Everybody Dance Now: Tensions between Participation and Performance in Interactive Public Installations

Sarah Webber[1], Mitchell Harrop[1], John Downs[1], Travis Cox[1],
Niels Wouters[1,2], Andrew Vande Moere[2]

[1]Microsoft Research Centre for SocialNUI
University of Melbourne, Australia
{s.webber, mharrop, travis.cox}
@unimelb.edu.au,
john@johndowns.co.nz

[2]Research[x]Design,
Department of Architecture,
KU Leuven, Belgium
andrew.vandemoere | niels.wouters
@asro.kuleuven.be

ABSTRACT

In this paper, we report on *Encounters*, an interactive public installation that provides a basis for studying the effect of dance performances on the emergence of creative, social experiences. Based on observations and interviews with dancers and participants, we identified a range of tensions that arise from integrating a staged performance with participatory interaction. These tensions occurred among both participants and performers, and influenced the social and performative experience. Based on our analysis, we propose several strategies to smoothen the integration of performative and participatory interaction. These strategies reconsider the role of the interactive installation, the effect of digital cues that draw on existing conventions, and mechanisms to direct gaze. We believe our findings and strategies are valuable to HCI researchers and performative artists seeking to design for public participation in interactive experiences.

Author Keywords

Participatory dance; installation art; public spaces

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous. J.5. Arts and humanities: Performing arts (e.g., dance, music)

INTRODUCTION

HCI research has a long history of engaging with the practice of dance (for example, Savage et al., 1978) and choreography (Schiphorst et al., 1990). The emergence of technologies which support movement-based interaction has led to increasing interest in the intersection between dance and bodily motion as a form of interaction with digital systems (Erkut et al., 2015; Loke et al., 2010).

A number of researchers have explored interactive technologies to augment dance performance, as a means

of enhancing artistic impact, and of enriching the social experience of dancing for leisure. The performative work *Chiseling Bodies* (Fdili Alaoui et al., 2013) generates abstract visuals based on the movement of the dancer, to form a virtual "dance partner", while *.Cyclic.* (Jung et al., 2012) enables the dancer to augment performance with music as well as visual display. Focusing on casual dance, *Canvas Dance* (Griggio et al., 2015) responds to the opportunities for interactive systems to augment the social dimensions of dancing.

Figure 1: Dancer and members of the public at *Encounters* (*foreground*); Screen with digital art representing people as coloured dots (*background*).

Our research project *Encounters* explores the effects of incorporating dance performance into a participatory interactive space. A semi-improvised dance was periodically performed as part of an interactive installation at a public arts festival. Through this we aimed to examine the potential of dance performance as a mechanism for motivating and sustaining public engagement with the installation. This paper draws on observations and interviews with participants and dancers to consider how integrating dance with an interactive installation impacts on artists and members of the public. We identify several tensions between performance and participation, and propose strategies for resolving these tensions in the context of interactive installations and digitally-augmented performance.

Performative Interaction with Public Installations

The notion of *performative interaction* has been fruitfully explored as part of research investigating the challenge of fostering engagement with interactive installations in public spaces. It has been observed that encouraging interaction as a spectacle for others can effectively draw an audience and foster participation (Hespanhol et al., 2012). Dalsgaard and Hansen (2008) consider public interaction with artistic installations as a form of

spectacle, and argue that installation users, who are aware that they are performing in front of others, simultaneously occupy the three roles of spectator, participant and performer.

Reeves (2011), through in-depth examination of a number of interactive installations, develops a framework that distinguishes the roles of performers (participants and actors) and spectators (bystanders and audiences). This framework provides a basis for understanding the mechanisms used to attract *bystanders* to become *audience* members, and motivating or inducting *audience* members to become *participants*. The involvement of actors and trained performers has been investigated as a mechanism for guiding or eliciting others' interaction (Bedwell et al., 2012; Reeves, 2011). Most commonly, this approach has been adopted for narrative-based experiences, such as *One Rock* and other installations described in (Reeves, 2011). In contrast, *Encounters* seeks to integrate dance performance into an open-ended interactive experience without defined beginning, middle and end.

