Some themes in bodily interaction

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Abstract

We identify and reflect on a number of themes that we argue has been underexplored in embodied interaction research. This work is based on findings from own design work and studies of artifacts for bodily forms of interaction in leisure oriented contexts, together with related theoretical and empirical literature. Three themes are discussed: the temporality of bodily experiences, the difference in scale of bodily interaction, and the social construction of bodily experiences.

Keywords

Embodied interaction, leisure activity, bodily engagement, leisure activities

ACM Classification Keywords

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction

People's movement and interaction with specialized artifacts in leisure activities are often highly engaging and joyful, complex, precise, and people may spend a lifetime perfecting a particular movement. What we find particularly intriguing with such practices is that it seems that through the artifacts people use, they are put in touch with, and are able to experience and see the physical world in essentially new ways. Looking at skateboarders' creative usages of skateboards on the different surfaces and artifacts in city spaces, they seem to see infinite opportunities to invent and try out new tricks, and similarly, golfers walk around their surroundings and see potential golf holes or exciting golf shots in the nature around them. The question that our work evolves around regards how we could design interactive artifacts for bodily interaction that had similar properties? What if we could design artifacts that provided for a similar kind of long-lasting physical-bodily engagement and for possibilities of similar kinds of personal development and social interaction?

We argue that people's bodily experiences and how they see and relate to the artifacts they use in such leisure practices offers one path towards understanding

some of the critical experiential qualities that could be used designing leisure oriented technologies for body and movement. In our work we are using this as a starting point to develop an understanding of the *body in embodied interaction*.

We aim to arrive at a conception of bodily interaction that accounts for the body. not as a device for interaction, but as an existential/experiential entity. Such a conception would support a way of considering the body in interaction, no matter if it was about ways of moving around technology or simply being still. The conception should allow us to effectively design for and take the human body into account in design, not only for the sake of manipulating a device. This resembles the arguments of embodied interaction as put forth by Dourish regarding how design must account context, social interaction and body not as separate entities but as an integrated system. In this paper we identify and reflect on some themes that we find to be critical for such a conception.

Background

Much HCI research is currently turning its attention towards "the body" and how to design for the body in interaction. How to explicitly design for bodily aspects of interaction has been explored in a diversity of areas such as for dance & performance [7, 12], health & well-being [10], to for movement-based interaction [3], bodily musical interaction [9], gaming interfaces, sports training aids [14, 8], gesture based interaction emotional interaction [16], bodily social interaction [5]. Most successfully perhaps, gaming consoles such as Nintendo Wii and Microsoft Kinnect has led the way in this development together with the increasingly growing market for sports technologies such as the

Nike+ running sensor. This development is paralleled by a number of technical and intellectual developments in HCI research, such as the fast growth of cheap and accessible sensor-based interaction technologies, and the interest in grounding interaction design in phenomenological and pragmatic philosophy that resist mind/body dualisms.

Through Paul Dourish's [1] seminal book, the concept of embodied interaction has been established as a way of conceptualizing interaction as a social, bodily and practice phenomenon. The arguments of embodied interaction as put forth by Dourish regarded how design must account for context, social interaction and technology not as separate entities but as an integrated whole. Dourish drew on the phenomenological philosophy of Husserl and Heidegger, to conceptualize human meaning making in relation to interactive technology. Despite the use of the term "embodied", in Dourish's original conception of embodied interaction, there was no specific elaboration on the qualities of the body and its relation to interaction. Instead, drawing on the ethnomethodogical tradition introduced in to HCI by Lucy Suchman, Dourish emphasized how meaningful interaction is formed through interplay between social, material, and bodily practices. Through the contextually rich perspective of embodied interaction, aspects of the body are occasionally brought to the fore depending on their role in the meaning making practices under stu8y. However, as argued in much recent work, HCI need to further develop an understanding of how to specifically design for bodily aspects of interaction [11, 6]. Examples of studies with specific focus on bodily experiences include Höök's [4] autobiographic study of horseback riding and Tholander & Johansson's [11] study of bodily experience in golf and skateboarding.

These had the specific aim of drawing out design qualities is the actual purpose of the studies.

