

Towards People Based Movement Interaction and KinAesthetic Interaction Experiences

Jin Moen

Interactive Institute Share Studio; and School of Computer Science and Communication, KTH
PO Box 24081, SE-104 50 Stockholm
+46 8 783 24 75
jin.moen@tii.se

ABSTRACT

Despite a long tradition of user centred human computer interaction design, movement interaction, as it is still in its early phase, could be described as technology driven. This paper suggests taking the starting point in personal experiences as well as theories, of modern dance and body-centred philosophies, when studying human movement in order to inform people centred movement interaction design. Taking this approach also implies designing for a kinaesthetic interaction experience that includes the aesthetic part of kinaesthetics.

Keywords

Human movement, kinaesthetic interaction, modern dance, aesthetic experience, the lived body, somaesthetics.

INTRODUCTION

During the recent years human computer interaction (HCI) and related fields as computer supported collaborative work, interaction design, and participatory design, have experienced a shift of interest from efficiency, functionality and usability, towards an increasing interest in designing for user experiences in general and experiences that are aesthetic, affective, emotional and embodied in particular [e.g. 4, 6, 11, 12, 13]. These aspects have become even more central and important as technology becomes more pervasive, ubiquitous and personal, and thus a self-evident and non-reflected part of our everyday lives. They are also a natural consequence for interaction design when our concern with artefacts is focused towards their presence rather than a well-defined use [6].

Despite the user centred and participatory design perspectives applied within HCI, one can still ask, however, to what extent people really are the starting point for interaction design and technology development. To what extent do we consider important aspects of human life as emotions, feelings, affections and (un)conscious actions, and not just cognitive skills, behaviours and physical abilities and disabilities, when choosing the point of

departure for user centred interaction design? Without necessarily trying to answer the question posed, this paper discusses some of the issues in relation to an area of HCI that is still in its quite early phase, namely full-body movement interaction, and more specifically what we call kinaesthetic movement interaction.

Movement Interaction

Human bodily movement interaction has often been reduced to only include gestures, hand movements or facial expressions. Along with the development of inexpensive and easy-accessible computer vision and motion capture technologies, the number of full-body movement interaction applications have increased both within research and commercial contexts.

However, most of the applications found within this field could still be described as technology driven or at least based on what the technology is able to make use of as input. Further, the output or feedback provided is most often vision or audio based. In the approach argued for here, we would like to explore how and if it is possible to use movement both as input and output, which implies making use of the body as a haptic display, and thus making use of the human kinaesthetic sense.

We propose to use modern dance and thus human movement, as starting point for people centred movement interaction design. Further, by drawing upon philosophy of dance, the body and aesthetics, we discuss the potential of preserving aesthetic interaction and aesthetic experiences in human computer movement interaction. We also briefly describe the kinaesthetic movement interaction prototype BodyBug that has been designed and developed using people's experiences of performing modern dance as the starting point for its interaction design.

MODERN DANCE AS THE STARTING POINT

In this work we argue for making use of experiences of modern dance in order to increase the understanding of human movement, as the dance perspective offers a possibility to study and discuss human movement from "within". Meaning that in dance it is human movement that is the main interaction modality, the design material that is used to express and communicate with the environment. Or in other words, "human movement is the material (ground) and unique aesthetic matter of dance" [5, p. 49].

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When people experience dance, both as performers and spectators, the experience includes affective and emotional as well as aesthetic aspects of human movement. And as “man has always danced” as recently discussed by Sheets-Johnstone [14], dance could be seen as a basic activity of human life, concerned with human movement.

Dance is, as HCI, a large field including a variety of related disciplines. In this work we are concerned with dance in the meaning of performing art, in contrast to ballroom dance or social dance, like waltz, jive, etc. We also are placed within the tradition of modern and contemporary dance, as different from e.g. (classical) ballet. Modern dance provides a great framework for exploring and increasing our knowledge of human movement [10] even taking into account people’s individuality and expressiveness.

Using experiences of dance and thus human movement, as starting point for movement interaction design, also contrasts other approaches that are based on the mere mechanics of human movement or ergonomics. This also includes approaches that are rather technology driven and take the starting point in what computers and technology are able to perceive or make use of as input. Laban Movement Analysis (LMA) is an example of a theoretical framework based in modern dance that in several cases has been used to inform movement interaction [e.g. 16]. However, in taking this approach the subjective experiences might be lost, as people often experience “objective” notions like flow and time differently.

