
Body and Embodiment in Dance Performance

Youhong(Friendred) Peng

Goldsmiths, University of London
New Cross, London, UK
Y.Peng@gold.ac.uk

Atau Tanaka

Goldsmiths, University of London
New Cross, London, UK
A.Tanaka@gold.ac.uk

ABSTRACT

In this paper, we describe the definition of the body being extended by the concepts of other disciplines, such as philosophy, where some define it as decided by the potential of its actions. Inspired by these philosophical ideas of the body, a dance performance, Skin-awareness, was developed to explore and experiment with the body as a self-aware entity, embodying and interacting with artefacts and an immersive environment. The choreographic and technical design are introduced, followed by a composition of the work indicating where this research might lead.

CCS CONCEPTS

• **Applied computing** → **Performing arts; Media arts;** • **Human-centered computing** → **HCI theory, concepts and models;**

KEYWORDS

Immersion; embodiment; phenomenology; dance performance; body; dance and technology.

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Figure 1: Skin-awareness / part 1-1 Equilibrium Between Light and Space; Part 1-2.



Figure 2: Skin-awareness / part 2-1 Immersion Encounter.

1 INTRODUCTION

The body as a significant component in dance performance has evolved through the embracing of interference from other disciplines to seek multimodalities. Phenomenological views of embodiment can be used in dance performance, via the integration of technology and thereby the extension of the idea of what the body itself represents.

Within performance arts, technology functions as a catalyst and has been incorporated with dance performances through sound, imagery and sensors. The diversity of dance performance today, hence, is distinguished by its integration with technology and utilisation of Human-Computer Interaction (HCI).

This paper begins with a brief review of Maurice Merleau-Ponty's (1908-1961) philosophical perspectives, wherein he claimed that perception is changed by action. The body has the ability to alter itself through embodied interactions and can be shaped by habituated experience, instructions and different contexts. Embodied interaction can further be explained as embodied perception from the body. Phenomenal embodiment coupled with improvisation in performance can be used as methods to explore the reaction of the body as a self-aware entity.

2 EMBODIMENT

2.1 Perception From the Action of the Body

Merleau-Ponty proposes that the body's function is to perceive the world [5]. He makes the distinction of two perspectives of the human body, the third person perspective versus the first person perspective [6]. The third person perspective describes the body as a physiological object in the world, whilst the first person perspective represents the body as a self-aware entity, capable of subjective cognition and perception through its interactions with surrounding tangible objects and environments [4]. Meaning that individuals perceive objects by interacting with them for what they actually are, but also that the complete experience depends on the individual's own perspective. There is a constant feedback between the individual and the object, whereby each individual's unique approach to interact with objects may change the nature of the objects themselves.

Merleau-Ponty said "The body becomes the highly polished machine which the ambiguous notion of behaviour nearly made us forget" [4], meaning that people are not fully aware that the body actually exists until it stops functioning correctly. Unlike Cartesian Dualism (mind-body), where Rene Descartes saw the physical body and mind as distinct, and denoted that the mind is immaterial and detached from the physiological body, constituting their own entities [7]. Merleau-Ponty claimed conversely that the idea of the 'lived body' [4], meaning your own body as experienced by yourself, and illustrated that the body as embodied perception has the ability and capacity to extend bodily space through action[1].



Figure 3: Skin-awareness / part 2-2 Immersion Encounter.



Figure 4: Skin-awareness / part 2-3 Immersion Encounter; part 2-4.

2.2 Embodiment and Phenomenology

Embodiment, in the context of performance, is the way the body is, the awareness and the subjective sense of the body [3]. An awareness of this relationship is pivotal to understanding that embodiment is about body awareness and not just being aware of the body. Paul Dourish, a professor of informatics at the University of California, incorporated Merleau-Ponty's philosophical perspective into HCI [2]. Phenomenologically inspired analysis of HCI plays a key role in filling the gap between embodiment and technology. All the interactions that the body encounters with the surrounding environment are embodied perception, while technology helps to enrich the sensory apparatus [8].