Scales of bodily interaction and the interplay between the small and the large

Many perspectives of the role of the body in interaction and HCI focus upon it through what is happening in the immediacy around the body at each instant, or in the immediate interaction with artifacts. Two approaches that has influenced HCI that illustrate this interest in the minute comes from, firstly, analysis of social interaction and the descriptive accounts of how it the interplay between talk and body, and secondly, notations for dance choreography. The vast amount of work studying practices of social interaction have attended to the moment-by-moment details of bodily action such as gesture, gaze, and body language and how these play out in conversation and meaning making in a number of different social practices. Similarly, Rudolph Laban's notation for systematic descriptions of bodily movement in dance has brought attention to the fine-grained aspects of bodily movements and positions. These approaches have turned attention to the minute details in how we use our bodies in interaction design. Tholander & Johanssson's [18] exemplifies this in their study of how practitioners of leisure activities such as golf and skate attend to the small details of bodily interaction. Much of their experience involves paying sensitivity to nuances and tiny details in body position, body movement, and changes in material circumstances. These aspects need to be taken as integrated facets of a constantly changing relationship between body, artefact and physical space in the making and unfolding of experience. What more rarely has been considered in HCI, concerns aspects of the mobile body and how

perception and experience is constructed through bodily engagement and movement occurring over longer stretches of space and time. In the literature on location-based interaction, aspects of mobility, space and place and in relation to novel technologies have been widely discussed. This has lead to important insights into how technologies contribute in forming new kinds of spatial and location-based experiences. However, the role of the physical body and movement through larger spaces are more rarely taken as a point of departure in studies of mobility and location-based interaction (see [2,13]). In the following, we attempt to outline some aspects that contribute to a conception of bodily interaction that also takes the relation between the physical body and the larger spatial aspects into account.

In studies on people's perception of large environments the relationship between body and place has been analysed. Spinney's [15] ethnography on the experience of cycling up the Mont Ventoux in France at over 2000 meter above sea-level serves to pin-point the kinesthetic basis of people's perception of a place and space. Spinney argues for how cyclists develop an experience of the landscape of the mountain not primarily through visual experiences and representations, but through an engagement with all the body's senses. In particular he emphasizes the role of the increasingly intense kinesthetic sensations from the straining and exhaustion of the body, such as the muscular pains, strong breathing, and tunnel vision. What guides the cyclist through the landscape is not primarily what is perceived through the visual sense, but just as much the kinesthetic experiences, i.e. what is felt in to body, such as temperature sensing, pulse, and lactic acid. In ascending the mountain there is an

array of senses that go in and out of the cyclists focus in building up the experience of the mountain landscape. Spinney, points to how the senses are "reprioritized " in the project of moving up the mountain. The senses that become peripheral or central at a particular moment are rarely obvious, for instance in orienting towards the cool of the shade the visual sense might get relegated in favor of other senses such as the bodies sense of temperature.

Understanding the body in interaction need thus also be looked upon from the point of view of the movements of the body as well as how the body moves around in the world. We have to consider how perception and bodily experiences are built both out of the movements of the body and how the body moves in world.

An interesting example including mobile technology that touches upon the relationships between bodily experiences and how movement in a large physical landscape is Ferreira and Höök's s [2] study of novel mobile phone users at the Vanuatu islands in the Pacific Ocean. They reveal the some of the ways that the people adjust their bodily conduct in order to coordinate their interaction with the technology and their everyday endeavors. These adjustments range from the small scale of involving for instance subtle bodily repositioning with respect to the artifact and surrounding circumstances such as water, sand, and vegetation, to the larger scale of moving to different locations on an island to find the best possible network coverage. This resonates some of Shklovski et al's [13] findings in their studies of gps-tracking of paroled sex offenders wearing a device that sends an alarm whenever they trespass into areas within a certain distance of schools and pre-schools. They showed how
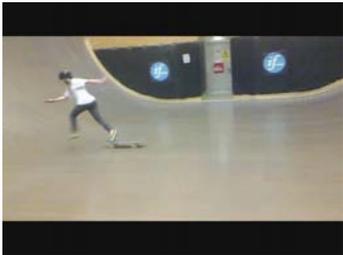

Figure 1. A beginner skater losing balance as the curve of the ramp changes from vertical to horizontal

the gps-device structured not only their immediate choices how to move around a particular area, but the wearers' actual choice to only visit some parts of a city, and even avoiding whole cities due to the fact that the technology made it too complex for them to move around.

What we would like to point at here is how bodily interaction and experience need to looked upon as occurring in different scales. Interaction and experience is happening both around the body as well as with reference to the larger physical space. While most work in designing for bodily interaction has focused on the smaller scale interaction close to the body, the larger scale bodily action and interaction need also be included as a dimension to a conception of the body in interaction that puts the body in a situation at core.