Dance and Interaction Design

So, what makes dance suitable as starting point for movement interaction design, in addition to its obvious concern with movements?

What unites the dance approach with the shift of focus from usability to experience within HCI is the emphasis on the aesthetic interaction and the “non-functional” perspective. By non-functional we mean doing something for the sake of its own or just for the pleasure of it, without having a functional goal or solving a given task. Applying a dance perspective on human computer movement interaction design also provides us with a direct focus on the body and human movement. What is human movement? How is human movement perceived or rather apperceived? What makes people move?

One main difference between human movement and moving objects is that human beings can have an intrinsic reason for moving. Objects on the other hand, need to have something that initiates their motion. Human movement is often a result of an intention within people. In anthropological studies of human movement, there has recently been a shift towards considering human movement as dynamically embodied actions, rather than behaviours that is possible to observe from the outside [2].

AESTHETIC INTERACTION AND EXPERIENCE

The notion of experience is a complex and well-discussed issue within philosophy and consequently even within HCI related disciplines. There is currently no cohesive theory of user experience existing in the design community [4]. When including the aesthetic perspective in the notion of user experience and interaction, the picture might get even more complex. In this section we will introduce phenomenology and somaesthetics as two perspectives that could contribute to the discussion of aesthetic interaction and experience in relation to movement interaction.

Phenomenology and the Lived Body

Phenomenology is a perspective often referred to when discussing the body. It is also a perspective that is increasingly used within technology development [6]. Fraleigh [5] however, develops the phenomenological concept of the lived body in terms of dance, and makes use of existential phenomenology to give account for the relation between *the self*, *the dance* and *the other*.

She claims that dance is not self-expression and that skilled dancers have the ability to express the dance and through that, move (emotionally) the other, i.e. the audience. However, as the dance cannot exist without the body, the body as such expresses the whole time, through its movements or mere physical presence.

Further, Fraleigh stresses that dance and thus human movement, is perceived through the body of the viewer and on an experiential and kinaesthetic level, which precedes words. A phenomenological definition of dance as art is proposed as “human movement created and expressed for an aesthetic purpose. [...] Dance is unique as art through its material condition, which (I continue to stress) is lived through the body and valued through the body” [5, p. 49].

Merleau-Ponty is one of the few contemporary philosophers concerned with the body, and thus often used as reference on the lived and perceived body. However, talking about dance he reduces this to a “motor-habit”, obviously lacking self-experience of dance. Having this perspective he also misses a crucial elemental aesthetic distinction central to dance, namely the distinction between the dancer moving through a form and a form moving through the dancer [14].

Somaesthetics

Baumgarten, who coined the notion of modern aesthetics and defined it to be a philosophical science of sensory cognition that includes both practical and theoretical training, also introduced a neglect of the human body into aesthetics [15]. This neglect might seem odd as our senses certainly are intertwined with the human body. To Baumgarten’s defence, however, it might be possible that his bodily exclusion was due to religious motives of that time (about 1750) as well as a heritage of Descartes’ error, to use Damasio’s words [1], of separating the body and the mind.

As an attempt to reintroduce Baumgarten's definition of aesthetics as a discipline that goes beyond today's narrow perspective of beauty and fine arts, and that includes both theory and practice, Shusterman has proposed a body-centred discipline called somaesthetics [15]. This discipline is also an attempt to end the neglect of the body within aesthetics, and rather advocate the use of one's body as a locus of sensory-aesthetic appreciation.

Shusterman's framework (in which he names dance as a somaesthetic art par excellence) draws upon pragmatist aesthetics and contemporary philosophers as John Dewey and Michael Foucault. Somaesthetics and pragmatist aesthetics have also been suggested as usable in the discussion of aesthetic interaction and user experiences in design [7, 12].

Aesthetic Interaction

But, if we experience our surroundings through our senses, does that mean that all experiences are aesthetic, applying Baumgarten's sensory definition of aesthetics?

The theory of somaesthetics is concerned with the immediately felt experience, and that is why it is philosophically relevant. Fenner however, points at the difference between aesthetic experiences and aesthetic analysis, and claims that without an imaginative or associative activity, an experience is not aesthetic but of mere pleasure [3]. Similarly, Fraleigh claims that "aesthetic values are founded in subjectivity, they have their source in *felt life* – or I could say *sentient life*" [5, p. 44], which could be said to be in line with Baumgarten's sensory aesthetics.

