
Bodies, Boards, Clubs and Bugs: A study of bodily engaging artifacts

Jakob Tholander

Mobile Life Centre , Stockholm
University, Forum 100
136 40 Kista, Sweden
jakobth@dsv.su.se

Carolina Johansson

Mobile Life Centre, SICS
Isafjordsgatan 22, Box 1263
164 29 Kista, Sweden
lina@sics.se

Abstract

Popular practices with non-digital artifacts were explored in order to reveal qualities for design of interaction that allow for full body experiences, and engagement of a rich array of our senses and bodily capabilities for being-in and moving-in the world. For successful design of movement-based and bodily interactive artifacts, we have to include qualities that allow users to connect their actions with the artifact to the surrounding physical and social world.

Keywords

Movement, body, engagement, experience, interaction

ACM Classification Keywords

H5.m Information interfaces and presentation

Copyright is held by the author/owner(s).
CHI 2010, April 10 – 15, 2010, Atlanta, Georgia, USA.
ACM 978-1-60558-930-5/10/04.

General Terms

Design and Human Factors

Introduction

HCI continues to move towards experience-oriented technologies that aim at bringing in a larger range of bodily, sensory and social aspects of human experience, and to design for rich human experiences where body, mind and world come together in new exciting ways. Such work include design frameworks for somaesthetic experiences [5], conceptualizations of feeling and body in interaction [2], examples of technologies for bodily engagement [1], [4], as well as approaches and principles for engaging in design of movement based interaction [3].

We are especially concerned with the experience of body and movement in relation to artifacts and to pinpoint some central experiential and interactional qualities in the design of interactive artifacts for bodily engagement with technology. We hope to unravel some of the magic of people's deep engagement and their skilled reflection in activities in which body-artifact experiences are central.

We have investigated two very popular and much loved practices with non-digital artifacts (skateboard, golf) in order to dig out some experiential aspects not yet covered by interactive artifacts, and to compare these

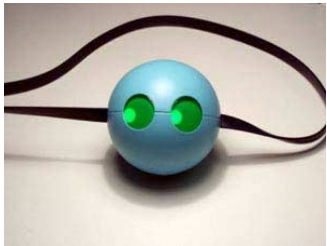


Figure 1: The BodyBug

practices to a new interactive device designed for movement and bodily engagement (a prototype of a tangible movement partner called the BodyBug). Although they differ in terms, such as golf and skate being longtime established activities and BodyBug a brand new technical device, there are still aspects to compare and gain insights from looking at.

We gained several design insights relating to the qualities of full body experience with artifacts. Here, we focus on one of them: the importance of creating interactive artifacts that do not shield the user from the material and physical environment and the interaction with the social context. We argue that the qualities we have identified are of critical importance for the crafting of interaction with artifacts that aim for gracefully engaged and sustained bodily interaction.

First, we present examples of people engaging in full body movement with non-digital artifacts; their deep and prolonged engagement with these and how graceful movement and reflections on movement are key elements in their experience. Next, we present examples from users of the BodyBug and how we can find traces of similarly engaged and graceful movements in the interaction. However, as the interaction with the BodyBug sometimes breaks down in undesirable ways, we trace the source of such breakdowns in the way that the feedback and response leads the user's perception to become too dominant on the artifact without connecting the user to the physical surrounding. We would like to emphasize that the BodyBug is successful in many ways, but in a study focusing on how it allows users to interact with the world, challenges and difficulties are revealed.

Studies of golfers, skateboarders and body buggers

Golf and skateboarding were chosen as both being activities with non-digital artifacts and also for their seemingly difference in character. The BodyBug (see Figure 1) is an example of a technical artifact developed for movement-engaging interaction [6]. It is a tamagotchi-like gadget that climbs on a string and feeds and responds on bodily movements. By using an accelerometer it senses the user's actions and movement. A small display on the back shows text and illustrations and has buttons for navigating games. In our study we used five simple mini-games played by moving around in different ways.

The studies were performed with an open-ended approach aiming at capturing the central aspects of body-artifact-movement relationships. Our data was collected "in the wild", i.e. in settings where the activity ordinarily takes place (skateboarding hall, golf driving range and dance studio). We observed and filmed the activity and held semi structured interviews around the participants' experience of body, movement and artifact. Here, we primarily focus on the participants' experiences and ways of talking about body and movement, and how they related to the artifacts they used for their activity.

Golfers and skateboarders on body, artifact and movement

Simply from observing golfers and skateboarders one could see an aesthetic as well as a functional engagement in their actions and movements. The golfers for instance always tried to finish their swing in a balanced posture which both is sign of appropriate technique and a way of mirroring the swing of highly



Figure 2, 3, 4. Body positions

skilled golfers. Similarly skateboarders stand on the board both to maximize balance and efficiency in movement, as well as conduct the tricks with grace and attitude to impress their peers.

In general descriptions of their experiences, golfers and skateboarders emphasized the importance of the social dimensions and possibility of learning and being 3 amongst friends. Within that context, the actual performance of the physical actions is of course central to their descriptions, but not brought up as the sole and primary reason for engaging in the activity.

