RHYME: musicking for all

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Abstract

Purpose – The purpose of this paper is to bring together the fields of participatory design, design for all, accessible music, tangible interaction and musicking to propose musicking for all, where participants can take part on their own terms, with their own intentions, initiatives and interpretations. The goal is to promote well-being and health among the participants.

Design/methodology/approach – Co-creative tangibles to enable musicking for all have been created and evaluated in a research project. The paper uses the experiences so far in this project to propose “musicking for all”, based on the fields mentioned in “Purpose” above.

Findings – Participatory design, design for all and tangible interaction forms a promising basis for musicking for all. Challenges/paradoxes emerge when applying participatory design approaches to design work involving disabled children.

Originality/value – The paper contributes with an original view on musicking for disabled children, and proposes musicking for all based on the fields of research mentioned in “Purpose” above. The value in the contribution is a fresh view on co-creative tangibles for disabled children, and a suggested way forward to improve health and well-being for this user group.

Keywords Children, Music, Disabilities, Participatory design, Co-creative tangibles, Musicking, Familiarity, Musicking for all, Design for all

1. Introduction

Musicologist and composer Christopher Small defined music as a verb, rather than a noun (Small, 1999):

To music is to take part in any capacity in a musical performance, and the meaning of musicking lies in the relationships that are established between the participants by the performance.

Small argues that any kind of activity leading up to or being part of a musical performance, can be seen as acts of musicking. This includes composing, performing, and experiencing music. Importantly, it also encompasses activities not requiring any formal musical skills or training. The ability to read sheet music or master a musical instrument is not a prerequisite for musicking activities. This inclusion is important as a basis for the views put forward in this paper.

RHYME[1] is a project where the overall goal is to improve health and quality of life for persons with severe disabilities through the use of co-creative tangibles (Cappelen and Andersson, 2011a). These artifacts are physical objects, for example in the form of soft pillows and carpets, which embed computing capabilities and electronic sensors and actuators to enable users to take part in music-related activities. This paper presents RHYME from a perspective of participatory design in design for all, and on tangible interaction and music, in what we call musicking for all.

The main contributions in this paper is twofold: a review and discussion of participatory design in design for all, and tangible interaction and familiarity as a basis for the possibility of musicking for all.

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The rest of the paper is organized as follows: first, we give an overview of the RHYME project and the co-creative tangibles in Section 2, followed by a review of related work on accessible music, participatory design, and tangible interaction in Section 3. Next, Section 4 contains a discussion of the role of participatory design in design for all, using RHYME as an example, and further elaborations on musicking for all. We conclude the paper in Section 5 with an outline of the next steps in the RHYME project.

2. The RHYME project

RHYME is a multidisciplinary project with participants from the Centre for Music and Health at the Norwegian Academy of Music, the Institute of Design at Oslo School of Architecture and Design, and Institute of Informatics at the University of Oslo. It is a five-year project, where a number of prototypes of co-creative tangibles are developed and tested. The testing takes place at a school and resource center for children with disabilities. The first prototype, ORFI, was evaluated in the spring of 2011, and the second prototype, WAVE, was evaluated in the spring of 2012. To capture, analyze, and understand the children’s interaction with the prototypes, we have used video recordings during their exploration of the prototypes, followed by iterative coding.

The cross-disciplinarity of the project is reflected by different interpretations and foci of analysis, and subsequent dissemination of work in respective research areas. The rest of this section describes two generations of prototypes in the RHYME project; the ORFI and WAVE co-creative tangibles. At the time of writing, a third-generation prototype, REFLECT, is under development.

2.1 ORFI

ORFI is a set of co-creative tangibles created earlier by three RHYME participants in the artist group and project MusicalFieldsForever[2]. The ORFI modules, or cushions, communicate wirelessly with each other. The modules come in two different sizes, some of them containing speakers, one having a microphone, some of them having wings for interacting with the music. There is also a dedicated genre pillow, which allows for changing between several genres of musical expression. The modules can be freely built, thrown, played in, and played with as the users like. ORFI responds with projected changeable graphics, light, and music when the wings of the modules are bent, or the microphone is activated (Plate 1).

