EXPLORING INTERACTION STYLES THROUGH VIDEO

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ABSTRACT
In this paper we present an approach to address interaction styles from the start of a design process using video as the main design tool. We argue that video with its visual and auditory richness, its dynamic and temporal character, and its narrative structure, is a natural medium for the exploration and generation of interaction styles. As part of an honours track within our regular industrial design bachelor program, some 25 students participated in a short module, in which they were introduced to the concept of designing interaction styles. Consisting of four workshops of four hours each, the aim of the module was to have the students experience how they could go through a design process starting from the "how" rather than from the "what" or "why". Throughout the module, video was consistently used as the only means to document and present the results. Overall, the application of video turned out to be insightful as well as critical. Through creating, reviewing and improving their videos, students developed sensitivity for what is 'wrong' or 'right' when designing an interaction flow. Fine-tuning this flow, however, proved to be quite difficult, having to master both video and audio editing software to a considerable extent. Developing skills in preparing, shooting and processing video thus turned out to be crucial, since these are required to get it 'just right'. Currently we are therefore looking into options to create an exploration toolkit that would make the alignment and manipulation of video and audio more accessible.

Keywords: Interaction design, interaction styles, video.

1   INTRODUCTION

When designing interactive objects, the interaction *style*, which defines the precise flow and palpable interplay between actions and reactions through direct sensory-motor contacts with the object over time, is generally something that is only addressed at the end of a design process, when many design decisions already have been made. While existing interaction design techniques, such as storyboarding and physical prototyping are useful to specify interactions from a functional perspective (*what* objects should do), they tend to fall short when exploring *how* objects will exactly respond to users actions and *how* actions and reactions precisely integrate. With more and more products, systems and services becoming interactive and -connected as a consequence of developments like ubiquitous computing and the Internet of Things, the need for tools and techniques that enable articulating interaction flows and patterns at the right level of dynamics, expression and nuance, becomes more pressing, especially for design education where the next generation of designers is being trained.

In an on-going research we are exploring how video can best be applied to visualize and define the dynamic flow of interactions in the conceptual phase of the design process. Our goal is to create a set of instructions and/or tools, which interaction designers can apply in their design process. In this paper we will presents our initial steps towards the construction of such a toolkit by describing our experiences in using video to explore interaction styles in an educational context.

2   VIDEO AS AN EXPLORATIVE DESIGN TOOL

Video traditionally has been widely applied for different purposes in a design process, such as ethnography, user research, usability studies and product presentations, its function in these cases being primarily to record, document and/or communicate. The camera is mainly used to capture existing real-life situations, with the designer trying to interfere as little as possible, concentrating mostly on recording these situations in a realistic way.

In recent years, however, using video for more generative and experiential purposes within design or, as termed by Ylirisku and Buur [1], as 'designer clay', has become more prominent. Pioneering work by Buur, Vedel Jensen and Djajadiningrat [2] applied video more as a design material, using its temporal qualities to capture the dynamics of movements and actions and to compare these in relation to each other. More recently, Bonanni and Ishi [3] used video as a medium to create stop-motion animations to prototype tangible user interfaces, while Desjardins, Wakkery and Zhang [4] describe the application of video to create a collection of low-level interactions, which a designer can then creatively combine to explore new possibilities. In ubiquitous computing research, which addresses the integration of computing technology into everyday products, video has lately been used to create design fictions, which suggest, mediate and provoke discourse on the future technologies and their implications rather than demonstrate fully developed solutions [5].

Within design education, however, the application of video still appears to mainly concentrate on its proven ability to record and present [6]. Although design students are getting more and more skilled in making videos of high production value to show the final result of their design process, using that same medium in a much earlier stage is not something that easily comes to mind, even though almost every one of them is nowadays permanently equipped with a high-definition camera in his or her smartphone. With the continuous rise of products, systems and services that are operated through dynamic interfaces, it becomes more important to make them aware of and train them to apply the design possibilities that video has to offer in the conceptualizing stage of a design process.

Video has the inherent potential to provide design students with a powerful and unique toolkit to be used throughout the entire design process. For example, rather than having a set of discrete frames that show specific moments of an interaction, a video is able to visualize continuous sequential representations of the precise flow of interactions without any interruption, which is critical when designing their exact flow. Moreover, using post-processing techniques created sequences can be further manipulated, providing additional control and creative possibilities. To explore and define the potential of video as a design tool in design education, a set of four workshops was conducted in which video was used to explore and design interaction styles.