THE ROLE OF THE ARTIFACT IN GOLF

Throughout our observations of verbalization and the instructor's illustrations of movements and bodily action, the golf club and its specific qualities was rarely focused upon or explicitly talked about. It is of course the main reason as to why they are performing their actions in a particular manner. However, they rarely reflected on that an action is performed in a particular way in order to manipulate the club so that it gets the speed and position necessary for producing a particular shot. While the artifact structures the activity and the movements, it seldom comes into focus in their talk about their movements. This might not be surprising and is supposedly the case for most physical activities of this type. Despite this, it provides an opportunity to investigate how particular qualities of an artifact shape the moves and actions users perform with it. In interviews and observations, we could see how the golfers repeatedly emphasized the relation of their actions to the physical world by paying attention to the sound of a hit, the feeling in the hands of a bad shot or the 'non-feeling' in the body of a good shot, focus on physical distance of a shot, feeling the ground under

their feet, etc. These were typical for how the golfers through the interaction with the golf club were put in touch with the physical world, and how that in turn gave them opportunities to reflect on their movements and interpret the outcomes of their swings.

GOLFERS TALK ON EXPERIENCE AND BODY

Both in the instructional situations and the interviews, the golfers put substantial effort into making their experience of playing golf and the golf swing 'talkable', often through the use of a technical language. Already at a fairly basic level, players talked about technical aspects of their movements that have been proven of importance for carrying out a successful golf swing. This included aspects such as "*I try to lower my shoulder during the backswing*", "*At the end of my backswing I try not to make sure that my weight never goes beyond the inside of my left foot*", "*I try to cock my wrists earlier in the backswing*". E.g., at the beginning of a lesson:

Lars: I feel that I do it in three steps: first here coming up, then I try turning my body...

Instructor: And how does it feel?

Lars: It feels mechanical, but it's starting to get better.

Excerpt 1.

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, it is also a part of the overall experience, and in the golfers strive and pleasure of improving their golf swing and game. The experience of



Figure 5. Skateboarders talking about tricks



Figure 6. Skateboarder on the ramp

swinging the golf club thereby is 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 reflects one of the challenges of what in phenomenology has been called 'linguaging' or verbalising human experience [7], which in HCI translates to the methodological problem of representing people's experiences such as bodily actions and movement for purposes of understanding human technology relationships.

SKATEBOARDERS ON BODY AND MOVEMENT

Contrary to the golfers, both in interviews and in-action observations the skateboarders described bodily experiences and movement in a more holistic manner. They emphasized the sense of speed, feeling free with the board, the smoothness of actions, and how the experience not only comes from the specific actions on the board, but from the whole context provided by friends, the culture of skateboarding and the environment. The skateboard was rarely a primary element of what they talked about; instead focus was on the embodied experience.

Generally, they were not particularly detailed in describing the bodily moves and actions involved in keeping the balance. Instead they focused on the totality of the feeling by emphasizing things like *"you feel it when you go in the turns, you then kind of feel, I don't know how to explain it"*, as a means for successfully doing the tricks. When getting more into details on aspects of movement in our interviews, the

skateboarders did not break down the activity into sub actions in the same manner as the golfers. E.g., Viveka, a 22 year-old working at a skateboard hall, emphasized the role of balance and ways of moving with the board, but she did not describe specific details such as body positions or shifts in stance. She said things like *"you kind of feel it"* and *"you have to relax and feel it"* and how *"movement is actually everything"*.

DESCRIBING THE MOVEMENTS OF FRIENDS

The skaters spent more time watching their friends and taking in the actions surrounding them in the hall than actual time on the board. We asked two skateboarders standing on the side to make in-situ commentaries on the actions of their friends. They did this with quite some detail regarding the relation between movements, the skateboard and how that affected the techniques for doing tricks. For instance, Sabina who had only been skateboarding three times as a part of school project described what she was looking for when observing her much more experienced friends: *"I am trying to see how they twist the board and how they place their feet. It's like, they change feet from having been standing like this. Then, when they make half the trick only one foot end up on the board"*.

When commenting on his friend, a 17 year-old talked about bodily control and described different movements in some detail: *"The tiniest things is about body movement, turning the shoulders with the board, how you stand, the placement of the feet, everything"*. Compared to the golfers however, he did not describe it in a technicalized language in terms of body positions or angles but focused on timing and feeling: *"You go for the feel. After a while this feeling has settled like in a little hole so you know exact, you feel now go"*.



Figure 7 & 8. Moving with the BodyBug

Experiencing movement with the BodyBug

Users of the BodyBug had different ways of characterizing and systemizing their movements: *"It feels as if one moved very circular all the time"* and *"To move it up then down, to interchange between high and low position, I liked that- it became like a sphere"*. Another participant classified her movement experiences as *"Base-movements"*. Free movement involving the whole body was preferred by the participants and was considered both natural and fun. When moving this way the artifact faded from immediate focus of attention and shifted towards the actual movement in relation both to the artifact and the physical environment; *"My favorite game was Stop, where it felt as if I could move around as I wanted"*. This shows the importance of how the artifact responds to the users' actions, and the possibilities for interpretation it opens up for.