ORFI is shaped as a “hybrid between furniture, instrument and 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 co-musician in a communicative way, where ORFI answers vary musically after some time” (Cappelen and Andersson, 2011b). The ambiguity (Gaver et al., 2003) of the co-creative tangibles is not only musical, it also applies to the physical manipulation and use of the pillows. For example, they can be lifted carefully, caressed, used to support your body when lying down, or thrown around and used in a pillow fight.

Plate 1  The ORFI prototype
From the action oriented, multidisciplinary user study, several weaknesses with ORFI were identified. In addition, many desired qualities for a new generation of co-creative tangibles were found. In particular, the music and health professionals wanted the sound source to be close to the area of interaction, similar to how acoustic instruments work. For interactive objects, this means, for example to place the input sensor close to the speaker. This is a complex design challenge involving wireless objects, object sizes and weights, sensor qualities, sound quality, and wireless sound transmission. One future goal in the RHYME project is to be able to install co-creative tangibles in families’ homes, which represent further design challenges.

Further inputs to the design of the next generation RHYME prototype included a desire to explore more sensory stimulation like vibrators and stronger speakers, creation of more accessible input sensors, integrated microphone, speakers, and camera for new cross-media interaction possibilities.

2.2 WAVE

The WAVE concept consists of two different forms of tangibles; WAVE Carpet and WAVE Orange. WAVE Carpet is a seven-branched carpet, and offers many cross-media possibilities. WAVE Orange is a wireless iOS–based beanbag chair with two arms.

2.2.1 WAVE Carpet. WAVE Carpet is a single tangible, measuring approximately 2 × 3 meters, laying on the floor. It includes several input and output devices, including six infrared sensors with light response in a bubble shaped field, a microphone with light response in one arm, and a camera with light response in another arm. Further, a Pico Projector resides in a third arm, and bend sensors with light are embedded in two separate arms. Accelerometer sensors with light can be found in two separate arms, and a sound vibration element (Visaton), speakers, and LEDs are also included. WAVE Carpet is wired to power and a computer, and is therefore not mobile in the same way as the ORFI prototype, which consists of multiple wirelessly connected modules that can be moved around freely (Plate 2).

Arduino hardware and software is used for controlling the input and output. Two amplifiers, a Mini Mac with SuperCollider and Processing is used for sound and graphics. The infrared sensors can be used to trigger sounds, either by hitting or stroking, enabling interaction for people with various forms of motor disabilities. The arms of the WAVE Carpet can be bent to intensify the music produced by the computer music system, and sounds in the environment can be recorded with the microphone arm and played back by bending a separate arm. Graphics projected through the Pico Projector (or a wall-mounted projector) are produced in accordance with the interaction and the music produced. Ambiguity in the design of the artifact, music, and graphics programs means that the response from the WAVE Carpet varies, and opens up for different interpretations of the artifact and its role.

Plate 2 The WAVE Carpet
2.2.2 WAVE Orange. WAVE Orange is, compared to WAVE Carpet, a technologically simpler co-creative tangible. It consists of a beanbag chair with two attached arms. This design invites to different physical interactions, such as sitting, laying, lifting, and caressing. The beanbag is large enough for adults, and can also support a child sitting on a parent or caregivers lap.

One of the two arms of WAVE Orange contains an embedded iPod/iPhone and a microphone with light response. Additionally, there are LEDs embedded in the textile to provide visual feedback, as well as an embedded speaker. The iPod/iPhone runs RJDj[3], using Pure Data[4] for the music software. An example of a music program running in the WAVE Orange is a voice repeater, where the sound input from the user is recorded through the microphone, and subsequently played back through the speaker with pitch shifts, delays, and other effects.