Participatory Art and Interactive Technologies
There is increasing research into the potential role of HCI in participatory arts projects, in which members of the public collaborate with professional artists or performers. Such work has examined how digital technologies can support participatory arts (Hook et al., 2015) or enable large scale participation in creative works, such as *Open Burble* (McCarthy et al., 2015). However, research exploring cross-fertilisation between participatory arts and HCI has revealed that the arts discipline introduces its own constraints, as well as opportunities, for public participation (Holmer et al., 2015).

Despite the important relationships between bodily movement, dance performance and public installations which foster movement-based interaction, little attention has been paid to opportunities for combining technology with participatory dance. One important work to address relevant questions, *The Smartphone Project*, demonstrates how mobile devices and media can effectively support participation of the audience in a narrative dance performance (Oppermann et al., 2015).

Encounters responds to the opportunities indicated by these prior works to further investigate the integration of dance performance with a public interactive installation.

METHODS

Design of Encounters
Encounters was an interactive installation designed, developed and hosted in collaboration between HCI researchers and members of an arts college in Melbourne. Installed in a courtyard of the college campus and run over four weekends (7pm-11pm or 7pm-2am) in January 2015, the *Encounters* installation consisted of three interaction spaces and a large screen displaying a series of interactive digital art works. Microsoft Kinect sensors were suspended from gantries above each of the three interaction spaces, pointing down towards the floor; these tracked peoples' movements around the space and detected jumps. Movements of individuals within the

spaces were represented as moving components of the digital art; each artwork offered different aesthetic responses to behaviours such as standing, rapid movement and jumping.
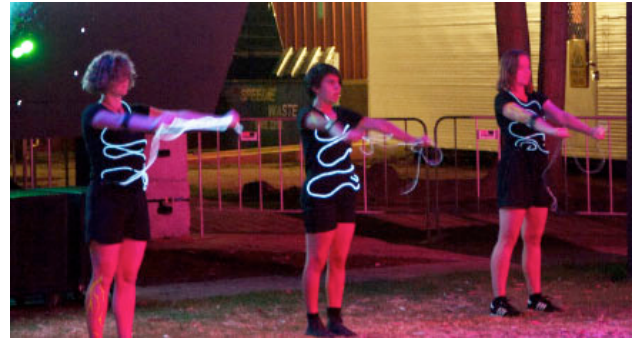

Figure 2: Dancers at *Encounters*

The conceptual approach, artistic creation and technical design of *Encounters* were realised through an iterative, collaborative process between visual artists, composers, dancers and computer scientists. Professional dancers contributed through developing a score (that is, broad guidelines which they would follow, rather than detailed choreography) aiming to demonstrate use of the installation and encourage participation. The dance score consisted of four phases, inspired by the *Cosmic* aesthetic of the audio and visual components of the installation:

1. *Weightlessness*: orbiting limbs and joints, pauses. Performed individually in midst of participants.
2. *Gravitational pull:* becoming heavier, ready for orbit. Performed in the space around participants.
3. *Creating clusters:* forming audiences into groups. Dancers aim to group participants.
4. *Asteroid shower:* rapid movement between platforms, moving to area directly in front of screen Dancers disperse groups then create distance.

Phases 1, 2 and 4 focused primarily on individual dancer performances. However, phase 3, *Creating clusters* overtly aimed to motivating participants to move around in the interactive space, and demonstrating forms of interactivity that participants might not have discovered. As such, it was envisaged that phase 3 would result in increased participant activity, which would then decrease during or at the end of phase 4.

Throughout each run of *Encounters*, three dancers performed for 10-minutes once every half hour. Dancers initially wore 'casual' streetwear, but from the second run wore a coordinated black costume to signal their status as performers (Figure 2). They also wore EL light wires (as seen around the bodies of dancers in Figure 2) and *Myo* armbands, the latter of which detected arm movements and translated them into sound.

