

# DESIGN FOR CO-CREATION WITH INTERACTIVE MONTAGE

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## ABSTRACT

Montage in cinema means to mount images and sounds from different sources, that are interpreted together and whose oppositions drive the story further. In this paper we develop the montage concept further for co-creation in interactive, tactile, spatial cross-media. As case we use the design of the interactive, tangible, cross-media installation ORFI. ORFI is developed to facilitate collaboration and co-creation between children with severe disabilities and their care persons. In this paper we focus on how we have designed for interactive montage. We present two main types of interactive montage, *close* and *shifted* in three dimensions (spatial, temporal and actorial). With the first we mean spatial and temporal closeness, depending on the roles users take and the interpretations they make during interaction. With shifted we mean how to use spatial and temporal shifting and distance between the media elements in space and over time, depending on the users' roles and interpretations. All this to encourage co-creation over time, between a variety of users in different situations.

## INTRODUCTION

Ubiquitous Computing, Tangible User Interface (TUI) and Tangible Interaction are a growing field within Interaction Design. It is a field where people with

different practical and theoretical backgrounds and competencies cross, extend and expand the boundaries of the field. Computers, sensors, output devices and software are embedded in everyday objects, traditionally designed by industrial designers and architects. This challenges our understanding of what the things are and how they should be used (Oulasvirta 2008). Wireless and multimedia capabilities can be integrated, and they all eventually become part of our everyday life, where we interact with intelligent and other everyday objects in a mixed reality environment. This opens up new and challenging areas to be explored.

Many have discussed design of tangible computational objects. Some have focused on the difference between atoms and bits (Weiser 1991, Ishii 1997), where others have focused on the aesthetical potential in *composites*, in the relation between the material and the computational (Löwgren 2004, Vallgård 2007, Wiberg 2010). These are important issues, regarding the design of the sensorial interface level of the tangible object.

Our focus in this paper, however, are cross-media relations *over time*, between many, tangible objects in the *use situation*. And the design of possible relations between different media elements like (light, graphics, music, tactility, etc.) to motivate collaboration between many users. Collaboration where users *create something third* together we call *co-creation*. This is an extended, socially motivated experience compared to *play*, where several people just act simultaneously, and *collaboration* where they act towards a common goal.

The designed *possible relations* between media elements, programmed in software, are realised as a *montage*, experienced by the users.

In this paper we discuss a tangible interactive installation developed to facilitate collaboration and co-creation between disabled children and their care persons. We focus on the use of different media types and the relation between these in order to motivate the users to collaborate and co-create together.

## RELATED WORK

The original vision for Ubiquitous Computing was formulated by Mark Weiser (Weiser 1991). The

computers should be disappearing and the interaction seamless. This ideal has later been criticized, especially by researchers with an artistic background, arguing for the need of what is the opposite of seamlessness, that what is, *seamful design* (Chalmers 2004), where the seams are important for the experience of the design, together with, ambiguity, heterogeneity, conflicting images (Andersson 2000, Gaver 2003) such as it is used in a montage.

#### CROSS-MEDIA AND INTERACTIVE MONTAGE

Montage was originally a film editing technique used to manipulate emotional responses by joining one moving image shot to another in a linear sequence. This was often made through violently contrasting, juxtaposing effects, with media elements from disparate sources (Eisenstein 1949). The New Media theorist Lev Manovich calls the traditional graphical user interfaces *anti-montage*, because the interfaces communicate the same message through more than one sense (Manovich 2001), using several media types with the same content like in multimedia or multimodal interfaces. For instance as one does in a news article, when presenting a text, pictures and video from the same event.

Some video games use a form of Interactive montage as an important and motivating functional part of the gameplay (Nitsche 2005), e.g. shifting angles or point-of-views from first person to third. Others have used montage to describe multimedia as the combinations of different media types in "multi modal spati-temporal montage" (Skjulstad 2008). Here montage, still a designer's technique, creates unity and coherence on a "textual macro level". In games through interaction the user dynamically constructs the montage, his experience and narrative (Liestøl 1994). When leaving the frame of the screen, moving out into the tangible space, montage changes fundamentally. Meaning is created cross-media through interaction, between diverse media types and over time, space and depending on what role the user takes on (Signer 2006, Gislén 2008).

#### METHODICAL FRAMEWORK

In this paper we answer the question, how to design potential relations between different media elements to motivate co-creation, by evaluating a design case based on an analytical model for mediation and shifting.

The research leading to the cross-media installation ORFI has develop over a period of 10 years, with different interfaces, media types, target groups, and contexts. We have taken the knowledge, design and technologies developed in our research, and applied it in the field of "Universal Design", with extreme challenges regarding user situation and the users' specific abilities.