Dag Svanæs, a professor at Norwegian University of Science and Technology (NUST), proposed three new concepts in 2000 according to Merleau-Ponty's phenomenology; "feel dimension", "interaction gestalts" and "kinaesthetic thinking" [9]. Svanæs used a driving experience example to demonstrate the difference between feel dimensions, for instance, the auditory, visual and olfactory sensations of driving a car, and interaction gestalts, that is, the nuance of the driving experience based on atomic elements of the feel dimension, which means the composition of the fractions as a whole instead of logical summation. Kinaesthetic thinking presupposes a nexus of the feel dimension and interaction gestalts, exploring expressive variation in proprioception of the musculature. These concepts from phenomenal structure can be used to inspire and anticipate the presence of the body in performance and the relationship between body and space.

Perception includes certain aspects according to Dag Svanæs for instance, 'phenomenal field' (personal experience), 'directedness' (instruction) and 'artefacts' etc. [9]. He claimed that the body has the ability to extend bodily structure through artefacts, and that bodily space changes subject to the potentials of the action. The process of what information the human mind projects can be distorted by past experiences, education, cultural values as well as the specificity of the occasion and information itself.

Our embodied perceptions, visual feedback or other sensations are perceived in the context of situational, relational, dispositional and cultural layers. This perception from action and embodiment plays a key role in understanding body conducted performance.

3 SKIN-AWARENESS (IMMERSIVE DANCE PERFORMANCE)

Inspired by Merleau-Ponty's philosophical frameworks and body related theories, the first author produced an interactive performance, aiming to explore the dancers' body as embodied perception and the changes in the immersive space. Embodied perception is represented by the phenomenal field and perceived bodily space. Three divergent settings were engineered in the performance to experiment with the capacity of bodily territory and space using immersive projection and light media, and via the interaction between body actions and the space itself.



Figure 5: Skin-awareness / part 3-1 Splitting the Space; part 3-2.

3.1 Artistic Concept and the Performance Score

This performance is six-minutes long, with a score being separated into different settings for the dancer to experience the changes from their body when the space has been shifted into parts of embodied perception. Improvisation has somatic implications, acting as a language, enriched by expressivity of gestures and awareness of the role of technology. In this case, technology which consisted of animations and lighting is fused to the dancer's improvisation. The reaction of the body was presented in different stages in the performance while the surrounding environment caused pressure on the body to react differently. The body/skin as entity provided first person perspective and the capacity to make choices under the influences of the dancer's conscious mind.

3.1.1 Part 1 - Immersion Encounter. The first scene immersed the dancer via altering the visual elements that surround the body. The moving elements morphed from fluidic black and white textures into a roaring arched structure (Fig. 1 left). Meanwhile, the body altered from the state of stasis to ecstatically pushing the body upwards and downwards repeatedly along with the swirling lines and melodic movement (Fig. 1 right).

3.1.2 Part 2 - Equilibrium Between Light and the Body. Different stages made the dancer's body react differently, from the first surrounding moving image to the second stage, which was the composition of the variations in the lighting and lasers. To achieve this a number of lighting patterns were engineered, such as the discontinuous lighting jumping in sequence from the circular structure (Fig. 2), turning on the full sequence (Fig. 3), fading in and out. The lighting design, as a part of the score, were scripts for the dancer to sense intuitively and to interpret naturally. The feel dimension, interaction gestalts and kinesthetic thinking, were forming a kind of 'neural network' in order to aid the body to act as a conscious entity.

In the next half of the second part, the dancer's movements varied from twisting to swiftly moving position while the body sensed the flowing light, from standing on the edge trying to respond with their body against wall to under the structure in the centre when the circle light was illuminated. The laser patterns formed a network to enable the light to communicate with the body (Fig. 4 2-3). The light drove the dancer's body into shapes that were beyond the score. The space occupied by the body was changed every second with the action of the dancer (Fig. 4 2-4).

3.1.3 Part 3 - Splitting the Space. A light beam was shot from the ceiling. During this the dancer had a one-way see through mirror which could be used to improvise and split the space into a different geometric volumes with a solid light beam (Fig. 5 3-1). The dancer's responses varied, sometimes reflecting the light to the audience, to themselves or fleeing away from the beam light. That wash of light embodied by the intention of the body became part of the body (Fig. 5 3-2). Perception can be interpreted through the potential of the action.