3   INTERACTION STYLES

Interaction styles are movement genres brought forth by the human body and technology on a pre-reflective level of interaction [7,8]. They address the "how' of interaction: the exploration and visualization of interaction styles on the level of the body (direct interaction, sensuous engagement) and the self (meanings and emotions). When we talk about exploring the "how" of interaction, we are thus referring to the immediate level of interaction that is experienced through a direct sensory-motor contact with an interactive object. The bodily and emotional expressions of these contacts together make up for the interaction flow, which describes the palpable interplay of actions and reactions over time. By articulating the interaction flow through shaping the properties of the object, distinctive patterns of interaction can be created, which can be characterized as interaction styles [9]. An interaction style here thus refers to the experiential manifestation of the interaction rather than the more functional and technical concept that is traditionally used to indicate a specific way of operating an interactive system, such as direct manipulation or command language. Interaction styles can have an appeal of their own and can be pleasurable in relation to their fulfillment of needs and in their embedding in everyday social practices.

To illustrate an interaction style, try making a rotating movement by moving your hands like if you are turning an imaginary wheel. Try to do this in a most neutral manner, disconnected from any expression. Now, within the restriction of the movement, try to make it as 'elegant' as possible. Notice how your fingers move more freely - like through water - or the palms are turns at specific moments to create a fluent and rhythmic pattern. Now try to make this movement as 'sturdy' as possible. Now notice how your hands become fists and the tension in the arms increases, resulting in more staccato-like movements. The difference in the flow of the interactions we define as *interaction style*.

Interaction styles are thus about *how* one interacts: the actual designed flow in interaction, the palpable experience where actions and feedbacks mix to create rhythms of exchange. To explore an interaction style early in a product design process, it is important that it becomes experiential in its embodiment and that critical details are addressed at various levels of expression. Existing interaction design techniques, such as storyboarding, interaction re-labelling and physical prototyping are useful to explore and define interactions from a functional perspective (*what* products should do), but to some

extent fall short when addressing *how* products will exactly respond to users actions and *how* actions and reactions precisely integrate. Video, with its visual and auditory richness, its dynamic and temporal character, its layeredness and its narrative structure, would be a logical medium to address precisely these issues.

4 DESIGN WORKSHOPS

To probe and evaluate its value as an exploration tool for designing product interaction styles, we applied video with this specific purpose in an educational context. As part of an honours track within our regular industrial design bachelor program, some 25 students participated in a short module called "Interaction Aesthetics", in which they were introduced to the concepts of tangible interaction design, interaction styles and aesthetics of interaction. Consisting of four workshops of four hours each, the aim of the module was to have the students experience how they could go through a design process starting from the "how" rather than from the "what" or "why".

As their main assignment, students worked in teams of four on the design of a physical music player that when used should articulate one of the following interaction styles: "curious", "angry", "wow", "sad" and "frightening". The functionality of the music player was very limited, having only six functions: "play", "stop", "next", "previous", "volume up" and "volume down". To stimulate the students to fully concentrate on exploring and designing the qualities of the interactions, no additional restrictions in terms of technology, materials or costs were given.

Starting with a review and discussion of some of the relevant literature to establish common ground and define some key concepts, the activities quickly became more experiential, using techniques such as role playing, bodystorming and lo-fi prototyping to experience, define and evaluate body postures, movements, gestures, shapes, materials, sounds etc., in relation to the intended interaction style. Throughout this process video was explicitly used as the main tool to explore, communicate and reflect on the results of the design process. Students were given some instructions on how to prepare, shoot and process their videos, but were also free to experiment to discover the medium for themselves.

