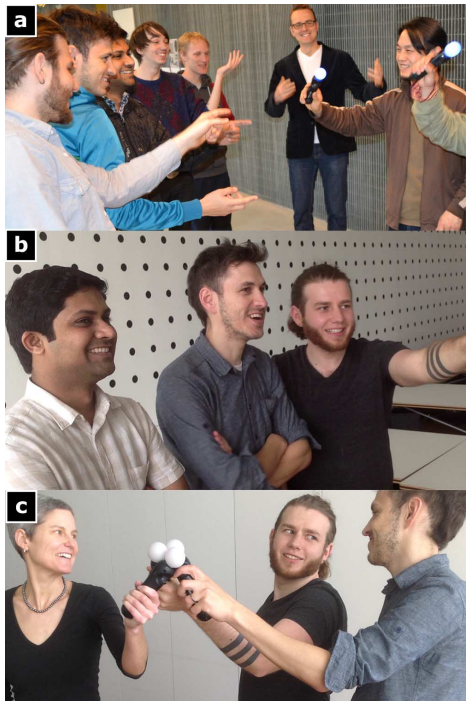

Fig.5: a,b,c. People had a fun, engaging and enjoyable experience with i-dentity.

represented is not something that has previously been considered by designers of digital games.

Conclusion

This paper introduced innominate movement representation as an unconventional form of digital play to facilitate engaging experiences. We detailed the design of i-dentity, a game using innominate representation as a novel game element, where player movements can conceal whose representation belongs to whom. We hope that our work contributes to game design research and practice by providing insights into how innominate representation can be leveraged in future designs of movement-based games.

Acknowledgements

We thank Sebastiaan Pijnappel, Martin Murer and Florian 'Floyd' Mueller for their valuable feedback, assistance, guidance and supervision with i-dentity, and Ruwan De Silva for making the video.

References

[1] Antle, A.N., Corness, G., and Bevans, A. Springboard: Designing Image Schema Based Embodied Interaction for an Abstract Domain. In *Whole Body Interaction*. Springer London, 2011, 7–18.

[2] Benford, S., Greenhalgh, C., Giannachi, G., Walker, B., Marshall, J. and Rodden, T. 2012. Uncomfortable interactions. In *Proc. ACM CHI '12* (2012), 2005–2014.

[3] Crawford, C. *Chris Crawford on Interactive Storytelling*. New Riders Games, 2004.

[4] Fluegelman, A. 1976. *New Games Book*. Headlands.

[5] Garner, J., Wood. G., Pijnappel, S., Murer, M., and Mueller, F. 2013. Combining Moving Bodies With Digital Elements: Design Space Between Players and Screens. In *Proc. Interactive Entertainment '13* (2013), 17:1-17:10

[6] Garner, J., Wood, G., Pijnappel, S., Murer, M., and Mueller, F. 2014. i-dentity: Innominate Movement Representation as Engaging Game Element. In *Proc. ACM CHI '14* (2014).

[7] Gaver, W., Beaver, J. and Benford, S. Ambiguity as a resource for design. In *Proc. ACM CHI '03* (2003), 233–240.

[8] i-dentity video. http://www.youtube.com/watch?v=pLROs4bz4FQ

[9] Koven, B.D. 1978. *The well-played game: a player's philosophy*. Anchor Press.

[10] Márquez Segura, E., Waern, A., Moen, J. and Johansson, C. 2013. The design space of body games: technological, physical, and social design. In *Proc. ACM CHI '13* (2013), 3365–3374.

[11] Marshall, J. and Benford, S. 2011. Using fast interaction to create intense experiences. In *Proc. ACM CHI '11* (2011), 1255–1264.

[12] Mueller, F., Edge, D., Vetere, F., Gibbs, M.R., Agamanolis, S., Bongers, B. and Sheridan, J.G. 2011. Designing sports: a framework for exertion games. In *Proc. ACM CHI '11* (2011), 2651–2660.

[13] Sengers, P. and Gaver, B. Staying open to interpretation: engaging multiple meanings in design and evaluation. In *Proc. ACM DIS '06* (2006), 99–108.

[14] Sony Move controllers. http://us.playstation.com/ps3/playstation-move/

[15] Wakkary, R., Hatala, M., Lovell, R. and Droumeva, M. 2005. An Ambient Intelligence Platform for Physical Play. *Proceedings of the 13th Annual ACM International Conference on Multimedia*, 2005, 764–773.

[16] Wilson, D. (2012). *Designing for the Pleasures of Disputation -or- How to make friends by trying to kick them!* PhD Dissertation, IT University of Copenhagen.