3. Related work

What follows is a review of three areas relevant to the RHYME project. First, a short review of accessible music is presented, before the Scandinavian tradition of participatory design is introduced. Finally, a discussion of tangible interaction, including the concept of familiarity is presented.

Accessible music is relevant to RHYME and musicking, perhaps mostly as a contrasting body of work. It has a different interpretation of music as a resource than what is proposed by Small’s concept of musicking, which has been adopted by the RHYME project team.

Participatory design is important as it proposes a number of ideals for system development that matches values and goals in the RHYME project, although RHYME itself can hardly be described as a “true” participatory design project. Finally, tangible interaction is the foundation for co-creative tangibles, the physical artifacts developed and evaluated in the RHYME project.

3.1 Accessible music

Within the accessibility field, much focus has been on making music notation accessible. For instance, the special thematic session “making music accessible” at ICCHP 2004 (Crombie et al., 2004) mentions work within Braille Music (Union and Krolick, 1996; Challis and Edwards, 2000), and Spoken Music (Crombie et al., 2002) as central in this domain. The I-maestro project (McKenzie and Marwick-Johnstone, 2008) is another example of a project aimed at music education.

Important as accessible scores are, they are targeted towards those having, or acquiring, a “formal” understanding of music (i.e. reading scores and performing on a conventional instrument). This contrasts with the intention of musicking as defined by Small. Musicking includes any kind of music-related activity, and pays special attention to the relations formed between the participants through these activities. Especially for severely disabled children, the traditional focus on accessible music in the form of sheet music and accessible instruments have less potential than sensory environments such as RHYME or Snoezelen (Hulsegge et al., 1987).

Work on accessible music with focus beyond musical notation include interactive books for sighted children and blind parents (Tollefsen and Flyen, 2008), the Benemin (Challis and Challis, 2008), and Soundbeam (Magee and Burland, 2008). Some of these projects exploit proximity and movement, however, there is little focus on tangible interaction in the music experience (Darrow, 2012). Use of traditional music instruments in music therapy inherently include tangible interaction. In RHYME, the co-creative tangibles of the ORFI and WAVE prototypes (Stensæth and Ruud, 2012) are used to investigate how children, caregivers, and family members can interact with a computer-based music system using tangibles, and how this interaction influences the relationships between the participants.

3.2 Participatory design

Participatory design in the Scandinavian tradition of system development has roots back to the 1960s and 1970s. Early work involving participatory design approaches include work with the Norwegian Iron and Metal Workers’ Union, the Swedish DEMOS system, and the Danish DUE project. Common in these projects was a political agenda which aimed at strengthening the
users’ role, through their trade unions, as influencers and co-designers in the development and
deployment of new technology in the workplace (see Bjerknes and Bratteteig, 1995 for a
detailed account of the history of participatory design in Scandinavian system development).

Gradually, methodologies and practices from the participatory design projects have established
themselves as common tools in most modern system development approaches, and we have
come to take almost for granted that representatives from the user groups are involved in the
design of new computer systems. Participatory design, however, is not just about involving
users. One of its ideals is to make all stakeholders co-designers, where each participant brings
to the table her own background, expertise, experience, vocabulary, and agenda (for more
thoughts about the ideals of participatory design, see Greenbaum and Kyng, 1991).

Accessibility projects using participatory design approaches include the use of cross-cultural
scenarios for requirement elicitation (Okamoto et al., 2007), ATM design for illiterate persons
(Cremers et al., 2008), agile methods to facilitate universal access (Memmel et al., 2007), “best
guess design” for web-based accessible entertainment (Tollefsen and Flyen, 2006), and the
design of a sound and image enhanced daily planner (Moffatt et al., 2004). We will return to
participatory design and design for all in Section 4.1.