The start of the performance was signalled by "digital cues*"* (Hespanhol et al., 2012) including a change in lighting, a 'crash' sound effect, and a 'black-hole' visual effect. The dance was accompanied by digital art, lighting and sound specifically designed to complement the performance. For example the visuals drew from a 'star chart' thematic, representing individual users as small

'dots' on the screen which would exude white lines to connect to other users' representations within a certain radius. This connection line thematic was reflected in the EL wire used by the dancers during their performance. These visuals were more muted and serene than the other works included in *Encounters*.

Data Gathering and Analysis

Interviews and observations
During the four weekend runs of *Encounters* three researchers observed dancers and participants (members of the public who entered the *Encounters* installation area), and conducted interviews. The installation attracted a broad spread of participant demographics (along dimensions of gender, age and social group composition), and interviewees were selected by researchers so as to capture the perceptions of a representative sample. Efforts were made to interview people who participated with particular enthusiasm, and some who observed the installation for extended periods but did not participate.

Observational notes recorded behaviour and interactions of dancers and participants, before during and after the dance performances. Observations and interviews sought to understand whether and how the dance performance impacted participation, understanding, social experience, and creative engagement with the installation. Questions avoided labels such as *dancer* and *art installation* to mitigate response bias. Two kinds of interviews were conducted: long and short, using two different question sets; long interviews typically took 4-8 minutes, while short interviews were as short as 1-2 minutes. A total of 125 interviews were conducted (80 with participants).

Segments of the interviews relating to the experiences of dancers and participants were coded through an iterative process that incorporated perspectives and insights from a dancer, a visual artist and a software engineer. Through this, insights were developed into the impressions of dancers and participants, revealing distinct themes and patterns in the perceptions of these two groups, as described below.

FINDINGS

Participants' Experience
Analysis of the interviews and observational data revealed that the dance performance resulted in both intended and unanticipated impacts on the participants' experience of the interactive installation.

Participants become spectators
Overall, participants tended to indicate that they were unsure as to whether or how to interact with the installation when the dance performance commenced. "When they [dancers] came out… whenever you see someone perform, you've got to move away, unless they tell you not to." [Two Females 18-30]. Researcher observations indicated that participants' activity tended to gradually come to a halt during the opening phases of the dance performance. During these periods, participants would often orient towards the screen, and would often self-organise into a prototypical audience formation, standing side-by-side in a line along the back of the space (Figure 3, foreground). This countered dancers' aim of

encouraging continued activity and demanded additional effort to motivate people to resume their participation.

Participants' activity and learning
In accordance with the aim of the phased dance performance, the third phase resulted in a high level of physical activity and social interaction in the space. Many participants joined in enthusiastically, which led them to create formations with friends and strangers: "*It got better when the dancers came out and we were in the circle and you saw the actual formation and they got us to run around*" [Female 30-50]. However, interviews with participants indicated that watching the dance performance, and even their involvement in the participatory phases of the dance, did not contribute specific learning about how to use the installation: "*The dance was fun to watch, but I didn't learn anything new from it*" [Young couple with child].

Dancers' Experience
Interviews and observations reflected the tensions and difficulties experienced by dancers in performing in a participatory interactive space, and initiating the transition from one mode of interaction to another.
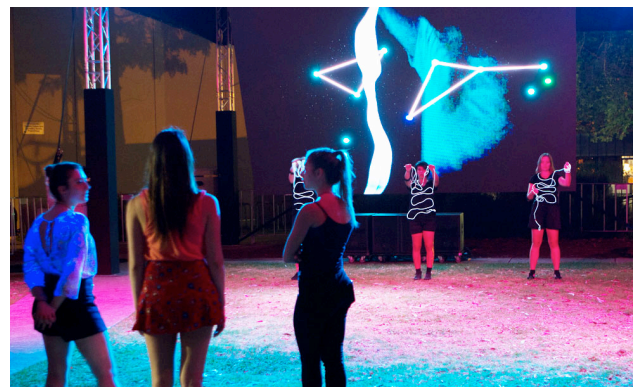
Figure 3: Phase 4 of dance performance

Tensions between performance and facilitation
We observed that during performances dancers appeared to adopt modes of behaviour consistent with theatrical performance. By avoiding eye contact and spoken interaction with visitors, dancers generated a sense of staged performance. However, it was apparent from interviews and close observation that dancers were highly attentive to participants throughout the dance performance.

