Movement, Embodiment, and Data Diaries - Exploring how to Design for and with the Senses

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Figure 1: Uke Obi. Left: all the parts of Uke Obi. The image shows the protective sleeve, wooden block with belt, and a clip which secures the belt on the block and which is used for folding the belt. Right: a snippet of the ritual (left side) and part of the notation system (right side), where the force, thickness, character, and length of the brush stroke communicate the movement values of the ritual.

ABSTRACT

In this submission, I discuss and illustrate how I design for and with the senses. It specifically focuses on the use of movements (relating it back to my background in judo) and the design of data physicalisations which go beyond the visual. I do so, by highlighting three previous design works. The first two examples illustrate how I use movements in the design process for the creation of artefacts and research products, and how they facilitate movement. The final example discusses a teaching method for data physicalisation, and how it triggered people to design for other modalities (sounds and haptics) and changed their understanding of data.

KEYWORDS

embodied, somaesthetics, movement, Data Diaries

1 INTRODUCTION

Early on in my studies of Industrial Design, I encountered the idea of designing for more than efficiency and usability. Design and the design of interactions should account for our bodies, enjoyment, and skills (e.g [3, 4, 17]). As I encountered these thoughts, I started to find and experiment with ways of combining this knowledge, together with my personal experiences and background: which is in (competitive) judo. This experience has shaped me and continues to shape me as a person. Walking into the dojo (the location where we would train), the smell of old sweat would hit you—not very pleasant, but somehow it has something nice to it. Once you have put on your judogi (the attire), fastened your obi (the belt), and bowed for the tatami, trainer, and your fellow practitioners, the magic would happen: the sensation of your feet moving over the tatami, resulting in a distinct feeling of friction and a blissful *"swisch, swisch"*-sound, and the sensations of your and your opponent's movements. To me, judo is all about that. Feeling your own movements and position in regards to those of your opponent, and see whether you could find a way to throw them or work towards a winning technique on the ground.

I am telling you this story to give you an idea of how I approach designing for and with the senses. From a judo perspective, I am interested in how interactions feel, what they look like, and the purpose they serve (in the broadest sense of the word, enjoyment and aesthetic are purposes as well). Both for the person having the
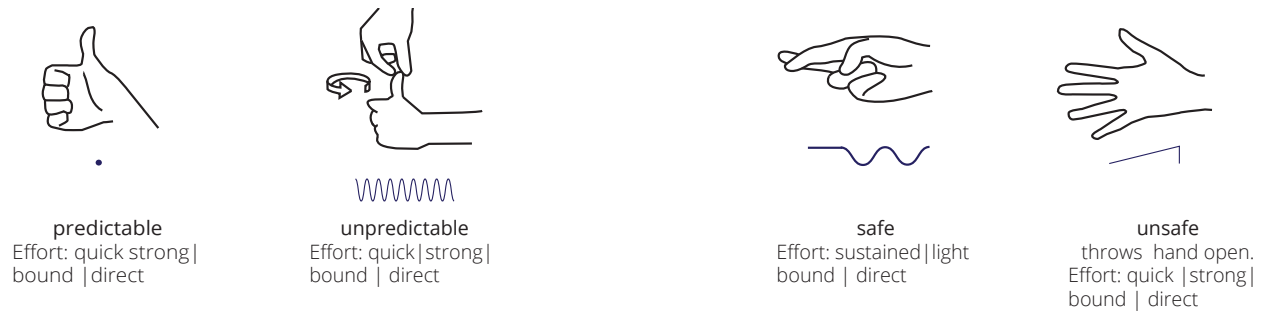
Figure 2: Pictograms of four password movements composed by the music conductors. Each pictogram is accompanied with an effort description (e.g. quick, strong, bound, and direct) and a line or dot indicating the progression of the movement (e.g. a dot is a static movement, whereas a sine wave indicates a continuous movement. The frequency of the sine wave indicates the speed of the movement.

interaction and for the artefact. As such, my approach to designing for the senses mostly concerns movement [6], somaesthetics [5], and explorations. These are then either communicated through graphical representations (as done in [10]) or through physicalisation. In the subsequent sections, I give examples of my approach, which I then use for a short description of why I would like to take part in this workshop and what I bring to it.

2 CASE STUDIES

To give an idea of how the senses are incorporated and used in my design process, I want to highlight three examples of previous design work. The first and second example use a movement-centred approach inspired by somaethetic interaction design [5, 11]. The third example discusses the *Data Diaries*, a set of assignments exploring how we can sensitise data physicalisation creators for the multimodal nature of physicalisations.

2.1 Uke Obi

Uke Obi is an artefact designed to elicit and guide a ritual around storing your obi. Uke Obi was created for the elective *Composing Everyday Rituals* at the Eindhoven University of Technology. Inspired by ceremonies and rituals in which movement plays an important role [9, 10], we looked for rituals and practises in our own lives. This led to the observation that when I am folding away my judogi, it always happens in the same deliberate manner. Something which is absent for folding away my obi. Inspired by this absence, we designed a ritual around storing and folding an obi. To do so, we created two performative objects: a clip to guide the folding process and a block made of different types of wood which the obi has to be folded on, and a cover which wraps around and protects the block-clip-belt-assemblage. Figure 1, left side, shows the complete Uke Obi. To communicate the ritual and the feeling of the movements, we created a notation map inspired by graphic music annotations [1], and as suggested by Lévy and Hengeveld [10]. For this we used different brushstrokes (see Figure 1 – right), where the weight, length, and dynamic nature (e.g. a slow and swirl-like pattern or angular and fast pattern) encode the performed movement. A video of the ritual and notation map can be found here [1].