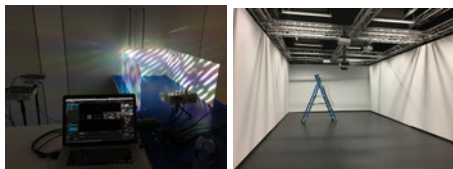


Figure 6: (Left): Small simulator for the immersive space; (Right): Sonic Immersive Media Lab with five projection screens.



Figure 7: Concept design rendered in Cinema4D.



Figure 8: (Left): Installation sketch; (Centre): Fusion 360 rendering; (Right): Static stress simulation in Fusion 360.

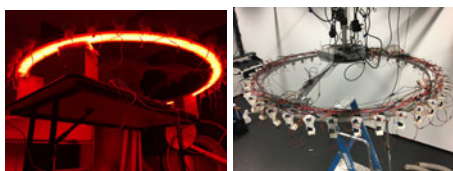


Figure 9: (Left) Light testing; (Right) Final installation.

3.2 Prototyping

3.2.1 Immersive Space. A small scale simulator (see Fig. 6 Left) of the immersive space from the Immersive Pipeline project were used for the test of this project (AHRC funded research project led by Prof. Atau Tanaka). The configuration is model to the actual performance venue, Sonics Immersive Media Lab (SIML), where all five projectors (Cannon WUX450ST) were mapped and adapted on the five white projection screens. As seen in the Fig. 6 (Right), it was an open 'U' shape space, audiences were allowed to sit outside of the performing space in terms of the perspectives of the projection images. The multi-image system was connected to two Matrox TripleHead2Go display ports, then to a Mac Pro in order to create a long narrow canvas in MadMapper.

3.2.2 Fabrication of the Structure. In order to manufacture the structure pictured in the sketch (Fig. 8 Left), both concept design and a fabrication structure model were engineered. The concept design was modelled and rendered in Cinema4D (see Fig. 7), where I contextualized and visualized the laser patterns to prepare for the simulation in the program. The fabrication structure was modelled (see Fig. 8 Centre) and simulated in Fusion360. Static stress was modelled to evaluate the weight that has been applied to the two supports (Fig. 8 Right).

3.2.3 Hardware. There were intricate physical computing designs, including 3D printing the tilt-pan modules (adapted from Thingiverse, an online 3D printing community, see: <https://www.thingiverse.com/thing:2467743>), assembling, installing light strips, schematic design, electricity design.

The forty motorized laser modules assembly were comprised of a hundred and sixty components. Each module was equipped with five parts including the connection, foundation, pan, tilt and laser holder. The connection part was used to connect the individual module with the structure and was designed in Adobe Illustrator and cut by a laser cutter.

There are two programmable LED light strips equipped with six-hundred pixels installed in the chamber of the structure (see Fig. 9 Left). For all to be assembled and functional, a few external power supplies were needed and two Teensy microcontrollers were utilized to control the data transmitted from bespoke software programmed for the project (Right).

3.2.4 Software Design. The software was developed in OpenFrameworks to control the peripheral devices including the DMX lights, eighty servo motors, six-hundred LED-pixel light and forty point lasers. This programme included multiple add-ons and protocols, for example, ofxSerial, ofxOsc, OfxIO, ofxPoco, ofxGUI and ofxDMX. Besides, there were three wash lights and one beam light in this performance, which were connected in serial addresses through a DMX to USB converter to a laptop. The graphic user interfaces (GUI) for different functions of each light were also designed and programmed, and were used in the rehearsals.

4 DISCUSSION AND CONCLUSIONS

In "Skin-awareness", the dancer's body communicated with the immersive space, extending the dancer's sensory apparatus. This project explored the relationship between the body and space, and experimented with the capacity of the body while interfering with elements that change the surrounding space. The body is not only an entity, but also an action, an experience and an embodied perception.

The main purpose of this paper was to analyse methodologies of coalescing philosophical concepts of the body into practice. The body being interpreted as the potential of actions offered us a novel perspective to inspire and guide artistic development. The technologized body can be regarded as a format of embodied perception. This gives body-dominated performance space to accommodate future technologies.

The body became a part of the immersive structure in the space, an extension of the philosophical ideas of embodiment, and an instrument to intertwine with lighting fixtures. The concept of the body itself benefited from the philosophical definition that action and the body are inseparable, which further exemplifies that some philosophical principles aid artists and choreographers to interpret, bridge and analyze the way they use the computational methods and mechanical compositions in body dominated performance.

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