Temporality

In our studies of golf, skateboard and body bug users a critical issue that repeatedly came up was the timing between bodily action, in relation to the physical world and the responses from artifact. For instance, in skateboarding, shifting the weight of the board need to be made at exactly at the point where the ramp goes over from the bent to flat ground (see Figure 1). Without timing the weight shift appropriately, it is likely that balance is lost with a small chance of recovery. If the weight is transferred too early you fall forward, or if transferred too late you fall backward. This involves a process of understanding how the board reacts with respect to actions made by users and to the properties of the surface.

In a similar fashion, users of the body bug we saw how users had to learn to time their actions to the

Figure 2 - 4: Talking about how the body feels in the golf swing

responses made by the bug. In the case of an interactive device, designers also have craft the responses from the device in a way that makes it possible for the user to act on the responses in meaningful way.

The situations described above involve bodily actions that often have to be timed at a very fine-grained level, down to at least tenths of seconds.

However, bodily interaction also unfolds over much longer stretches of time, such as minutes and hours. This is especially relevant for the case of bodily interaction since our body and mind changes over time, we get tired, our bodies strain. To illustrate this we would like to come back to Spinney's study of ascending The Mont Ventoux is the experience of pain throughout the duration of the ascent. For the cyclist in the study, the ordeal of cycling up to the summit of Mont Ventoux involves a significant amount of pain and suffering. However, in the context of this achievement, pain was not primarily something negative. Instead, together with struggling and finally reaching the summit, pain is experienced in a positive sense. Despite all the bodily feelings of exhaustion and fatigue, pain gets reinterpreted as something pleasurable. However, Spinney argues for how it is not the pain as such that is pleasurable, it is the achievement of controlling the pain throughout the duration of the 26 kilometer long ascent. This points to how the experience of ascending the mountain need to be understood as an interplay between the kinesthetic sensing of the cyclist, a large physical landscape, throughout hour-long duration of the ascent. This mirrors Sörlin's [17] idea from the study of how the practice of becoming a world champion cross-county

skier involves a dialectic between suffering and passion (two closely related words in Swedish 'lidande' and 'lidelse') that the athlete constantly negotiates with. In both these cases, pain (or suffering) is not only to be understood as something that has to be overcome but as an aspect that is critical to forming the meaning of the experience.

The social construction of bodily experiences

While "first wave" HCI focused primarily on the cognitive and intellectual aspects of interaction, more recent experience-oriented perspectives have shifted towards a focus on aspects such as affect and embodiment. However, we argue that we need to understand interaction in a fashion that does not leave out one or the other. Even though many bodily experiences are pre-dominantly described as non-intellectual, such as Höök's autoethnographic study of horseback riding, much of our physical experiences with the world are mediated and made meaningful through intellectual reflection and social interaction. A critical question is then how bodily experiences are shaped by the cognitive aspects of meaning making. Let us illustrate this with an excerpt from our studies of golfers. We saw how their experience of how their golf swings felt were structured by the discourse of talking about the swing and knowledge of how a technically correct golf swing should be, that they had learnt from instructors, books and magazines. The social practice within which the talk about the feeling of a golf swing brings particular aspects into focus and shapes what the experience becomes about.

By describing a sequence of steps, Lars here verbally together with illustrative moves (see Figures 2-4) deconstructs his experience of the golf swing for the

purposes of talking about it with the instructor, thereby allowing him to describe and communicate aspects of how he experiences his swing. This is a form of intellectualization that does not only have a communicative role, but it is also a part of the overall experience in the golfers pleasurable strive to improve his swing and his game. The bodily experience of swinging the golf club should thus be seen as closely intertwined with intellectual aspects of the movement.

The dynamic whole is broken down into smaller constituents in order to make aspects of the experience shared with someone else. The talk about the bodily experience is thus bound to a particular activity and a specific form of social interaction.

This points to how design for bodily interaction and experiences cannot only be understood from the point of view of the individual and his/her body. To a significant extent bodily experiences are also socially constructed through specific social practices and ways of talking. Hence, bodily experiences must be understood through an integration of pre-reflective and non-verbal aspects, together with cognitive, intellectual and social aspects.

Conclusions

By reflecting on our previous research into bodily forms of interaction we have identified a number of themes allowing for an expanded understanding of bodily interaction. In particular, we believe that these themes provide new directions in which to investigate novel forms of bodily interaction, in line with current technical developments.

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