

Studying Aesthetics of Interaction in a Musical Interface Design Process Through ‘Aesthetic Experience Prism’

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ABSTRACT

This paper introduces ‘The Aesthetic Experience Prism’, a framework for studying how components of aesthetic experience materialize in the model’s of interaction of novel musical interfaces as well as how the role of aesthetics could be made more explicit in the processes of designing interaction for musical technologies. The Aesthetic Experience Prism makes use of Arthur Danto’s framework of aesthetic experience that consists of three conceptual entities: (1) metaphor; (2) expression; and (3) style. In this paper we present key questions driving the research, theoretical background, artistic research approach and user research activities.

In the DIYSE project a proof-of-concept music creation system prototype was developed in a collaborative design setting. The prototype provides means to the performer to create music with minimum effort while allowing for versatile interaction. We argue that by using an artistic research approach specifically targeting designing for aesthetic experience we were able to transform the knowledge from early design ideas to resulting technology products in which model’s of interaction metaphors, expression and style are in an apparent role.

Keywords

Aesthetics, Interaction Design, Artistic Research, Exploration

1. INTRODUCTION

In the design of data driven technological environments, new opportunities for creating expressive applications are arising. Designers of interactive systems are increasingly interested in taking steps beyond designing merely for usability as it has been recognized that computing environments need to be responsive not only to people’s instrumental needs, but also to people’s personal, emotional and artistic needs. Curiously, the importance of designing for aesthetic experience has been acknowledged among game designers for years [2]. Also, in the music technology field there has been a trend of adopting gaming platforms, such as Wii and Kinect, for the purpose of making music. The modifiability, low-cost and easy availability of these platforms makes them an exciting choice for the designer of musical interfaces.

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This research is motivated by the fact that in the literature on musical tools creation we identify two gaps. The first is related to discussing what is the role of aesthetics in the models of interaction promoted by novel musical interfaces. The second gap concerns the design methodology: through what kind of a process have these models of interaction, that supposedly embed aesthetic values, been brought forth. We find this a research area that necessitates critical examination. In order to bring the research to a practical level we introduce an analytical aesthetic experience framework The Aesthetic Experience Prism that can be used for studying the resulting design as well as for guiding the design process aiming at embedding aesthetic values in the end products.

1.1 Research Project Context

This research is part of Eureka/ITEA2 DIYSE (Do It Yourself Smart Experiences) –project¹ which aims at enabling ordinary people to easily create setup and control applications in their smart living environments as well as in the public Internet-of-Things space. The choice of the target groups, children and persons with intellectual learning disabilities, was based in the preliminary user studies conducted in DIYSE. The project stakeholders Technical Research Centre of Finland (VTT), Delicode, Music Makers, Laurea and Rinnekoti Foundation operate both at national and international levels in research, education, technology industry, music publishing and healthcare fields.

1.2 Development Partners

The technologies and content were developed collaboratively with project key partners. The following is an overview of the partners’ responsibilities within this project. VTT arranged and conducted co-design workshops. Delicode software development start-up company developed natural interaction software [13] for the Kinect platform. Music Makers, an established music making company, focused on developing the musical content and utilizing/adapting the music creation technologies developed by VTT and Delicode.

2. THEORETICAL BACKGROUND

Aesthetic experience in the context of the use of interactive technologies can be described as a phenomenon in which an interactive environment, including the arrangement of audio, visual and physical materials, users and spectators form a whole and meet each other at subjective, sensory, emotional and sensual levels. We use Arthur C. Danto’s framework for characterizing the structure of aesthetic experience [3]. In the field of aesthetics Danto is a representative analytical

¹ www.dyse.org

aesthetics, which is distinguished from pragmatist aesthetics by its relation to practice. Analytical aesthetics offers us a way of looking at aesthetical factors intellectually by studying the created artifacts to articulate their meaning and value in a certain kind of experience. Danto proposes that we must seek to grasp the point of intersection between style, expression, and rhetoric when examining the phenomenon of aesthetic experience (see figure 1).