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[1]http://www.rosavankoningsbruggen.nl/rituals.html

2.2 Crypto – An Embodied Password

The next project I want to highlight is *Crypto*. Crypto is a design research project, in which we created an embodied password [15]. The project builds-upon the hypothesis that people can recall movement-based passwords through muscle memory. To get an understanding of what movements are suitable and unsuitable for a password, we started the design process by consulting music conductors. In a study with four music conductors, we asked them to create hand movements for various password qualities, which were either desirable (e.g. safe) or undesirable (e.g. unsafe). Movements were recorded and analysed using the *Interaction Quality Framework* [14]. To communicate and document the movements, I created drawings of the hands and movements (see Figure 2). The movement effort is indicated below the drawing, the lines indicate the progression of the movement, and arrows the direction. These movements were then used as design material for the password. By re-enacting the movements, to understand their qualities and what they felt like, we created mock-ups which we believed would trigger the original movements created by the music conductors. During this process we would constantly try out and experiment the artefacts ourselves, to see what worked, what did not, and to experience and feel the interaction ourselves—enhancing our understanding of them. Through multiple experiments (these can be found in the paper [15]), we ended up with the final design of Crypto (see Figure 3). Inspired by a combination lock, Crypto allows you to compose a sequence of rotations, which together form your password. To visualise the passwords (as a hint for the users and a tool for us, the researchers, to explore how passwords evolve over time) we created notation maps, just as with Uke Obi. An example of a notation map from a password can be seen in Figure 3 – right. Without explanation, the map is ambiguous and unclear; far removed from traditional visualisations, which mostly aim to communicate data clearly and efficiently [8]. This could be seen as both a strength –who would want the visualisation of their password to be clear to others?– and a weakness –critique we received was that the notation maps are unreadable, hence uninformative. In this workshop I would love to discuss and explore how others tackle these challenges, and how they balance ambiguity and clarity when designing across senses and modalities.
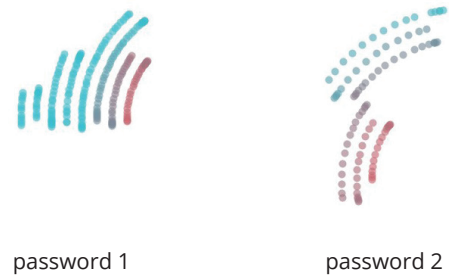
password 1   password 2

Figure 3: Left: An image of Crypto, the embodied password. The user can use the top part of Crypto (held by the right hand) to enter a password based on rotational movements. Right: Two notation maps of two passwords. Each arc represents one rotational movement. The denseness of the line indicates speed: a dotted line is a slow movement, whereas a continuous line represents a fast movement. The length of each line corresponds to the length of rotation Each password starts at the arc on the right (coloured in a pink / purple hue). The longer the password, the bluer the line becomes. The direction of the rotation (left or right) is indicated by the direction of the line (upwards or downwards). Even with some explanation, the notation maps are ambiguous.

2.3 The Data Diaires

Figure 4: Two examples of data representations created for the Data Diaries. Left: A sonification representing the routes walked indoors. Top notes represent routes walked for procrastination, whereas lower notes represent routes which were useful. Right: Two images of different tapioca textures. The sensation and aesthetics of these textures represent the senses and sensations encountered. The first image is boiled tapioca, representing feeling swollen. The second image are dehydrated tapioca chunks, which represent feeling calm.

The last project I want to highlight are the *Data Diaries* [16]. The Data Diaries are a set of assignments which we developed in the context of creating data physicalisations. They are inspired by the book *"Dear Data"* [12], and aim to sensitise physicalisation creators for the different aspects and facets physicalisations allow for. In total, we designed five Data Diaries, which we used in our project on data physicalisation at the Bauhaus-Universität Weimar. For each Data Diary, students had to track a specific source of personal data for the duration of a week and represent that data. The first two Data Diaries were visualisations, to help students get used to tracking and representing personal data. Then, from the third diary on, students had to physicalise their data, where the fourth Data Diary asked students to use the tactile modality (e.g. create a haptification) and the fifth required them to use movements to communicate data. Through physicalisation, students found multiple ways and approaches to 'sketch with' and use different senses. For example, one student created a sonification of their indoor walks. The walks were categorised into one of two groups: useful walks

(e.g. grabbing a book) or walks for procrastination. These were then perforated in a sheet of paper (see Figure 4 – left), to be played with a music box. Another example shows different tapioca textures which represent the senses and sensations felt by one of the students. Here, the student created personal, or subjective, mappings between what and how they felt (e.g. calm or swollen) and the tapioca. They deliberately restricted themselves to one material, to explore its potential and affordances in-depth. Moreover, they forced themselves to only use its previous state to create the next. For example, first tapioca was cooked to a pulp to represent *swollen*, which they then dehydrated to represent *calm* (see Figure 4 – right).

3 THE ROLE OF SENSES IN FUTURE WORK

At the moment, I am a PhD-student at the Art and Design faculty of the Bauhaus-Universität Weimar. Here, I am exploring data physicalisations and the role they can play in our understanding of (personal) data. Through the Data Diaries we saw how physicalisations and the creation of them both require and facilitate a new understanding of data [16]. Instead of being abstract and neutral, students realised that data are always subjective and messy. Students started to design and account for emotions and uncertainty in their designs, as such their notion of data started to align with data feminism [2]. Moreover, as data physicalisations are inherently multimodal [7, 13], I will be designing for more than the visual. Therefore, participating in this workshop would mean a great opportunity to learn and discuss how others approach this, what problems they encounter, and how they overcome them. To this workshop, I will bring experience with designing for and with movements, insights from how to design for different senses in context of data physicalisation, and a feminist and critical constructivist view on data.

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