Many of these projects are oriented towards efficiency and access to information, which is the
dominant focus in Human Computer Interaction (HCI) and Computer-Supported Collaborative
Work. RHYME, however, is not about efficiency. It is about creating conditions for the
possibilities of musicking, and to explore how these musical activities can be made available for
children, families, and caregivers. Its goal is to establish a common ground where users can
participate in music-related activities on their own terms, and with their own interpretations. This
focus aligns well with the third wave of HCI, which is more concerned with experience and
meaning making (Bødker, 2006; Fallman, 2011) than with efficiency.

3.3 Tangible interaction

A major recent research direction within HCI is the exploration of the interaction that can be
facilitated by integrating computer technology with things and surroundings of our everyday
world. This field of research goes by many names; some examples are ubiquitous computing
(Weiser, 1991), tangible interaction (Ishii, 2008; Hornecker and Buur, 2006), internet of things
(Kortuem et al., 2010), and embedded computing (Wolf, 2002).

Moving from the now classical interaction with computers through the use of mouse, GUI, icons,
and menus in a desktop environment towards interaction with everyday “things” with embedded
computers is a major shift in the HCI field. Since the early prototypes in tangible interaction,
numerous prototypes have been made to explore tangible interaction. More recently, Sifteo
Cubes, Electronic SCRABBLE Flash, and the Sphero Ball are all examples of tangible interaction
products available in the marketplace. With the recent development of Near Field Communication,
we expect to see a proliferation of new, tangible forms of interaction with computing systems.

3.3.1 Familiarity. Dourish states that “In this world, our primary experience of computation is not
with a traditional desktop computer, but rather with a range of computationally-enhanced devices,
pieces of paper, pens, walls, books, hammers etc. The opportunity implied by this ubiquitous
computing vision is to capitalize on our familiarity, skill and experience in dealing with the everyday
world around us” (Dourish, 2004). The use of everyday things, like pillows, carpets, and paper, is
characterized by our familiarity with the things and what we can do with them. By focussing on
familiarity, we build on users’ pre-existing involvement, understanding, and relationship of the
“everyday” world. Phil Turner references Heidegger in order to explore the phenomenon of
familiarity (Turner and Walle, 2006). He proposes familiarity as a basis for design for all. The concept
of familiarity can play an important role in design for all, and has been demonstrated to work well
with participatory design for elderly people (Demirbilek and Demirkan, 2004).

Familiarity, as a phenomenon, is subjective in the sense that it involves people’s understanding of
themselves, the equipmental nexus and the activities in their being-in-the-world. What is observable
to researchers and designers, are the outcomes, such as “easiness, confidence, success, performance, which are all manifestations or signs of familiarity” (Van de Walle et al., 2003).
As an example of the role of familiarity, take the story of “Cato” from Herstad et al. (Herstad and Holone, 2012). Cato, a young boy with severe disabilities, is introduced to WAVE Carpet in a number of sessions in the spring of 2012. At first he is reluctant to this new “thing.” However, the familiarity of the carpets general appearance as a soft physical object invites him to explore together with his helper. After a while, when he gets to use an acoustic guitar, which he is very fond of, Cato starts exploring the WAVE Carpet through the familiarity of the guitar, for example by recording sound produced with the guitar and playing it back through the carpet. Herstad et al. writes:

Without the guitar, Cato seems insecure, and reluctant to explore the WAVE Carpet. To him, the guitar is both a familiar thing that belongs in the room, and also an artifact that produces a familiar sound, and has a familiar and predictable response to his interactions. As we see throughout the first two sessions, the guitar seems important to Cato as a bridge for making sense of the WAVE Carpet, to enable him to explore the new through the familiar (Herstad and Holone, 2012).

4. Discussion

4.1 Participatory design and design for all

Fischer (2001) uses communities of interest to illustrate challenges in cross-disciplinary activities, such as design work. In projects like RHYME, with multiple research traditions and methodologies involved through different participants, these challenges are sometimes very obvious. In addition, the children’s interaction with the co-creative tangibles must often be interpreted through their caregivers. This form of mediated communication introduces another layer of challenges in participatory design processes, emphasizing the need to work carefully to best understand the different stakeholders, each on their own terms.