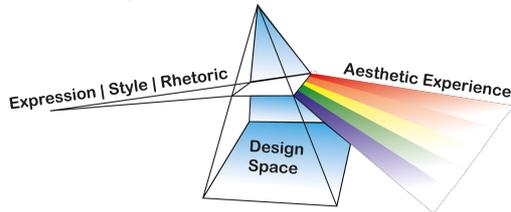


Figure 1. Danto's concepts: expression, style, rhetoric intersecting the design space and scattering into the various shades of the aesthetic experience.

In the context of this research we can study the concept of aesthetic experience on two levels.

- How the role of aesthetics could be made more explicit in the processes of interaction design for musical technologies?
- How do the developed interaction styles enable expression, style and rhetoric?

Danto's theoretical framework of aesthetic experience offers us a prism to look through and to study the design space in the specific context of this project. The analytical examination highlights aesthetic aspects and leads us to look at how materials, in this case gestures for interaction, build form through the logic underpinning expression, style and rhetoric. Below we open up the three terms coined by Danto and continue their refinement by targeting the specific area of novel musical interface design.

2.1.1 Metaphor

Eldridge interprets Danto's concept of metaphor to be a central device of rhetoric [4]. Lakoff and Johnson state that the essence of metaphor is understanding and experiencing one kind of thing in terms of another [6]. Metaphors are a powerful means for making sense of the world around us, for interpreting existing realities and for building new meanings that can foster e.g. the making of new technological solutions. Metaphors operate through language and structure our perception. However, they are not only lingual but employ other sensory channels as well. In the context of design, through metaphorical thinking a design team is able to transform technologies into a more comprehensible form [5].

2.1.2 Expression

Danto proposes, that an artwork expresses something about its content, in contrast with an ordinary representation [3]. To be able to design for aesthetic experiences, the designer needs data as a source material for producing representations, of the future interactive devices. Information is data that has been given meaning and so without the meaning it remains only data [1]. At its best, the artifacts are not mere replicates of the existing world but have semantic dimensions beyond what is here and now. The challenge for the designer is to shed light on the resulting wholeness in order to allow meanings to be inferred.

2.1.3 Style

For Eldridge Danto's component of style means that in order to an artifact to have a style it needs to be rhetorically effective in

bringing their audiences to feel something in relation to their contents. Unlike metaphors, they do not invite their audiences actively to see their subject in a new light [3]. Interactive artifacts have distinctive style and do invite us to see their subject actively in a new way. It is as if design outcomes were an externalization of the creator's consciousness, as if we could see her way of seeing and not merely what she saw. Thus, the idea of the way of seeing captures what is meant with the component of style.

3. STARTING POINT FOR THE DESIGN

The starting point for the design was to develop a music creation system, which aims to provide people without a musical background to experience the joy of being involved in the music creation. The primary target groups in the project were children and persons with intellectual disabilities. Keeping the needs of the prospective end users in mind we aimed to create a tool that gives people without musical training a possibility to experience the joy of making music collaboratively. In our prototype we used Wii controllers [11] (in a guitar) and Kinect [12]. The controllers are mapped to provide inputs to the music generation system, which utilizes musical fragments to create the music. In addition, a variety of parameters can be used to adjust the music and specify how the music is influenced by user actions.

4. METHODS

For developing the music creation system we took an artistic research approach. The process culminated in an informal testing event in which the developed technologies were demonstrated in a technology exhibition context. During the project four collaborative design workshops were arranged for planning the project for gaining insight to users' needs expectations and hopes towards the system. However, for the sake of space the description of these workshops are left out of the scope of this paper. However, we plan to document the other workshops in our future papers.

4.1 Artistic Research Approach

Artistic research practice was chosen for designing the proof-of-concept system. Traditionally artistic research has been acknowledged as a process in which an artist is audience of her own work in progress, and they monitor their ongoing work, to establish whether, to what extent, and how they are managing to achieve original sense [4].