A DESIGN CASE: BODYBUG

BodyBug is a movement interaction prototype that has been designed on basis of an ethnographically informed study of people exploring human movement through participation in a dance course based on modern dance methodologies [8, 9]. The prototype consists of a case running on a plastic covered wire that has attachments made of Velcro at each end, in order to wear it by attaching it onto your body in an optional way (see Figure 1). When the case, which contains mechanics and electronics, is moved in space, it will move for a set time and direction along the wire, depending on how it is programmed regarding input/output.

When designing BodyBug we wanted to focus on the movement interaction per se, and to consider design implications that arose from the dance course: using the body as display for movement input and output, working with movement impulses, utilizing the interaction space immediately surrounding oneself, taking account of individual differences in movement patterns, and designing for the mere pleasure of motion. The participants on the

course expressed through interviews that they had had an experience of being able to feel beauty in their movement, i.e. an aesthetic experience; sensing their bodies, and they had found new ways of moving and make use of their bodies. They also expressed the insight of people having very individual movement patterns and qualities of motion, as well as an increased consciousness of their own movement pattern.



Figure 1: BodyBug
(Photo: Peter Knüttsson)

Even if BodyBug was not aimed to solve a given problem or to be used in a specific context, the interaction intentions we had when designing BodyBug were that it should encourage and trigger movements and provide a possibility to sense one's (kinaesthetic) body and to move in new ways. Another issue was to make the "interaction task", i.e. to make BodyBug move, the main focus, rather than what kind of input, e.g. specific movements, that was needed in order to make it move. Making the prototype was also a way to gestalt our research questions and concerns with kinaesthetic movement interaction, as well as being an example of a "functional artefact without functionalities".

Qualitative observations of people interacting with BodyBug show a great variety in ways of interaction and different movements. People also adjust their interaction and approach the artefact depending on their idea of "what it is" and "how it works". When BodyBug starts to move several users get surprised, as if they had not expected that to happen. Despite its neutral appearance, people interacting with BodyBug, soon start to talk to it in terms of "come on", "not that way", etc. The interaction BodyBug creates engages not only the mover but also the audience as they often make comments on the movements and the interaction created by the user.

MOVING ON

So, how can we make use of experiences from philosophy of the body and movement, as well as modern dance to inform human computer interaction design?

The relation between the dancer, the dance and the other, presented by Fraleigh, provides an interaction model that could be applied to human computer interaction. When computers and computational objects tend to be more human like in their behaviour, the computer could be considered as "the other". How we will communicate and interact with the computer depends on how and what we know about its possible reactions and responses to our actions, as in everyday human communication and interaction. What we expect of the computer will be framed and shaped by its embodiment, its bodily appearance and presence, and thus its "body language".

Today, it is too often the user that is looked upon as “the other” and thus needs to adjust to the interaction possibilities provided by the computer, or rather the interaction designers, programmers and engineers, and their (sometimes too specified and narrow) idea of “what it is” and “how it should work”. As a consequence, we are almost too well used with certain interaction forms that we hardly are able to question or to imagine alternatives to. For this reason we need new approaches to interaction design, that open up for new insights and throw away or at least provide alternatives to old interaction paradigms and metaphors.

When trying to look into the future it might not be possible to predict what human computer interaction will look like in ten years. However, what we should strive towards is an interaction design that is based on how people interact in order to avoid interaction that is derived from, based on or defined by technology. In other words, develop technology that can adjust to the desirable and various interactions of human beings. Using dance to inform our work, we can find inspiration in Fraleigh’s description of dance and apply it to interaction design:

“The dance begins with the choreographer. It is he who originally envisions the aesthetic values of the dance – values made up of movement lived through the body, unavoidably implicating the sentient self. The choreographer creates through his own movement or that of the dancer and through his own power to imagine (give image to) dance movement. Often the choreographer and the dancer are one and the same, or the choreographer may constitute the dance as he makes the dance for someone else. The dancer always gives the choreographer’s composition visible form and interprets it.” [5, pp.49-50]

With this in mind, we might hope for a future where it is possible for each user to “choreograph” a desirable full-body movement interaction with computers and computational objects. An interaction that is aesthetically, pleurably and functionally satisfying, giving room for individual differences and aesthetic interaction experiences.

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