Through the iterative process of choreography, dancers explored alternative mechanisms to motivate audience interaction. A key goal, as stated by a dancer, was to define a "routine that did not alienate the audience, but encouraged interaction and engagement". It was originally conceived that dancers would use movement to encourage members of the public to form groups and move in formation. Over time the participatory phase of the dance evolved, with input from the broader project team, so that dancers addressed participants verbally, giving encouragement and instructions. Analysis of dancers' account of this shift revealed that artistic tensions were created by the requirement that they act as *facilitators* as well as *performers*.

Dancers were conscious that their entry into the interactive space where members of the public were already happily participating, and the start of their performance in the midst of participants, had the effect of altering the form of interactivity proposed by *Encounters*. This changed again when dancers encouraged the public to join the participatory dance phase, when dancers resumed their scripted performance, and when dancers left the space. Consequently, dancers expressed that a key concern was to approach the public in such a way that would put them at their ease: "the biggest thing is to initially draw people in so they trust me and they can feel safe around me".

Dancers also paid considerable attention to shaping the third, participatory phase of the dance to best manage transitions from one form of interactivity to another: "Maybe we need to construct another way of doing things [encouraging interaction]". However, the difficulty in transitioning between performer and *facilitator* roles was a key theme in the interviews conducted with dancers.

Dancers' interpretation of audience gaze
During the dance performance, participants' orientation and fixed attention to the screen was unsettling for the dancers, as one expressed: "People just focus on the screen... We're not really their main focus". However researchers observed that despite their close attention to the screen many people watched dancers closely, sometimes in their peripheral vision.

DISCUSSION
Our investigation of perceptions of dancers and participants in *Encounters* reveals the challenging social and interactional impacts of weaving a dance performance into an interactive public installation. Dancers in *Encounters* provided an aesthetic performance, but also acted as *facilitators*, demonstrating and encouraging specific forms of interaction with the installation. Evidently dancers experienced considerable tensions in transitioning between these two roles. This research provides new insights into interactions between performers and members of the public participating in an open-ended interactive experience.

Prior work by Reeves (2011) has explored the challenges of fostering the transition from the passive role of spectator to more active participation. In our research, the inverse transition from participant to spectator is found to involve similar complexity. In *Encounters*, the start of the dance performance prompted participants to conform to the pattern of behaviour associated with watching a staged performance. Reflecting on the cues used to signal a dance performance, it seems that effects such as the dimming of lights contributed to the tendency towards reduced participant activity at this point.

During the dance, spectators tended to look fixedly at the screen but simultaneously observe dancers in their peripheral vision in an attempt to watch both *effects* and *manipulations* and understand their interrelationships. This orientation towards the screen was unsettling and unexpected for the dancers.

Strategies for interactive, participatory performance
From the above discussion we propose a number of mechanisms to contribute to an improved experience for performers and participants in installations which combine dance performance with public participation.

System as facilitator
Responding to dancers' experience of tensions between *facilitating* and *performing*, we propose that the work of facilitation might be taken on by the interactive installation itself. Digital cues might be used to prompt participants to model the performers' actions, move in formation, or respond in specific ways to the movements of dancers and other participants. In this way, the system would take on a role which echoes that of a disco DJ, or a country dance *caller* who delivers instructions in an entertaining and upbeat fashion. This allows performing dancers to fully inhabit the artistic role of performer, in contrast to the facilitation roles proposed elsewhere for *actors* (Reeves, 2011) and demonstrators (Friederichs-Büttner et al., 2012).

Cues drawing on existing conventions
Digital cues have an important role to play in the transitions between performative and participatory modes of interaction. To prompt prototypical audience behaviours (such as standing apart from the performer, watching and applauding) visual and audio effects might echo theatrical conventions such as the red curtain, orchestral preparations or, as in *Encounters,* the dimming of lights. In contrast, participation might be prompted by evoking leisure dance forms such as disco or country dancing through lighting, musical refrains or DJ-style calls.