According to Eldridge artistic research approach within context of contemporary art differs in a way that an artist, while shaping of to-be artifact highlights the open-ended, explorative, satisfaction-seeking quality of the work [4]. Therefore, we find this way of thinking similar to our way of working. For example in our case study we set us a goal to design and develop an open-ended musical instrument that would remain open for users' interpretations. Also, the process itself did not aim at any purposeful result, but the resulting artifact may find its place in the real world beyond what is thought in advance. That is, the developed system would be feasible for our end-user groups of this study, but could also be utilized in other performance driven contexts. For example for creating interaction metaphors we experimented with various mapping strategies between gestures and produced sounds.

4.2 Tools

For developing the musical instrument we used three technologies. The Kinect tracking software developed by Delicode was used for detecting OSC signals to Max/MSP which in turn send midi data to Ableton Live sequencer for producing sounds. In similar vein, Nintendo Wii Remotes and Guitar Hero controllers were also used for our physical

controller framework and their interactions were manipulated via Max/MSP.

4.3 Informal Evaluation

This installation was tested in the ITEA/Artemis Co-summit in October 2011. Circa 20 persons tested the music creation environment in this two-day event, which was arranged in last week of October 2011. The system was tested with technological experts visiting the exhibition. First the concept was discussed briefly and participants were encouraged to experiment with the system. Afterwards researchers conducted a survey. In the interview participants were asked to describe their insights regarding the experience and acceptance towards the system. In all 9 people were interviewed, 7 males, 2 females, aged 21-60.

5. FINDINGS

The used artistic research approach was chosen in the spirit of challenging the traditional software development process for making possible the handling of metaphors, style and expression. In the following sub-sections we represent the research outcomes by taking a look through Danto's framework of aesthetic experience.

5.1 Metaphors

Cultural cues steer our design decisions, and thus affect users, the underlying reveals many possibilities regarding how the designer can create new regularities for interaction mappings. Lakoff and Johnson give an account of orientation metaphors and bring to light how metaphors are embodied bound [6]. Orientation metaphors give a concept of spatial orientation. For example, we might say high pitch is up. In line with Lakoff and Johnson, the fact that the concept high pitch is oriented up leads to English expressions like "I am feeling up". Metaphors ground on the bodily and/or sensomotoric experiences, because we find our place in the world through our bodies [6].

The basic issue of the interaction is that the melodic element is altered with right hand and rhythmic element is changed with left hand. In tables 1 and 2 are described interaction gestures, feedback of the system and intended metaphorical element.

Table 1. Interaction metaphors, right hand

Hand/device	Interaction	Feedback	Metaphor
Right	Up-down	Pitch	Uplifting-Depress
Right	Left-right	Time values	Narrow-Wide

Y-axis hand movement was divided in eight phases covering two-octaves. For example, when the user moves the hand up the pitch goes higher vis-à-vis the tone is low at the bottom. X-axis hand movement alters time value of the melody. That is, the user can change density of the rhythm as follows.

- Palm near to center of the body (1/8 notes)
- Palm between center of the body and extreme width (1/12 (triple eight) notes)
- Palm near to extreme width (1/16 notes)

Table 2. Interaction metaphors, left hand

Hand/device	Interaction	Feedback	Metaphor
Left	Up-down	Pulse	Rapid-Calm
Left	Speed	Dynamics	Exited-Easeful

The placement of the palm correlates to probability of the triggered rhythmic elements. When the arm is aligned at the extreme height position the rhythm is static and all the triggered notes are present; that is the user perceives rhythm density fast.

When the hand palm is placed at the lowest position, which is near center of the body, the probability of the triggered notes is minimum. As a result, the rhythm is rare/slow. Left hand included also mapping between dynamics (speed) of the hand and loudness of the triggered sounds.

5.2 Style

Our attempt was to design the system by relying on our acquired taste when designing iteratively the system. Melchionne identifies acquired taste as a form of intentional belief acquisition or adaptive preference formation, distinguishing it from ordinary or discovered taste [7]. Aesthetic perception helps us to find our place in the world through our bodies and making judgments about artistic works. The design process was bidirectional as the content changed the technology requirements and produced technologies revealed new potentials in terms of produced outcomes.