THE ROLE OF THE ARTIFACT

"Because I'm very guided by this [pointing at the BodyBug] it follows that one doesn't really have an eye on the room in general". As the participants' focus was often exclusively on the BodyBug giving instructions on the small screen or by its eyes, the participants had difficulties connecting with their physical surrounding. Often, they were close to bumping into each other and thus not being aware of one another or the room: *"it feels a bit..inside. That one is in one's own sphere"*.

The BodyBug has two modes of communicating: audio by different noises and playing tunes, and visual by text on the small display or movement cues by the eyes. It was evident that the visual form was dominating: *"It was a little bit difficult to understand when I did right or wrong because I couldn't look at the*

display when spinning around". Feeling the display was too small also proves this visual domination: *"it was too hard to see exactly what it wanted, especially when one is moving around"*. Other participants did pay more attention to the audio cues given. However, also in this case the visual stole the attention at occasions as she also admits to *"sneaking a peak"* at the display. Some users expressed frustration over not getting the right feedback even though they felt they had performed a correct move.

This 'artifact-focused' interaction is in part due to how the BodyBug responds to the users actions. It gives a discrete kind of feedback that evaluates whether you have moved right or wrong, without leaving room for the users' own interpretation. In comparison, a non-technical device as a golf club or skateboard provides an open-ended response that allows the users' to have a richer range of possible interpretations of their experience with the artifact.

Discussion

Our findings reveal the following key qualities for design of interactive artifacts that connect body and world in an intriguing way:

- make it necessary to engage with the physical environment
- avoid perceptive modalities (in our case vision) that remove attention from body and environment
- the response should not be discrete but open up for individual experience and interpretation
- the artifact should allow users to continuously be socially aware.

Both skateboarders and golfers emphasized the connection to the physical environment for the

accomplishment of challenging interaction with the artifact. Skateboarders talked about “surfaces” such as slopes or rails and how they were used to carry out tricks. Similarly, golfers spent time on practicing the moves required to hit the ball from different slopes or bouncing the club on the ground. Also among BodyBug users, we observed interaction and movement of the engaged, sustained and often graceful character where user, artifact, and physical surround worked as complimentary aspects in the interaction. However, in many cases the movement got detached from the world around the user who only focused on the feedback of the artifact, without relating to how the feedback corresponded to the physical world. The visual, textual and sound feedback of the BodyBug seemed to detach the users from their bodily engagement with artifact and world as complementary aspects.

The interdependency between user, artifact and physical environment is one of the primary qualities for the kind of rich, sustained and graceful interaction that we saw in golf and skateboarding. In this relationship, the response, or feedback, of the artifact comes out of how it is applied to the physical world and how the user interprets and experiences the response of that application. Hence, it is not primarily the feedback from the artifact itself that determines the outcome of the action carried out by the user. Rather, it is the user's interpretation of the response in relation to artifact and world that makes up the experience.

This challenges designers of experience-oriented artifacts for body and movement to view the artifact as a medium for engaging in movement based activities, while not letting it become the sole and primary focus of the movement. This would allow the “outcome” of

the activity not to be determined by the output of the system, but to be determined by the experience of the user. Rather than making users mind-focused we should aim for designing artifacts that allow them to become movement- and body-focused, so that they can continuously be bodily engaged with and connected to social, material and physical aspects of their surrounding world. Thereby, users can engage with movement-based interactive artifacts in a way that can be increasingly developed and mastered over time, and provide possibilities for a deep connectedness between our bodies and the physical world.

Example citations

- [1] Fagerberg, P., Ståhl, A., and Höök, K. 2004. eMoto: emotionally engaging interaction. *Personal Ubiquitous Comput.* 8, 5 (Sep. 2004), 377-381.
- [2] Larssen, A. T., Robertson, T., and Edwards, J. 2007. The feel dimension of technology interaction: exploring tangibles through movement and touch. In *Proc of TEI'07*. ACM Press. 271-278
- [3] Loke, L., Larssen, A. T., Robertson, T., and Edwards, J. 2007. Understanding movement for interaction design: frameworks and approaches. *Personal Ubiquitous Comput.* 11, 8, 691-701.
- [4] Moen, J. 2007. From hand-held to body-worn: embodied experiences of the design and use of a wearable movement-based interaction concept. In *Proc of TEI '07*. ACM Press. 251 - 258
- [5] Schiphorst, T. 2009. soft(n): toward a somaesthetics of touch. Work-in-progress *CHI 2009*, Boston, MA, USA, 2427-2438.
- [6] BodyBug by Movinto Fun
<http://www.bodybug.se/>
- [7] Sheets-Johnstone. The Corporeal Turn. An interdisciplinary Reader. Imprint Academic. Exeter, UK