Directing audience gaze
Interactive experiences might be enriched through mechanisms which allow performers to actively guide the audience's gaze and attention. This could be incorporated with existing techniques for enabling dancers to accentuate the visual impact of their movements and interact with dynamic props of their own creation (Fdili Alaoui et al., 2013). Such techniques could be used to emphasise the visual and felt experience of movement (Loke et al., 2010) or to reveal the connections between manipulations and effects (Reeves, 2011).

CONCLUSION
This work supports the approach of including dance performance as a mechanism to motivate social and active engagement with an interactive installation. This paper contributes insights into the tensions experienced by dancers between *performing* and *facilitating*; and by participants between viewing artistic performance and the active, exploratory behaviours encouraged by interactive installations. It also offers design strategies to address these tensions, relevant to researchers and designers of public and artistic interactive installations, as well as those interested in performative dance.

REFERENCES

Bedwell, B., and Caruana, T. Encouraging Spectacle to Create Self-sustaining Interactions at Public Displays. In Proc. PerDis '12, ACM (2012) 15:1–15:6.

Dalsgaard, P., and Hansen, L.K. Performing Perception: Staging Aesthetics of Interaction. ACM Transactions on Computer-Human Interaction 15, 3 (2008) 13:1–13:33.

Erkut, C., and Rajala-Erkut, A. Beyond Command & Control: Sketching Embodied Interaction. In Ext. Abstracts CHI 2015, ACM (2015) 1681–1686.

Fdili Alaoui, S., Jacquemin, C., and Bevilacqua, F. Chiseling Bodies: An Augmented Dance Performance. In Ext. Abstracts CHI 2015, ACM (2013) 2915–2918.

Friederichs-Büttner, G., Walther-Franks, B., and Malaka, R. An Unfinished Drama: Designing Participation for the Theatrical Dance Performance Parcival XX-XI. In Proc. DIS '12, ACM (2012) 770–778.

Griggio, C.F., and Romero, M. Canvas Dance: An Interactive Dance Visualization for Large-Group Interaction. In Ext. Abstracts CHI 2015, ACM (2015) 379–382.

Hespanhol, L., and Tomitsch, M. Designing for Collective Participation with Media Installations in Public Spaces. In Proc. MAB 2012, ACM (2012) 33–42.

Holmer, H.B., DiSalvo, C., Sengers, P., and Lodato, T. Constructing and constraining participation in participatory arts and HCI. International Journal of Human-Computer Studies 74 (2015) 107–123.

Hook, J., Clarke, R., McCarthy, J., Anderson, K., Dudman, J., and Wright, P. Making the Invisible Visible: Design to Support the Documentation of Participatory Arts Experiences. In Proc. CHI 2015, ACM (2015) 2583–2592.

Jung, D., Jensen, M.H., Laing, S., and Mayall, J. .Cyclic.: An Interactive Performance Combining Dance, Graphics, Music and Kinect-technology. In Proc. CHINZ 2012, ACM (2012) 36–43.

Loke, L., and Robertson, T.J. Studies of dancers: Moving from experience to interaction design. International Journal of Design 4, 2 (2010).

McCarthy, J.J., and Wright, P. Taking [A]part: The Politics and Aesthetics of Participation in Experience-Centered Design. MIT Press.

Oppermann, L., Putschli, C., Brosda, C., Lobunets, O., and Prioville, F. The Smartphone Project: An Augmented Dance Performance. In Proc. CHI 2015, ACM (2015) 2569–2572.

Reeves, S. A Framework for Designing Interfaces in Public Settings. In Designing Interfaces in Public Settings. Springer London, (2011), 141–175.

Savage, G.J., and Officer, J.M. CHOREO: an interactive computer model for dance. International Journal of Man-Machine Studies 10, 3 (1978) 233–250.

Schiphorst, T., Calvert, T., Lee, C., Welman, C., and Gaudet, S. Tools for Interaction with the Creative Process of Composition. In Proc. CHI 1990, ACM (1990) 167–174.