The developed system, with set of rules, enable enough interaction layers to explore and, thus allows the user to build distinctive, and therefore recognizable way in which an act is performed. For example, the user may change the way they play music, add more sounds and change their proportions and perspective as well as shape sound textures. The users also may establish a certain set of rules regarding they wish to reproduce their music piece again, thus the interaction is not rigid in one style.

5.3 Expression

From the expression point of view, the design decisions or tools should not be too fixed. In line with Redström we try to expand the expressiveness of the interface by creating several layers of interaction [9]. In other words, by adding different layers of meaning in such a way that, for example, performing a certain action might mean several different things.

Regarding to our system, the user is able to explore between musical elements by making gestures through mapped interaction layers. For example, the user is able to alter probability of the triggered notes and their timing by moving the left hand across x and y axis of the interaction space. As a result the user is able to explore within interaction layers and sounds and the materials continue to be available for new meaning making.

5.4 Informal Evaluation

During the session we found out that many times rational thinking hindered putting one's soul into music making character. That is, moving hands and torso unconventionally is not experienced every day, thus it was observed that some of the users felt too embarrassed to try the demo. Many of the by-passers mentioned that expression or music making is not their thing and rather experienced the system by witnessing others playing the system. However, when encouraging some, they were able to find enough curiosity to test the system. From the aesthetic interaction point of view we found out that the users first tested the interaction layers one by one and gradually build the experience by exploring with more complex musical unities. The participants perceived interacting with the system as music making process. This was our number one aim when designing the system. In the surveys the users stated that the music making process was fun and engaging simply by the fact it allowed them to make meaningful music without an effort and still feeling they are in control nonetheless what actions they made. The discussions also helped us to bring the concept to a new level. Many of the users expressed needs for

additional instruments, sounds, music genres and interaction styles. According to users, in this way the system could be personalized to meet the specific needs required in DJing, playing music-based games and establishing a pop-up band with friends.

6. DISCUSSION

Musical instruments are often cited as examples of great interaction design. By using the traditional instruments one is able to play almost anything. In order to provide such a variety of sounds system we will need to develop means to achieve such versatility. Our idea is to increase control of the small details as well as managing larger and more complex wholeness. By adding adaptive elements to the system, we are able to provide ways for adjusting and personalizing the system with changing levels of difficulty, pace and movement. However, regarding the current technological constraints, tracking fine details with Kinect is not available yet. In the future this will change and therefore the creative developer is able to think in advance how to harmonize intended gestures, bodily movements and produced sounds.

7. CONCLUSION

The final version of the music creation environment finds its application as interactive music installation that could be used by children or passers-by to experiment with interactive music. It includes a Kinect interface to allow the music to be controlled by the gestures and movements of the performer. The tool provides support to create interactive music experiences with a minimum effort from the performer while allowing for versatile interaction modes to be integrated to the system. This installation was tested in the ITEA/Artemis Co-summit. The artistic research approach employed was used in the spirit of challenging the traditional software development process for making possible the handling of metaphors, style and expression. For creating interaction metaphors we experimented with various mapping strategies between gestures and produced sounds. The proof-of-concept instrument is both functional and aesthetically pleasing interactive music instrument. We tested the system with technological experts and found out that our system provides people without a musical background, to experience the joy of being involved in the music creation. The musical output is pleasant, avoiding “mistakes”, and a variety of parameters can be used to adjust the music and specify how the music is influenced by user actions. Finally by taking a look at developed technologies through Danto’s framework of aesthetic experience we gained understanding how materials build form through the logic underpinning expression, style and rhetoric. Even if aesthetics could be codified, they still require talent and skill to implement them; the talent must be innate and the skill must be taught or otherwise acquired. Any skilled practitioner also needs to know how and when it is appropriate to break the

rules. When developing interactive systems for aesthetic experience the developer may seek to realize engagement. Engagement is not about making things easy, it is about making things that can be experienced at many levels of skill and enjoyment.

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