In the second workshop the students were provided with a large and diverse collection of tinkering materials, such as boxes, wires, pieces of cloth, balls, sheets of paper, wooden sticks etc. They were instructed to first use this collection as inspirational material to construct objects that would afford the acting out of possible bodily manifestations of their specific interaction style. Secondly, these objects were then to be used as props in the creation of several short (< 10 seconds) *video sketches*, in which for each of the six functions three ways of interaction were visualized (Figure 1.). Thus each group ended up with a collection of 18 movies, which together provided a spectrum of possible solutions, which could be reviewed, combined or manipulated.
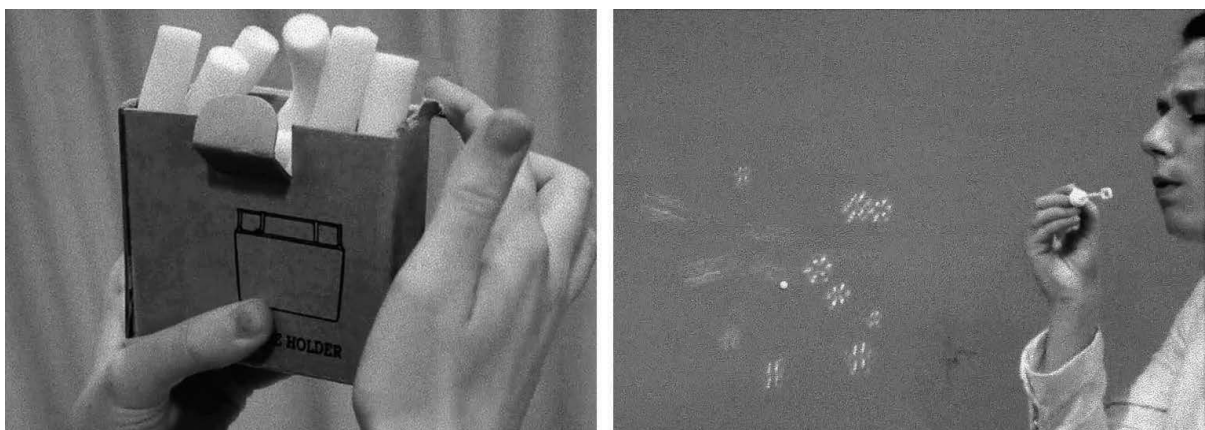

Figure 1. Two stills from video sketches of interaction style explorations

Following this workshop the students were asked to create a design proposal of the music player in the form of a physical model. For this they had to integrate the different types of interactions, which they had documented in the movies, into one coherent interaction style, which should result in the intended expression when interacting with the model. For this purpose, video was again instrumental, enabling

them to review their previous explorations, translate these into product properties, act out the intended interactions with the model, review these enactments, fine-tune the model, adjust their enactments etc. As a last and crucial step, sound was added to the design. To fully and precisely define how the flow of interaction would take place, it was needed to simulate the actual experience of operating the music player as close as possible. Here video proved to be invaluable. By adding a sound layer to the existing visual layer in the movie-editing program, students could experiment and control the interplay between action and reaction, which is were an interaction style actually comes to live. How precisely does the volume go up? In a delicate and harmonious way, fitting a 'sad' interaction style or in a more abrupt and brutal way, fitting an 'angry' style? How to go to the next song? By stroking it gently, so that the new song is slowly fading in or by shaking it hard, jumping instantly to the beginning?

At the end of the module each student team had to present the results of their process by means of a video, in which the interaction with the final design was demonstrated. Because of the attention paid to the alignment of images and sounds, these videos proved to be very clear in the way they exposed the precise flow of the interactions in relation to the operation of the music player. Figure 2 displays two stills from the "frightening" style, showing how the volume of the music can be reduced through pricking the balloon with one finger.
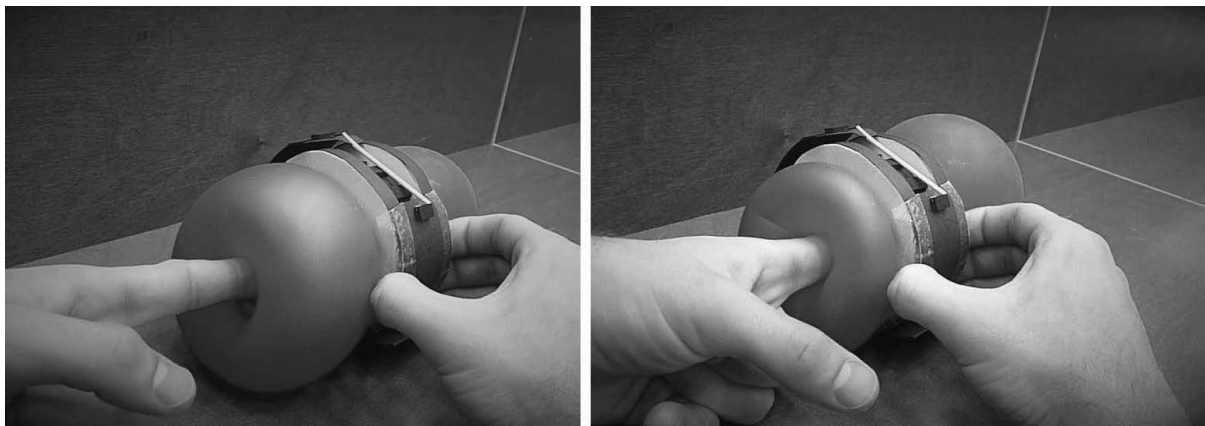