For this paper, families and children with severe disabilities was studied, while using ORFI at a usability lab rebuilt to simulate a home environment, and at a large rehabilitation centre at a hospital.

#### SHIFTING

"Shifting" is this paper's conceptual framework of analysis. It is borrowed from sociologist Bruno Latour and related to his studies on use of physical and technical things (Latour 1996). Latour showed how things can act, not only as neutral objects or tools, but as active actors, with abilities to influence scientific results and everyday life. He developed theories on how humans create relations to things, and how things mediate human actions and meanings. We use Latour's theories when designing and investigating relations between media elements and user interaction.

The term *shifting* comes from semiotics and originally explains how a reader is motivated by the text to identify with the texts' main character. The reader, or in our case the user, can shift from identifying with the main character to a more peripheral character. Latour calls this *actorially shifting* (Latour 1999). The users can also be motivated by the rhetoric's of the text, or in our case by the design, to shift position in *space* to another location and to another time. Like an old picture of Paris can make us imagine being in Paris in the old days, even if we are in London in 2011. Latour calls this *spatial* and *temporal shifting*.

What Latour recognized was that when including interaction with *physical* artefacts, yet another type of shifting takes place, where the user of the artefact not only think about shifting. Instead the user delegates meaning and actions to the artefact by using it. The user *shifts down* to the artefact and by doing that he also shifts role from being a more passive observer to an immersed interacting user, or player.

#### ORFI - A CROSS-MEDIA FIELD

Our case in this paper is the interactive installation ORFI. ORFI is a tangible, cross-media installation (see Fig. 1).



Figure 1: The ORFI landscape, the modules and the dynamic video projection.

It consists of 20 tetrahedron shaped soft modules, as special shaped cushions. The modules are made in black textile and come in three different sizes from 30 to 90

centimetres. Most of the tetrahedron has orange origami shaped “wings” mounted with an orange transparent light stick along one side. The “wings” contain bendable sensors. By interacting with the wings the user creates changes in light, video and music. Two orange tetrahedrons contain microphones. ORFI is shaped as a hybrid, a hybrid between furniture, an instrument and a toy, in order to motivate different interpretations and forms of interaction. One can sit down in it as in a chair or play on it as on an instrument, with immediate response to interaction. Or one can talk, sing and play with it, as with a friend and a co-musician in a communicative way, where ORFI answers vary musically after some time.

Every module contains a micro computer and a radio device, so they can communicate wireless with each other. The modules can be connected together in a Lego-like manner into large interactive landscapes. Or, the modules can be spread out in a radius of 100 meters. So one can interact with each other sitting close, or far away from each other. There is no central point in the installation, it is like a field (Cappelen 2003). The users can look at each other or at the dynamic video they create together. Or one can just chill out and feel the vibrations from the music sitting in the largest modules as an immersive, ambient, experience.

The installation has a 4-channel sound system that makes listening a distributed experience. ORFI consist of several music genres, which the user can change between. Some of the genres use sound files that can be combined, following musical principles for layering and sequential ordering. In other genres the music and the dynamic graphics is based on programming code, making it possible to order content in layers and sequentially, based on how the users interact. Every sound node is designed, so that each can be composed together with others, following musical rules.

The many possibilities, such as many, mobile modules and many genres to choose and negotiate between, reflect our goal to facilitate collaboration and communication on equal terms, between different users in different use situations.

## DISCUSSION AND OBSERVATIONS

The ORFI installation has been evaluated and user tested in many ways, and on different stages throughout the design process. After finishing the installation we have done several sessions of user observations in a usability lab with families and other user constellations, in order to control and verify our findings and observations.

Five families, with disabled children, spent between one and two hours at our “home look-alike” usability lab, while we were sitting behind the glass walls observing and filming from 4 angles, recording video material for later analysis. After the test period we made in-depth-interviews with all family members present. We also made additional user testing at a hospital rehabilitation

centre where patients made weekly visits at Multi Sensory Environments. Here 12 users experienced ORFI for one hour, twice, with a week in between. The observations were recorded, with two fixed and one motor-controllable video camera. Together with the therapists we moved the camera during sessions and watched what were happening on a TV screen from a neighbouring room. Before the session we had introduced the therapists to ORFI on a technical level. All users were brought by their professional care person or a family member, and they spent the hour together in the ORFI room. In this paper we present one relevant and representative user story collected from our observations and tests. This in order to argue for the papers theoretical point in design of interactive montage. In future papers we will present more results from the testing.

## CLOSE AND SHIFTED

In the cross-media installation ORFI, the different media types (music, sound, light, graphics, colour, vibrations, texture, structure) are designed to continuously invite the users to co-create in several ways. ORFI creates a montage of media elements, as response to the users’ interactions and the designed rules. The *relation* between the media elements in the actual montage are of two main types, *close* and *shifted*. This means that the user can get *direct* (close) or *shifted response* to his interaction. Using Latour’s concept further, we can say that the relations between media elements can be *close* or *shifted*, *spatially*, *temporally* or *actorially*.

