Exploring Technology Use in Dance Performances

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The objective of the paper is to critically reflect on how research through design inquiry (Bardzell, Bardzell, & Koefoed Hansen, 2015; Bowers, 2012; Dalsgaard, 2010; Gaver, 2012; Zimmerman & Forlizzi, 2014) can be used to gain knowledge of a new design context within HCI. The paper carefully examines what could be learned and applied by looping iteratively through the interaction design research triangle presented by Fallman (Fallman, 2008). The design context to which this new knowledge was applied to is within area that is difficult to design for, as it focuses on rich movements in dance, and how technology can be used to enhance or bring something new to dance performing arts. Our design inquiry, therefore, using the term we coined – addhance, seeks to either add novel experience of a sort, or enhance a dance performance. In what follows we describe how design triangle was used, what were our own reflections on what we learned from moving, drifting (or dancing) inside the triangle, and how it was used to explore the context until we landed on a design direction. Consequently, we used insights gained to craft using digital materials how human body movements could translate to music. We, thus, wish to explore how the dancers could compose music by moving their bodies. In a regular workflow of a dance performance set up, the music would be chosen prior to work on choreography. Thus, the music leads the choreography, dances and the performance, making a performance into coherent, visual and sound experience. Through the case we explore, we seek to disrupt this workflow and instead, make dancers movements produce music as a primary driver of the visual and sound experience of dance.

The Fallman's triangle aims to integrate the theoretical reflections with design practice and explorations. Within design explorations, we were interested in exploring what was possible, desirable and would contribute to the new knowledge pertinent to the use of technology in dance. In the early phase of design explorations, we engaged in finding a broad selection of exemplars, adding to them short annotations reflecting why they are interesting, what is the technology and its role, aiming to build insight into the design context and inspire novel ideas, not only by combining the elements of interest regarding these exemplars, but also in relation to theoretical and conceptual explorations. To integrate the latter, we had numerous brainstorming sessions, and reading hours to related concepts and theories we could find in the literature with the annotated exemplars and insights gained. These explorations led to the first formulation of our concept: wearing sound. What if dancers could wear sound? What if they generated sounds? Aiming at conceptual maturation, we started rapid prototyping to challenge the concept and its potential, moving towards design practice. The design practice served as means of further developing the design concept. Through prototyping, we could reflect on how to strengthen our concept and further explore its feasibility. Borrowing Fallman's terminology again, we can state that we entered the first "loop" between the design exploration and design practice. Loops represent what sets interaction design research apart from other research: the ability to move between theory and practice flawlessly.

Furthermore, we challenged ourselves to think big, to think how digital design could truly revolutionise the dancing experience, and perhaps learning to dance. The outcome of our research was envisioned as a tool that would enable dancers at dance schools to work with choreography using only their body to compose the music through dance moves. Finally, returning to design studies, we frame some research inquiries based on analytical reflection on the overall process and the context. Therefore, this paper is intended to be the reflective and conceptual work, showcased by a concrete design exemplar.

The design exemplar, Musical Moves, is based on movement capture through Kinect. By watching numerous exemplars of dance performances and carefully analysing how the body parts move, we have developed a language that translates movements into sounds. We have musicalized movements by mapping leg movements with piano notes and hands movements with an audio file that will harmoniously integrate with the piano notes. The final prototype is intended to enhance the choreography, enlighten dancers' movements and bring a new disrupted workflow of both creating and enjoying a dancing performance.

However, our focus was also on strong aesthetic qualities of our digital product, in line with Fallman's proposal that aesthetic is a central part of interaction design research. He sees aesthetics as means of being able to deal with issues of what is beautiful, harmonic and fitting in the digital world. Aesthetics, as we thought of it in relation to our case, implied beauty and harmony of sounds, making up music in this way.

In summary, we have designed a Kinect based system that captures dancer's movements and translates them into a melody. We also, by walking a reader through this example, address how to use research through design in practice, and illustrate generative aspects of this design based approach to HCI (Culén, Mainsah, & Finken, 2014).

References:

Bardzell, J., Bardzell, S., & Koefoed Hansen, L. (2015). Immodest Proposals: Research Through

Design and Knowledge. In *Proceedings of the 33rd Annual ACM Conference on Human*

Factors in Computing Systems (pp. 2093–2102). New York, NY, USA: ACM.

https://doi.org/10.1145/2702123.2702400

Bowers, J. (2012). The Logic of Annotated Portfolios: Communicating the Value of "Research

Through Design." In *Proceedings of the Designing Interactive Systems Conference* (pp. 68–

77). New York, NY, USA: ACM. https://doi.org/10.1145/2317956.2317968

Culén, A. L., Mainsah, H. N., & Finken, S. (2014). Design Practice in Human Computer Interaction

Design Education. In *The Seventh International Conference on Advances in Computer-*

Human Interactions (pp. 300–306).

Dalsgaard, P. (2010). Research in and Through Design: An Interaction Design Research Approach. In

Proceedings of the 22Nd Conference of the Computer-Human Interaction Special Interest

Group of Australia on Computer-Human Interaction (pp. 200–203). New York, NY, USA:

ACM. https://doi.org/10.1145/1952222.1952265

Fallman, D. (2008). The Interaction Design Research Triangle of Design Practice, Design Studies,

and Design Exploration. *Design Issues*, *24*(3), 4–18. https://doi.org/10.1162/desi.2008.24.3.4

Gaver, W. (2012). What Should We Expect from Research Through Design? In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 937–946). New York, NY, USA: ACM. https://doi.org/10.1145/2207676.2208538

Zimmerman, J., & Forlizzi, J. (2014). Research Through Design in HCI. In J. S. Olson & W. A. Kellogg (Eds.), *Ways of Knowing in HCI* (pp. 167–189). Springer New York. Retrieved from http://link.springer.com/chapter/10.1007/978-1-4939-0378-8_8