There is not much published literature on participatory design work involving children with disabilities. Allsop (2010) provides a good overview of participatory design work with children, and she argues that methods for involving children are readily available. However, she notes: “[...] although their suitability with use for children with disabilities has not been considered” (Allsop, 2010). One challenge in applying participatory design ideals in projects involving disabled children is the focus on rapid prototyping, direct communication, and active participation and decision making to drive the design process. When engaging disabled children in design, the need for plenty of time, the reliance on voice by proxy (helpers translating between the child and other participants), and the child’s often unfamiliar role as initiative taker and decision maker must be taken into account by all stakeholders.

One recent and significant contribution to published work on participatory design for disabled children comes from Larsen and Hedvall (2012). They have developed an approach to enable children to contribute directly to the evolution of Snoezelen environments by their actions rather than with spoken language. By utilizing low-fi technology probes, the professional designers suggest new ideas and variations of existing artifacts, and use their observations of the children interacting with these as contributions in the design process.

4.2 Musicking for all

With this paper, we aim to describe the intersection of tangible interaction, musicking, and participatory design in the context of work with disabled children to enable musicking for all. Tangible interaction, the manipulation of physical objects as a form of interaction with a computer system, has great potential for enabling musicking for all.

The RHYME prototypes are all open for interpretation, and can take on different roles, for instance as instrument, co-musician, communication partner, toy, meeting place, or ambient musical landscape. These roles can be changed dynamically by the users interacting with the artifact (Cappelen and Andersson, 2011b). The diversity of the users targeted in the RHYME project makes this approach especially suitable to enable musicking for all. The co-creative tangibles are not simply interfaces to musical instruments, they can be used and understood by each individual on his or her own terms. The dialog between the user, the artifact, and other users is a continuous negotiation of meaning, initiative, and musical expression, following the
The RHYMЕ project has produced different prototypes of audio-visual spaces where children and people in their surroundings together can explore the unfamiliar new interactive features of carpets and pillows through the familiarity of the same objects. Sometimes the children are also bringing familiar objects, such as balls or acoustic guitars. In this way, both the familiarity of these well-known artifacts and the familiar design of the co-creative tangibles help with enabling musicking for all.

Finally, it should be noted that Small’s definition of musicking (Small, 1999) applies to a wider range of activities than those directly related to performing music. Further, Small proposes that musicking is value-free, that it is not necessarily a pleasurable activity. However, in the RHYMЕ project, the setting in which musicking for all takes place is created with well-being and salutogenic health in mind.

5. Conclusion and future work

In this paper, we have presented the RHYMЕ project and its co-creative tangible prototypes ORFI and WAVE. Further, we have argued that participatory design, musicking, and tangible interaction are fields which create a good foundation for musicking for all. This has been illustrated with examples from the RHYMЕ project. With focus on musicking, rather than accessible music, we hope to contribute with an inclusive approach to music-related activities, where all participants can take part, interpret, and take initiative on their own terms. We have also mentioned some challenges and dilemmas related to the application of participatory design approaches in design for all. These dilemmas are topics for further work.

The RHYMЕ project has currently gone through two design iterations, resulting in the prototypes described in this paper. A third generation, REFLECT, is soon ready for testing. Future design iterations aim at introducing co-creative tangibles in the homes of the children and their families, to enable musicking at home, and not only in a school setting as is the current case. Further, enabling networked, internet-based co-creation aims at musicking over distance, for instance with friends and family in other locations. These are important steps in the RHYMЕ project to truly embrace musicking for all.

By taking participatory design processes seriously, and accounting for the challenges emphasized in the work with disabled children, new and promising tangibles can be created to allow for participation in musical activities for multiple users on their own terms.

Notes

1. http://rhyme.no
3. http://rjdj.me

References


Cappelen, B. and Andersson, A. (2011a), “Designing smart textiles for music and health”, Ambience 11: were art technology and design meet, University of Borås, Borås.


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