The relation between the media elements are *spatially close*, when the user gets response from the system, *near* by where the user is interacting. And the relation is *temporally close* if the user gets an *immediate*, temporally close, response to his interaction.

The relation is *actorially close* when the user is the one driving or *controlling* the action sequence, the narrative. This means that the user is interpreting and acting, as he is using an *instrument* or a tool, which gives direct response to every user interaction. But ORFI also gives *shifted response*; For instance by lightening up *far away* from the user, and thereby moving the focus from the user to the light. This is what we call *spatially shifted response*. Further ORFI gives *temporally shifted response* by giving a more complex varying musical answer *after some seconds*, like if it was an improvising co-musician in a band. This shifts the roles actorially, from being a self focused user, controlling an instrument, to a co-musician listening carefully to the other before playing along. In this way the media elements and their potential relations represent a potentiality for users to interpret and act in different ways.

During our observations we found five different strategies and roles, actorial positions. Those strategies depended upon the users’ background, ability, knowledge about ORFI and interests. One strategy is

treating ORFI as an *instrument* or a dead toy. Another, as a friend and *dialog partner*. A third, as a *mediator* between different users. A fourth, as an improvising *co-musician* who creates surprises. A fifth strategy is treating ORFI as an *ambient and immersive environment* to be in.

These diverse communication strategies we have observed, varies over time. But after a while, we observed that some interpretations and positions were established and maintained, depending on the relations between the users.

Five year old Tom was resting on an ORFI cushion module on the floor in one room (actorial: ambient resting, spatially close). In the room next door, Tom's mother sat in a sofa built from many modules. Both mother and son sat on cushions with speakers in them. Both had a microphone module laying next to them (spatially close). Tom played with the wing. He let the module "fly" as a bird (actorial shifting from ambient to playing games). He bent the wings. The light in the wings blinked directly and created a sound (spatially and temporally close). He became aware of the changes in colours in the room next door, where his mother was. Invited by the colour changes he got curious and looked up. He rose and walked into the other room and up to the large projection (see Fig. 2) that covered one of the walls (shifting: spatially from shifted to close, actorially from ambience to playing).



Figure 2: Interacting in front of the projection.

Tom held the "bird" in his hands while playing on it, as on an instrument (actorial shifting from playing to controlling an instrument).

The graphics responded and changed immediately (spatially and temporally close). The cushion he was laying on in the first room, now answered in sound (spatially shifted). He turned towards the sound, ran towards it and threw himself onto the big cushion (see Fig. 3). He felt the tactile vibration from the speakers in the module (close spatially).

Then his mother spoke into her microphone. Tom looked up. His mother watched how the sound of her voice was "filled" in one of the cushions, as the light stick started to glow (spatially shifted, temporally close).



Figure 3: Diving into the tactile field.

She got up and took the cushion, and then sat down and started to "play" with the sound of her own voice. She recognised the melody of her voice. Surprisingly, ORFI had cut-up and shifted the voice to a higher pitch. She sounded like "Daisy Duck" (actorial shifting: the pitch and the meaning from the mothers role to a "cartoon-like" character). Tom listened to his mother and started to laugh. He walked towards her. Sat down next to her in the "module sofa" and bent the wings in a fast rhythmic movement. The voice of the mother sounded like Daisy Duck again, and the more he interacted, the more dramatic and contrasting the shifts became. He laughed as he continued.

## CONCLUSIONS

In this paper we have presented and discussed how to design interactive montage. With this research we wish to contribute to the field of tangible interaction, and how to encourage users to co-create in interactive, tangible cross-media environments.

When interacting, the user creates a *montage* of media elements, and thereby drives the *narrative* and sequence of actions further. The user interaction is based on the action possibilities that the designer has designed into the medium. The more media elements that can be related rhetorically interesting to each other, in layers and sequentially, the more action possibilities the user have. And the more possible montages and narratives can be created.

We have presented two main types of relations the media elements can have to each other, *close* and *shifted* in three dimensions; *spatial*, *temporal* and *actorial*.

The *close* relation is a direct response on interaction in one or *many media types*. This can strengthen the user's abilities to focus and experience to master the medium. While the *shifted* response invites the user to shift position spatially, temporally and role based, actorially, during the interaction. The possibilities to shift at all times, makes it possible for the user to dynamically choose activity level, and role to play, no matter if he wants to be the person driving the action further on, or to take a more relaxed spectator role in an ambient physical environment. These possibilities is what makes co-creation continue for a long time, because it doesn't, as is the case in gaming experiences, need the same level of intensity all the time.

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