Figure 2. Reducing the volume through pricking the balloon, articulating a 'frightening' interaction style

5   LESSONS LEARNED

Overall, the application of video as the main design tool to explore and define interaction styles, turned out to be insightful as well as critical. Because of its dynamic and continuous qualities, the students could conduct their explorations at the right level of abstraction and precision. Having or developing skills in preparing, shooting and processing video turned out to be instrumental in this, since it, more than using sketches or storyboards, which leave much room for interpretations, requires to get it 'just right'. By reviewing and recreating their videos, the students trained their sensitivity for what is 'wrong' or 'right' when designing interactions on a detailed level.

Framing, which is the way that actors and object are displayed within a shot, required them to make explicit decisions about the goal and focus of the exploration. Having to determine what to shoot and what not, forced them to make clear-cut selections from reality based on their intentions, thus setting the boundaries of their exploration space. Selecting the right type of shot turned out to be highly depended on the character, scale and dynamics of the interaction style. Social interactions, which were about the interplay between multiple actors and/or objects within a specific context, called for extreme long shots to long shots, to provide overview and show relations. Full-body interactions, which required large and complex movements that have a high impact on both the actor and object involved, were best captured using medium to long shots to focus on the dynamics between actor and object and its possible impact within the context. Finally, micro-interactions which require small and exact movements that have much less impact on actors, objects and context involved, were best shot using close-ups or extreme close-ups, that show in detail the precise dialogue between actor and object.

In addition to framing, the students could scope their exploration space further by selecting the depth of field, which determines how much of the scene is in focus. In general, social and bodily interactions

should be shot using a large to medium depth of field, while shots of micro-interactions could be given more emphasis using a shallow depth of field.

Selecting the position of the camera provided a further parameter to play with and control. A static camera position, using a tri-pod or any other means to fix the camera, gave the advantage that the composition stayed constant throughout the entire scene and over multiple scenes, providing that no additional camera movements, such as tilts and pans were being used. As a result, each scene has the same quality, making for good comparison. Furthermore, because the camera is fixed, no additional movements can distract from the movements that are the focus of the exploration. These characteristics make a static camera set-up ideal for recording small-scale enactments of full-body and micro-interactions that take place in a fixed setting. An additional advantage is that by using the self-recording option, a designer can be part of the recorded enactment as well.

A dynamic camera position, hand-held or by means of a simple video rig, gave the students much more flexibility during the exploration process. By making changes to where and how the camera was positioned, they were able to actively control the scope and focus of their exploration. As a consequence, they automatically became more bodily engaged in the exploration process as well. By having to position and reposition themselves in terms of distance, height and movement in relation to their subject, they were constantly making decisions, deliberately or instinctively, that influenced the eventual outcome. A further advantage of this type of camera work is that it enabled responding to interesting or unexpected situations by actively following the flow of the interaction with the camera.

As to the adding of sounds to the video, timing proved to be really critical here. Transitions in movement and sound had to be perfectly aligned to create a realistic experience, a few milliseconds difference could already mean that the interaction was not in-tune and thus appeared to be not natural or fitting. Getting this right turned out to be difficult in many cases, though, mainly due to the fact that the used editing software did not allow for easy manipulation of the sounds. When timing was correctly achieved, however, the resulting effect was so convincing that it clearly supported the believability of the design. Close-ups or, in the case of larger movements, medium shots, showing the exact coordination of actions and reactions on a detailed level, turned out to be particular effective. Surprisingly, adding a storyline to the video proved to be distracting, as it shifted the attention from the interaction flow to a much larger context, thus loosing focus and detail.

6   CONCLUSIONS

From our perspective as design educators, the application of video allowed us to focus specifically on the dynamic qualities of the interactions with the product. Reviewing the videos together with the students resulted in often engaging discussions about the precise characteristics of a particular interaction style, something that would be not possible when another medium would have been used. Especially when combining the visual layer with the auditory layer, video provided a powerful tool to explore and prototype the precise interaction flow early in the design process. Fine-tuning this flow, however, proved to be quite difficult, having to master both video and audio editing software to a considerable extent. We are therefore currently looking into options to make the alignment and manipulation of video and audio more easily accessible. In addition, we are also exploring the use of animation as an extra layer to add visual feedback, such as lighting, to the video exploration toolkit as well.

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